Developing professional teacher researchers: Transforming language learning through discourse analysis

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THESIS

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To my parents—Taylor and Lois Troiano

To my husband, Chris – your love pushed me each day

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SUMMARY

I conducted a two-year case study of a cohort of two middle school mainstream teachers, one a mathematics and science teacher and the other a language arts teacher, and one elementary teacher involved in the LSciMAct (*Transforming Literacy, Math and Science Through Participatory Action Research*) professional development project. The teachers and I conducted action research using videotaped classroom practices to discuss classroom discourse. Using a sociocultural/CHAT theoretical framework, I drew on literacy, discourse analysis, and professional development research. In examining how teachers used discourse analysis as a tool for conducting action research, I used ethnographic methods and an iterative process of recording study group meetings, classroom observations, and focus groups. In addition, I collected written participant artifacts, such as teachers' fieldnotes, coding, and transcripts of classroom interactions. Teachers used discourse analysis as a mediational tool to study their classroom data. The goal of the activity system was for teachers to use these tools to study their practices and design curriculum integrating literacy, math, and science. One finding was that the teachers developed the majority of their awareness(s) using the transcripts and other analytic tools outside of the elementary/middle school context. Thus, conducting long-term PD required fostering what I named *ethnographic relationships,* or relationships that considered and honored diverging and converging researcher and participant perspectives, experiences, and goals. Another finding was that the teachers redeveloped the analytical tools to transform their practices. One of the most challenging concepts in the PD was *third space*. In order to move beyond the tension they experienced, the teachers attempted to work in a negotiated space, or third space, where the expertise of students and teacher were fluid and informed one another. Thus, a third finding was that instructional moment-to-moment third spaces in class and the way activities were designed

needed to work together to inform authentic curriculum development. The significance of this study is, first, it positioned teachers through collaborative professional development to take up a theoretical framework and develop curriculum and pedagogical practices and, second, it allowed them to analyze their efforts using the same framework as a tool for continued professional development.

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Introduction

I conducted a research study on the use of discourse analysis as a professional development tool in preparing mainstream middle school math and science classroom teachers to address the language and content learning of language minority (LM) students, particularly those who are English learners (ELs)[1]. Within the literature and my own experiences with professional development activities (PD) and program, I found gaps in efforts to prepare teachers to work with ELs. A critical issue within PD is the perspective of ELs as linguistic deficient in comparison with native English-speaking peers. Often the goal of PD for teachers working with ELs is to help them bridge the "language gap" so that they become English proficient in an expedited time period. The PD is delivered often hierarchically, with individuals (i.e., university researchers, department leaders, etc.) who as the exclusive experts transmit knowledge to teachers. To further complicate matters, there is little opportunity for teachers to practice, receive feedback, or participate in follow up PD activities.

I first became interested in the issue of mainstream classroom teachers working with ELs when I was a high school English as a second language (ESL) and bilingual lead teacher in a large urban Midwestern school district. In this district, almost 12% or about 56,000 of the students are classified as ELs, meaning they receive some form of bilingual education services (District, 2012). This number does not account for the thousands of former EL students or language minority students who have exited bilingual programs after the state mandated three-year limit and who were and still are struggling to learn academic English (Gutiérrez, 1995). These students often have content area courses taught by regular, mainstream classroom teachers. And many of these students, the ones in bilingual programs and the ones who exited,

[1] The term English learner (EL) refers to students who receive English as a second language (ESL) instruction. The term language minority (LM) refers to students whose native language is not the dominant language of the larger society.

struggle with both learning the English language and learning content, and thus are in need of teachers with expertise in both second language learning and interaction and content knowledge and pedagogy. Unfortunately, this need is not being met.

We can add to this need, the following numbers. Students whose first language is not English are the fastest growing segment of the U.S. school-age population (Gándara, 2010). By 2015, 30 percent of this population will be ELs (Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006). Efforts to meet the needs of these students can be measured in part by the dropout rate of Latina/os in this district's high schools, which was 57% in 2000 (Designs for Change, 2007). Native Spanish-speaking students account for nearly 38% of the student population and about 85% of students receiving bilingual/ESL services.

There are, however, over 110 languages represented in the district's schools, with large influxes of refugee students over the past five years. Across the nation, similar dropout trends are evident. Nationally, the dropout for ELs is 31%, twenty-one percentage points higher than the rate for those adolescents whose first language is English (Short & Fitzsimmons, 2007). Those ELs who reported on the 2000 census as having difficulty speaking English had an 82% dropout rate (U.S. Census Report, 2005).

Research suggests that for ELs entering secondary schools, low literacy development matched by poor literacy instruction correlates with high dropout rates. Second language researchers (Cummins, 1981; Thomas & Collier, 2002) maintain that it can take up to seven years or more to acquire the academic language needed to succeed in school. Thus, it is no wonder that EL students and students who are no longer formally designated as ELs continue to struggle with academic texts and learning English years after exiting ESL/bilingual programs. To address these students' academic and language needs so that the trends described above are

reversed begins with preparing elementary and middle school teachers to meet these students' needs.

Pilot Study

Findings generated from a pilot study conducted in the spring of 2008 as part of the LSciMAct (*Transforming Literacy, Math and Science Through Participatory Action Research*) Program[2] have contributed to my growing understanding of teacher needs and professional development opportunities and have informed the research questions of the study that follows in significant ways. In the pilot study, I documented three elementary and middle school teachers' participation in an action research graduate-level course and how that experience informed their development and implementation of curriculum, including their understanding of student learning. I worked with these same three teachers—Cara, Eva, and Susan—in the year-long study described in the following chapters. They teach second, sixth, and combined seventh and eighth grades, respectively, in an urban, public K-8 school. Given the action research model adopted for teacher development as well as the sociocultural perspective that informed the design and analysis, the pilot study lent itself to qualitative and ethnographic methods. As such, I videotaped classroom observations, conducted a focus group, and collected artifacts, all methods I also used in this study.

The action research course was designed so that teachers could begin integrating language, literacy, and culture with critical content areas of mathematics and science. It was premised on the understanding that many of the difficulties experienced by ELs in the content areas like mathematics and science are, in part, explained by educators' prevailing view that

[2] The participating teachers are supported by *Transforming Literacy, Science, and Math through Action Research (LSciMAct)*, a teacher training grant supported by the Department of Education's Office of English Language Acquisition (T195N070301) focused on improving instruction for English Language Learners. The findings and opinions expressed here are those of the author(s) and do not necessarily reflect the views of the funding agency.

mathematics and science learning are independent of linguistic and cultural factors (Nasir, Hand & Taylor, 2008). By using an action research model of teacher inquiry, the course prepared teachers to critically engage these issues and develop a situated, collaborative, and transformative action plan that was anchored in sociocultural views of learning. All the components of the course were geared toward helping teachers learn to conduct discourse analysis to inform their practice.

LSciMAct Project Team members and the teachers with whom we worked adopted a cultural-historical activity theory (CHAT) framework (Engeström, Miettinen, & Punamäki, 1999; Wertsch, 1991; Cole, 1996; Vygotsky, 1986) of learning and development, thus allowing for both a questioning of the structural determinations of current educational practices and a way to analyze data in classrooms. Engeström's (1999) "activity triangle" was used as a heuristic to develop activities and analyze an activity system (Appendix A2). The activity theory framework was an essential component of the course instruction and was used by teachers in their development of curriculum units integrating math, science, and literacy.

Another essential component of the course was developing teachers' understanding of discourse and how to conduct discourse analyses. The coursework drew on Vygotsky's research and theories to emphasize the importance of discursive practices in the classroom (Hicks, 1995/1996; National Council of Teachers of Mathematics, 1989, 2000). Teachers used a coding protocol (Appendix A3) that started out with the following categories to analyze the discourse of their classrooms: *mediational tools, assistance, funds of knowledge, multiple languages/Discourses, discourse features, questions, points of tension, third spaces, shifts in participation,* and *role shifts*. They transcribed two 1-minute video clips of classroom interactions and analyzed them for emergent themes from the coding protocol. In the one-year

action research study described in the following chapters, the teachers continued to use the coding protocol to critically analyze their classroom interactions.

Findings from teachers' piloting. The artifacts collected, along with the focus group, demonstrated that teachers began to appropriate the language of cultural historical activity theory (CHAT) and Third Space theory (e.g., assistance, funds of knowledge, discourse, role shift) in their talk about classroom practices. In their analyses of classroom interaction, the teachers demonstrated connecting theory and practice by explaining how an activity system worked in their classrooms with respect to math, science, and literacy. By analyzing their discourse, they critically examined missed opportunities for expansion and became aware of a need to allow students to expand their ideas in order to develop student knowledge in math and science. Teachers also became more conscious about how they engaged students. For example, by examining how role shifts occurred in the discourse, teachers talked about how to create more opportunities for students to be positioned as experts. This was coupled with teachers' ideas that making more connections to students' funds of knowledge and expanding on third space opportunities would help create third spaces. Most significant, however, teachers became aware of their authoritative discourse. This allowed them to reflect in new ways to design student-centered curriculum, while being mindful of state standards and other authoritative voices in the classroom. In other words, teachers developed a meta-awareness of their positioning in the classroom and how students respond that was not evidenced in coursework and discussions from the early part of the graduate course.

Research Question(s)

With the conclusion of the action research course, the teachers understood the role teacher research could play in their professional development and had an initial understanding of

how to analyze their classroom discourse using a protocol and videotaped segments of their teaching. As practicing teachers, their professional development foregrounded a new framework for discourse analysis and gave them practice in using it through the video and transcripts analyses. The research, and the professional development described in the following chapters, will look at how the teachers became aware of the stances they were taking. Thus, extending on the research described above, in this dissertation I answer the following major question: How do mainstream classroom teachers working with language minority students use discourse analysis as a tool to examine their teaching and students' learning in the content areas of math, science and language arts? Related to this larger question, I answer the following secondary questions:

1.) How does discourse analysis inform mainstream classroom teachers' understanding of ELs and the development of curriculum to meet these students' needs?
2.) And how does reflection on classroom practice using discourse analysis inform teachers' pedagogical practice?

The following chapters present my theoretical framework and the literature that informs my practice. It is important to note that the same framework that informed the teachers' action research informed my research of the teachers' participation in LSciMAct and the year-long action research project. I discuss the framework and the literature that informs my work in the next two chapters. In chapters 5, 6, and 7, I present the findings of my research, and Chapter 8 discusses the relationship of findings to one another and limitations and implications of this research.

Theoretical Framework(s)

Preparing teachers to become linguistically and culturally responsive educators is a current issue in teacher preparation (Cochran-Smith & Zeichner, 2005; Darling-Hammond & Bransford, 2005). However, there is a dearth of research on the preparation of mainstream classroom teachers to teach English learners (ELs), especially in the content areas of language arts, mathematics and science. In this chapter, I present the theoretical framework that informs both the professional development in which the teachers participated and the data collection and analysis methods I used. The first subsection reviews research on the application of Bakhtin's and Vygotsky's sociocultural theory to second language acquisition. Using this as a context, I then set out the theoretical framework that will inform my work.

Second Language Learning and Context: Sociocultural Theory

In the last ten years, some second language acquisition researchers have begun to draw on Bakhtinian sociocultural theory to explain individual language variation (Tarone, 2007). Among other topics, Bakhtin (1929/1984) wrote about language users' internalization of what he called different voices, or speaking styles. Drawing on Bakhtin, researchers have posited that language learning is as much an effort at identity development as it is at learning a vocabulary and grammar of a language. The nature of the learning—the context in which it takes place and the type of interactions around it—influence not only how the language is learned but also the meaning and relevance of that language to the learner. Through the use of language, a speaker is positioning herself as a particular type of person.

Bakhtin, however, was not concerned with language learning and teaching *per se*. His desire was to explain how language works, and proffered no theory of learning. However, coming out of the same Marxist tradition that evolved into cultural historical and sociocultural

theory, Vygotsky focused on the learning process. He, probably better than anyone before him or since, captured best the significance of the learner's relationship with, in his writing, a significant other, or mentor, nurturer, or teacher. He referred to the learner's cognitive or mental development as the intrapersonal plane. The interaction between the learner and others took place on the interpersonal plane. To explain the relation between the interpersonal and the intrapersonal planes, Vygotsky developed the concept of the *zone of proximal development* (ZPD), which he defined as "the distance between the actual developmental level as determined by independent problem solving and the level of the potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, 86). Thus, he distinguished between two crucial levels of development: actual and potential.

Actual development represents children's ability to perform mental activities without help from a more capable peer or mentor. This independence indicates that the functions associated with the independently performed activities have been stabilized within the learner; no intervention from another person is necessary. The potential level of development indicates that certain mental functions have not been stabilized; therefore, some assistance from a more capable peer or mentor is required. Vygotsky was more interested in the individual's potential level of development than his actual, particularly in relation to the role that social interaction, and its mediation by signs and symbols, plays in moving a learner from the potential level to the actual level. He posited that with the assistance of mediational means, or "sign operations," the external interactions conducted in a variety of social contexts, or on the intrapersonal plane, are appropriated and become inner speech, or speech for oneself. Thus, the learner moves to the intrapersonal plane or is internalized by the learner.

For Vygotsky, and the theorists and researchers he has influenced, learning is a social process contingent on the nature of interaction between the learner and others. Important in this interaction is how the learning is mediated or scaffolded by signs and symbols. Related to this are what these signs and symbols mean to the learner and how the more knowledgeable other can draw on this already existing meaning to foster new meaning. This process is similar to Bakhtin's idea of double voicing, whereby a learner internalizes the voices of others, and the voices often carry authority.

Sociocultural Theory and Education

Those theorists and researches who have followed Vygotsky have continued to inform and extend on his work. For example, Donato (1998) challenged the traditional second language acquisition roles of input, interaction, and negotiation by addressing the role of collective scaffolding in the acquisition of French as a second language (Johnson, 2004). Contrary to the accepted view of scaffolded help, in which help is provided by a more capable other, the findings of Donato's study revealed that learners at the same level of second language proficiency were capable of providing guided support to one another. Collective scaffolding created by all participants brought about developmental changes in participants' own second language knowledge. That is, Donato illustrated how the construction of knowledge resulted in a major linguistic change among and within the individual learners, which was not individual but social in nature. Other researchers who examined assistance (Aljaafreh & Lantolf, 1994; Ohta, 2000), found results that concurred with Vygosky's conceptualization of the zone of proximal development that learning cannot occur if too much assistance is provided or if a problem-solving task is too easy. The interaction needs to be marked by enough challenge that a learner cannot do it on his own but can do it with the help of the other. As such, Swain (2000) and van

Lier (2000) stressed the importance of collaborative dialogues as social and cognitive tools for knowledge building and second language development. Such dialogue pushes learners to think in ways they may not have considered by also providing them opportunities to clarify their thoughts and share what they know with others.

Vygotsky's work and the work that built on it suggest the importance of teachers' understanding of the role of context and social interaction in teaching and learning. Significant, too, in developing this understanding is the importance of student interaction among themselves. While none of this work dismisses or even minimizes the importance of the cognitive or mental planes of learning, it highlights how it is we come to know. For example in 1997, Firth and Wagner called for a reconceptualization of second language acquisition theory, methodology, research, and foci. In doing so, they placed a greater emphasis on social and contextual orientations claiming that "mainstream SLA theory and research skewed our view of language users and learners, seeing them only as nonnative speakers and ignoring other social identities (e.g., mothers, friends, employees) engaged in using and learning an L2" (p.759). Since Firth and Wagner made their claim, there has been a notable increase in second language acquisition research and theory that prioritize sociocultural and contextual factors in addition to acknowledging individual agency and multifaceted identities. For example, Johnson (2004) advocated a "dialogically-based approach," inspired by Vygotsky's sociocultural theory and Bakhtin's "dialogized heteroglossia," to replace what she viewed as a prevailing "cognitive bias" in the field.

Building on this evolving understanding of second language understanding, Sullivan (2000) stated that teachers should examine the sociocultural context to which individuals have been exposed in the course of their lives. In a review of sociolinguistic approaches to second

language acquisition, Tarone (2007) examined the relationship between social context and second language use and acquisition, demonstrating that learners' second language (L2) input and processing of L2 input in social settings are socially mediated. The research showed that social and linguistic context affect linguistic use, choice, and development, and that learners, as Bakhtin suggested, intentionally assert social identities through their L2 in communicating in social contexts.

Sociocultural theory and teaching ELs. From a Vygotskian point of view, the process of learning any concept is a process of mediating between the subject or learner and the object of knowledge or content (Lerman, 2002). This process is often framed as teaching within a student's zone of proximal development. Thus, as implied earlier, learning is a social process of moving a learner from his/her initial conceptualization or understanding (often experiential) of how something works to a scientific (taxonomical, categorical, theoretical, etc.) understanding (Vygotsky, 1986). Taking a sociocultural approach to education means viewing learning in these content areas as social activities conducted within institutional and cultural frameworks that inform the learners, the educators, and the context (Lemke, 2001).

A sociocultural perspective challenges the traditional conceptual change approach of education that views education as opportunities for students to change their 'everyday' understandings of science on the basis of good evidence and valid argumentation (Calabrese-Barton & Tan, 2009). Key areas of interest in sociocultural research include classroom discourse, language and literacy, issues of diversity and difference, and cultural influences. A sociocultural approach identifies learning as a process of activating and building on prior experience and soliciting students in practice and reflection as an effort to move their zone of proximal development. A sociocultural model is grounded in students interacting with teachers

and other students, realizing, however, that each interaction is representative of communities characterized, in part, by their belief systems. Thus, sociocultural research focuses on how new discourses, values, and practices arise and spread in social networks like classrooms and, in the case of this study, in teacher researcher study groups, and also asks how beliefs function in society as a whole, and what their economic and political implications are (Lemke, 2001).

In foregrounding language in relation to how students learn, a sociocultural perspective complicates more traditional perspectives that assume content such as math and science to be independent of language and culture. It also challenges how teachers perceive bilingual students learning of mathematics [and science] and expands what counts as competence in communicating mathematically [and scientifically] (Moschkovich, 1999a; 1999b; 2002; Gutiérrez, 2002). Likewise, this perspective foregrounds the nature of pedagogic discourse and the role it plays in students learning mathematics [and science] discourse (Khisty & Chval, 2002). A sociocultural perspective on learning can help shift the focus of mathematics and science instruction for English learners from one of language learning to mathematical and scientific Discourse development (Gee, 1996, 2011). As a framework for reviewing research literature of teacher beliefs about ELs and their subsequent instructional practices, sociocultural theory offers a lens for examining how those beliefs lead to practices that apprentice ELs not only into the Discourse of science and math but also into English language use.

It is this lens and the underlying theories that inform it that guided the curriculum development and implementation, and thus the professional development that is part of my study. The three teachers were immersed into this theory and developed curriculum based on it (see methodology section for more details). Following from this experience, they were asked to consider the nature of their interaction with students. They used a coding protocol (Razfar &

Rumenapp, 2011) to analyze the discourse of the classroom, whether that was teacher-student discourse or small group student discourse. Through ongoing discussion and reflection of the data they collected, the teachers assessed past practices and planned future practices. The teachers were brought into their understanding of this theory through an examination of and immersion into the practice that evolved from third space theory and the role of action research in teacher professional development.

Third Space Theory

Gutiérrez, Rymes, and Larson (1995) studied the tension that can arise between the teacher and students in terms of sociocultural discourse or classroom "scripts" that get taken up and reflect the reproduction of broader sociopolitical dimensions around race, culture, and ethnicity within local classroom activity. Using discourse analysis in their research on urban students in the Los Angeles area, Gutiérrez et al. (1995) identified two types of talk in a high school history classroom: a dominant monologic *teacher script* and *student script*. Since there was not a valued role for students within the teacher script, students formed their own *counterscript*, a student script in which they asserted varied expertise in the form of local knowledge such as cultural references to popular music, film and television. For example, as Gutiérrez et al. (1995) reported, although their counterscript attempted to incorporate the teacher's script, students own cultural perspectives about the Supreme Court Case of *Brown v. Board of Education* differed from that of the teacher. Gutiérrez et al. (1995) argued that this tension could only be resolved when students and teachers attempt to move beyond given scripts towards a hybrid discourse structure or toward a "third space." They coined the term "third space" to describe "where teacher and student scripts – the formal and informal, the official and unofficial spaces of the learning environment – intersect, creating the potential for authentic

interaction" (Gutiérrez, 2008, p. 152). As such, the intersection of competing discourses and epistemologies creates opportunities for students to elaborate on and incorporate their own expertise and narratives into the larger classroom context.

Teachers' efforts to create third spaces often fail because students and teacher retreat to more comfortable and predictable Initiation-Response-Evaluation (IRE) scripts and because students and teachers lack experience negotiating the learning context. Student participation needs to be based on authentic competence and joint activity (Gutiérrez, Baquedano-López, Alvarez, & Chiu, 1999), rather than on traditional school criteria. In a dialogic classroom (Christoph & Nystrand, 2001), what counts as knowledge is a matter of negotiation among learners and teacher (Baquedano-Lopez, Solis, & Kattan, 2005). Baynham (2006) uses the term "creative discourse agency" to refer both to the ways students make and take their place in the classroom and the ways the teacher contingently and responsively opens up spaces for dialogue. When these ways are successful, traditional teacher controlled IRE talk structure (Cazden, 2001) is disrupted. Participants interact and inform one another, creating a learning context premised on dialogue. In such a classroom, power is distributed across participants as out-of-school life-worlds and in-school academic discourses co-mingle to create hybrid discourses.

Teachers need to actively work to develop third spaces by engaging students in reading and writing activities that allow them to draw upon their different funds of knowledge. Moje et al., (2004) noted that teachers and curriculum developers need to develop deep understandings of students' funds of knowledge and Discourses, such as family, community, peer groups, and popular culture, in order to facilitate third space development. Fitts (2009) drew on Moje et al.'s definition of third space as a "navigational space" in examining the ways that 5th graders and their teachers constructed third spaces in bilingual and bicultural communities of practice in a

dual-language school. Students and teachers used students' funds of knowledge to connect with and transform academic tasks and discourses and to create third spaces. Although the fifth-grade teachers made efforts to utilize students' funds of knowledge to inform curricula, the majority of these instances fell into the categories of using third spaces as bridges or as navigational spaces, while the official, school-based discourse structures, texts, ways of knowing, and communicating were consistently privileged.

Gutiérrez et al. (1999), identify third space as a hybrid space, where Discourses intermingle to scaffold or support student experience with a new Discourse. Third space, thus, can be viewed as a navigational space or as a way of crossing and succeeding in different discourse communities, especially at the secondary level as students confront specialized texts across content areas (Lemke, 2001; Moje, Collazo, Carrilo, & Marx, 2001; New London Group, 1996). It can also be viewed as a space of cultural, social, and epistemological change in which competing knowledge and Discourse are brought into "conversation" with one another to challenge and reshape both academic content literacy practices and the everyday epistemologies of the Discourses of learners' everyday lives (Barton, 2001; Lee, 2005; Moje et al., 2001; Moll & Greenberg, 1990). Thus, sound curriculum development and implementation with a recognition of the particular funds of knowledge (Moll & Greenberg, 1990) and Discourses (Gee, 1996), such as family, community, peer groups and popular culture, that students have available outside of school are essential to creating third spaces. The curriculum needs to be viewed as part of the larger context, helping to position students and teachers in collaborative relationships.

While teachers' use of student experience and language appears to have the potential to transform students' conceptualization of content and their understanding of themselves as learners, interaction among students has also been identified as essential to implementing a

sociocultural theory of learning or, in pedagogical terms, a third space in the classroom. For example, Bicais and Correia (2008) examined the ways in which English learners claimed their home and peer cultures in the classroom's unofficial space in order to create meaningful written texts. In their study, they found that within peer-learning spaces for writing, children asked for clarification, information, and task content, and this interaction helped them to produce written artifacts. Peer-learning spaces allowed teachers to encourage dialogue that weaves multiple home resources into school discourses. This qualitative study suggests the need to plan peer-learning spaces for children to interact in during writing, which foster and advance their understanding of classroom writing practices. The authors found that ELs interact in *peer-learning spaces* or in the learning-oriented talk that they have with one other differently than they do in interactions led by the teacher. In peer-learning spaces, children have the opportunity to change the discourse pattern and create new knowledge as they engage one another. During peer interactions, children take on various roles, and create a context that combines the home, school, and peer cultures. In the peer-learning spaces, ELs are not constrained by the evaluation of the teacher, allowing them to continue the conversation. In these unofficial spaces, children use language to extend their officially sanctioned student role of responding to a teacher-initiated discourse pattern. Children are able to break free from previously assigned roles and assume different stances with their peers (e.g., clarifying and questioning) in ways that show their knowledge and reflect their complex lives. Children create learning spaces and transform the IRE into a dialogic exchange.

Moje et al. (2004) attempted to understand better the funds of knowledge (Moll & Greenberg, 1990) and Discourses that students draw on to make sense of classroom science texts in order to create a third space. Fostering this type of interaction is necessary to apprentice

students in the discourses of language arts, math and science (Gutiérrez, 2002; Khisty & Chval, 2002; Moje et al., 2004). Although Hogan and Corey (2001) pointed out the need to draw teachers' and researchers' attention to the nature of the composite culture that shapes students' experience of science, they did not consider students' funds of knowledge in and out of school as an essential component of this culture. Instead, they focused on transmitting their own beliefs about science. Thus, instead of using the uncomfortable tension they experienced as a medium for scaffolding students' learning in science, they concluded more time is necessary to judge the impact of their work.

Moje and colleagues concluded that drawing on students' repertoire of knowledge requires that students and teachers engage both conventional science funds of knowledge and everyday funds of knowledge in order to make reasoned and data-based evaluations of the knowledge and Discourses that produce the texts they read and write. However, students did not routinely offer publicly or relate these experiences to texts in science classroom inquiry. These data suggested that one way to develop third spaces between academic science knowledge and students' funds of knowledge is to examine discursive strategies that the knowledge do and do not share. For example, teachers can develop third spaces by engaging students in experiments, discussions, and reading and writing activities that focus on bridging texts and experiences of students. Key to these efforts is the nature of discourse in the classroom. How teachers engage their students *and* how they allow them to draw on existing language skills and funds of knowledge determine the degree to which their experiences and funds of knowledge will help define the learning context.

Classroom Discourse

Hicks (1995/1996) noted that studies that focus on discursive practices of students constructing language arts, science and math in schools follow the call from the research community to bring discourse analysis to the study of pedagogical practices. Drawing on Vygotsky's research and theories, many scholars during the past few decades have advocated for greater emphasis on discursive practice in the classroom (National Council of Teachers of Mathematics, 1989, 2000). For example, reforms in mathematics education have placed communication at the heart of the learning process (NCTM, 1989, 2000). The National Research Council (1996) recommends providing opportunities for students to respond to questions and challenges from their community regarding their scientific knowledge.

Lemke (1990) found that teachers' discourse invoked the authority of science and thus constructed a particular relationship between the students and scientific knowledge (that knowledge of science is available only to the most intellectually elite). In a dialogic classroom (Christoph & Nystrand, 2001) what counts as knowledge is a matter of negotiation among learners and teacher (Baquedano-Lopez, et al., 2005). Here, the traditional teacher-controlled Initiation-Response-Evaluation (IRE) talk structure (Cazden, 2001) is disrupted by allowing participants to interact and inform one another to create a learning context premised on dialogue. In such a classroom, power is distributed across participants as out-of-school life-worlds and in-school academic discourses co-mingle to create hybrid discourses. In contrast, the following studies move from the focus on teacher talk in presentations of content to a focus on student discourse as they are engaged in the practices of school across multiple settings.

Khisty (1995) examined how teachers explained mathematics in classrooms with Latina/o students. She noted that the material presented was "decontextualized," meaning that little

information such as visuals was provided; as a result, students had to follow information orally and deduce what was being discussed or referred to. According to Canadian linguist James Cummins (1984):

> A major aim of schooling is to develop students' ability to manipulate and interpret cognitively-demanding context-reduced text. The more initial reading and writing instruction can be embedded in a meaningful communicative context (i.e., related to the child's experience), the more successful it is likely to be. The principle holds for second-language instruction. (136)

In a later study, Khisty and Chval (2002) found not all teachers clarified mathematical terminology in ways helpful for bilingual students. Most classrooms were dominated by IRE; however, one classroom used teacher-student talk to build an understanding of math concepts. Hiebert and Wearne (1993) examined the impact of changes in discourse on students' learning of mathematical concepts like place value. Collaborative teams of teachers and researchers (Bill, Leer, Reams, & Resnick, 1992) and mathematics educators, who are both researchers and classroom teachers (Ball, 1991, 1993; Lampert, 1990), explored the forms of reasoning and community building that occur when teachers and students engage in new forms of mathematical discourse. Hudicourt-Barnes (2003), a former teacher researcher, demonstrated how teachers used discourse practices common in Haiti to leverage scientific argumentation in Haitian-speaking classrooms. Crawford (2005) found a direct correlation with the way teachers talk about, present, and invite students into discussion and teachers' expertise in the content area. The analysis speaks to the need for pedagogical practice that offers students opportunities to use multiple modes of discourse to display their knowledge. A central theme that has emerged from this work involves the changes in how knowledge is co-constructed when mathematics and

science are contextualized in terms of students' funds of knowledge as opposed to being taught as a set of procedures (Wells, 2000).

Researchers have shown, too, that math and science teachers need to use classroom talk (Cazden, 2001) and mathematical or scientific inquiry to draw on students' funds of knowledge. The studies in this section highlight the importance of creating classroom environments that recognize and honor student experience and language as assets to content learning. The relationship between classroom practices that build on student experience and language and ultimately student academic performance needs further study. Currently, the research that is being done emphasizes the creation of classrooms based on sociocultural models of learning, such as third spaces, which includes finding ways to transform teacher beliefs and attitudes as prerequisite to transforming teacher practices.

In posing my research questions, I am interested in how the teachers not only draw on the theoretical framework set out above to develop and implement curriculum but also how they make sense of those efforts through using these theoretical constructs to analyze their classroom interactions with students. My own theoretical framework for analyzing the teachers' practices as they evolve through their analysis of classroom practices is guided by the same literature presented above and in the following chapter.

Review of Related Literature

During my five years teaching in the large Midwestern district, I had many opportunities to work with content area teachers – some resistant and some open to working with ELs and the challenges and opportunities they presented in their classrooms. Most of these teachers had no formal professional development or educational preparation for working with ELs. The few teachers with training often drew on common strategies such as use of visual aids, simplified English language, and students' native languages. They often complained, however, of a lack of resources suitable for ELs in the content areas. I draw on all my experiences as a teacher and doctoral candidate to address the dearth of research and professional development opportunities to prepare mainstream classroom content area teachers to meet the language and academic needs of ELs. The following sections provide an overview of the research that informs my understanding of (1) literacy and the teaching of content to ELs in science and math classrooms, (2) teacher beliefs about ELs and classroom instruction, and (3) professional development and action research. All these topics should be considered in preparing mainstream classroom teachers to teach ELs and have informed the design of the LSciMAct Program, the teachers' action research, and my research.

Literacy and Teaching of Content

A review of the literacy literature over the last 40 years demonstrates that the definition of literacy has evolved with the research and is still a matter of debate among scholars and practitioners. An autonomous model of literacy poses literacy as distinct and separate from the cultural and contextual representations in which they are situated (Street, 1984). As such, literacy can be objectively defined, measured, and transmitted to others. On the other hand, an ideological model of literacy calls for a fundamental reorientation of the autonomous perspective

whereby the social context of the literacy event, including the political, social, and economic conditions, is at the forefront of the study. Together, these two broad literacy constructs complicate doing research and transforming teaching in schools because the differences between them are not often made explicit, not even by people espousing one or the other model. Plus, it is still common for our assumptions about literacy to preclude any consideration of practices that are not school-like.

Some literacy scholars, notably those working from a sociocultural theoretical framework, suggest that literacy practices are defined by the context in which they are embedded (Gee, 2011; New London Group, 1996). As such, literacy is conceptualized as more than the traditional meanings of reading and writing. It is inherently bound up in the activities that are valued in that context and what it means to be a member of the community that takes up those activities. With this conceptualization, content area literacy learning, thus, requires taking up new identities as one takes up particular ways of being, or as Gee (2011) noted, Secondary Discourses. He defined a Secondary Discourse as "a way of thinking, acting, speaking, believing, interacting, and using artifacts, including reading and writing, in a particular context that allows the participant to function to some level of success in that context" (133). Literacy is the mastery of a Secondary Discourse and invariably an issue of language use with particular ways of using language valued by member of that Discourse community.

The perspective that literacy learning is a matter of taking up a Secondary Discourse, and that Discourses are best acquired through forms of apprenticeship that provide learners with opportunities to "try out" the practices and activities valued by that Discourse, suggests that pedagogically, teachers need to draw on students' already developed Discourses as resources for introducing and nurturing the development of new Discourses. By extension, the active

integration of existing Primary and Secondary Discourses with the content area discourse, or a Secondary Discourse, is essential in supporting a learner's effort to navigate the texts and literate practices of that new Secondary Discourse (Moje et al., 2004).

Within the fields of bilingual education and English language education the Primary and Secondary Discourses students bring into the classroom are often referred to as their funds of knowledge (Moll & Greenberg, 1990). Unfortunately, few teachers draw on the ideological model of literacy or even funds of knowledge in their classroom practices. Even fewer content area teachers, based on my experiences as a teacher and novice researcher, are even aware of how to address the literacy needs of these students, whether they be native English or English learners. And when literacy is not seen as the mastery of a Secondary Discourse, it is no wonder English learners struggle and often fail. These students are often placed in classrooms with teachers who are not prepared to teach basic literacy skills to any adolescent, much less to address the language and literacy needs of ELs (NCES, 2004). The lack of adequate teacher development conflicts with the fact that the relationship between literacy proficiency and academic achievement grows stronger as grade levels increase—regardless of individual student characteristics (Biancarosa & Snow, 2004). As Fradd and Lee (2004) noted, "The instructional process is complex, particularly when it involves developing language proficiency and literacy along with content knowledge" (16). Therefore, adolescent ELs need skillful content teachers knowledgeable in second language learning, literacy development, and sheltered ESL and bilingual content teaching methods (Brisk, 2006; Genesee, Lindholm-Leary, Saunders, & Christian, 2006). This knowledge goes beyond only demonstrating particularly pedagogical skills or content knowledge to include specific teacher beliefs.

Most studies considering sociocultural and pedagogical issues in mathematics and science address the nature of teacher beliefs and instructional approaches of effective classrooms or programs serving Latina/o students such as bilingual or ESL classrooms (Janzen, 2008). However, there is a dearth of research that examines how professional development might inform teacher beliefs and instruction in mainstream math, and science classrooms with ELs. Yet, the research that is available provides insight into what scholars believe to be the most effective way to teach science and mathematics to ELs. In the following sections, I present an overview of the research in preparation for giving direction to what more needs to be done.

Language and Literacy Practices in Science and Math Classrooms

Science and ELs. With the inception of NCLB English language-testing requirements, students are more frequently taught and tested in English (Gándara, 2006) although research demonstrates that students' limited proficiency in English constrains their science achievement when instruction and assessment are exclusively in English (Torres & Zeidler, 2002). Given that students need opportunities to acquire the language of science and other semiotic tools (Duran, Duran, & Weffer, 1998), a linguistic hegemony based on the use of English-only to teach and assess science places ELs in a position of potential failure (Tobin & McRobbie, 1996; Curtis & Millar, 1988).

According to the multicultural education literature, school knowledge represents the "culture of power" of the dominant society (Au, 1998; Delpit, 1988). The disjunction between students' home culture and language uses and school-based practices that preference an autonomous model of literacy and use English language as the sole medium of evaluation automatically disadvantages all nonmainstream English users, including ELs. Instead, bilingualism, Kearsey and Turner (1999) suggested, should be treated as a resource to foster

improved understanding of scientific language through interdisciplinary writing (Merino & Hammond, 2001) and inquiry-based science (Kelly & Breton, 2001; Rodriguez & Bethel, 1983). Amaral, Garrison, and Klentschy (2002) noted that inquiry-based science benefited ELs in a number of ways; it created a realistic science-learning context, allowed students to build on shared experiences and to draw on existing language ability, promoted cooperative learning and explorative learning that validated student experience, and created positive learning attitudes.

The science community has a variety of models for linking student cultural knowledge and experience with science. Lee and Fradd (1998) view school knowledge as discontinuous with Western science, and use the model of instructional congruence to address these concerns, whereas Warren, Ballenger, Ogonowski, Rosebery, and Hudicourt-Barnes (2001) use an everyday sense-making model to work with teachers to identify students' linguistic and cultural experiences that can serve as intellectual resources for science learning. Effective science instruction, from both perspectives, should enable students to cross cultural borders between the two domains (Costa, 1995; Aikenhead, 2001). Identity studies in which students appropriated epistemic and cultural behaviors of science but expressed difficulty in appropriating the discursive practice of science (Brown, 2006) demonstrated a need to place greater emphasis on the relationship between students' identity and their scientific literacy development. Calabrese-Barton and Tan (2009) built on these efforts by collaborating with teachers to study how teachers and students work to merge students' funds of knowledge with school science.

A growing body of work has investigated sociocultural questions in science, considering what the culture of science is, how it compares with the cultures that ELs bring to the classroom, and whether science instruction is taking students' backgrounds into account. The Chèche Konnen Project, conducted by Rosebery, Warren, and colleagues, examined the complex,

interactive, and complementary relationships between scientific practices and everyday sense-making of children from diverse languages and cultures (Ballenger, 1997; Rosebery, Warren, & Conant, 1992; Warren, Ballenger, Ogonowski, Rosebery, & Hudicourt-Barnes, 2001). In order to assist students in constructing new knowledge, teachers need to establish spaces in which different discourses and knowledge – from science disciplines, science classrooms, and students' lives – are brought together (Moje, et al., 2001). In addition, students need to do more than just acquire factual knowledge; they need to be enculturated into a new discourse community in which the values, such as conjecture and experimentation in science, are characteristic modes of inquiry (Rosebery et al., 1992).

Lee's (2005) synthesis of the research on science education and ELs found that students from diverse linguistic backgrounds come to school with already constructed knowledge, including home language and cultural values, acquired in their home countries. Although such knowledge serves as a framework for constructing new understandings, students' knowledge is often marginalized from participating in school science. Lee identified five key findings across studies: (1) the education system often fails to provide adequate instructional scaffolding for ELs in science classrooms; (2) when ELs are provided equitable learning opportunities, they demonstrate academic achievement; (3) effective learning environments share the principle of articulating students' linguistic and cultural experience with science disciplines, but specific approaches to achieving this goal differ from one theoretical perspective to another; (4) science instruction is often ignored with ELs because of the perceived need for ELs to develop English language proficiency; and (5) teachers need to understand the complex dynamics between scientific practices and students' everyday knowledge and must facilitate and guide students'

investigations of their own questions as they learn to speak, read, write, think, and act as members of a science learning community.

Math and ELs. Unlike science and other content areas, math, with respect to ELs, is a somewhat under-researched discipline, perhaps because of the belief that the language of math is universal and based on a number system that transcends many languages. Pimm (1987) contradicted this belief by drawing on Halliday's (1978) systemic functional linguistic approach (SFL), to demonstrate that language is not only a critical issue in math teaching but in conceptualizing mathematics as a language. Halliday refers to a 'mathematical register' as "meanings that belong to the language of mathematics (the mathematical use of natural language, that is; not mathematics itself), and that a language must express if it is used for mathematical purposes" (Halliday, 1975, 65). Thus, the mathematical register is not just technical terms, but terms borrowed from everyday English, such as *legs, product, mean, relation, power,* and *complete*. Non-mathematical meanings of terms borrowed for the mathematics register can cause confusion when they influence mathematical understanding (Lager, 2006).

A research review of the features of math language (Schleppegrell, 2007) outlined a range of challenges that math can present. These features include the use of more than one semiotic system (symbolic notation, visual displays such as graphs, written and spoken language); technical vocabulary; and grammatical features including complex noun phrases. Schleppegrell (2007) suggests that a focus on language is critical for student learning in the classroom, that both students and teachers should use math language, and that instruction should assist students to move from everyday language to the more formal register of math.

One of the challenges for ELs in learning mathematics is that it can only be acquired in school and not through conversational interaction (Ron, 1999). Teachers have helped enable

students to grasp mathematical language by demonstrating how word problems can be derived from students' personal narratives (Lo Cicero, Fuson, & Allexsaht-Snider, 1999); emphasizing the importance of using familiar language to understand new concepts (Hernandez, 1999); and drawing on authentic experiences to help students acquire the mathematical register by hearing it used frequently in natural communication. (Khisty & Viego, 1999).

As such, teacher talk plays an important role in extending students' thinking and modeling of mathematical discourse (Khisty & Chval, 2002), and in apprenticing students, especially racially, ethnically, and linguistically diverse students, into mathematical discourse (Gutiérrez, 2002). Significantly, Gutiérrez (2002) provided examples of how teachers who are not fluent in Spanish or who do not share the cultural or ethnic background of their students adopted teaching practices that supported students' learning. For example, the teachers encouraged students to use Spanish to process higher-order cognitive skills. They also gave Spanish-speaking students opportunities to interact with English peers by working in cooperative groups every day. Teachers saw communication as key to understanding math concepts, and focused on supporting student discourse about mathematics. Teachers stressed the language of mathematics as an important part of learning and communicating and demonstrated a well-defined understanding of student's linguistic backgrounds and mathematical needs. In related studies, researchers noted an important aspect of effective teaching is for teachers to build connections with families to create classroom cultures that mirror students home cultures (Gutstein, Lipman, Hernandez, & de los Reyes, 1997) as well as combining math and language arts instruction to construct new attitudes about ethnicity and gender roles in the field of mathematics (Daisey & Jose-Kampfner, 2002).

Moschkovich (2002) noted that a sociocultural perspective complicates how teachers perceive bilingual students learning of mathematics and expands what counts as competence in communicating mathematically. A sociocultural perspective on learning can help shift the focus of mathematics and science instruction for English language learners from one of language learning to mathematical and scientific Discourse development. As such, pedagogical recommendations for ELs include use of students' knowledge or interests to make connections to math curriculum and other content areas (Basturto, 1999); to use cooperative learning or a variety of grouping practices in the classroom (Lee & Jung, 2004); and to integrate technology (Buchanan & Helman, 1997) or math journals (Garrison, 1997).

The research addressing the needs of ELs in math and science classrooms demonstrate the importance of drawing on students' existing languages and literacy skills, or funds of knowledge. Funds of knowledge as a pedagogical framework from which to build teaching practice, now stands as the dominant perspective among bilingual education scholars versed in sociocultural theory. Of course, much of what is known about teaching math and science can be applied to other content areas, such as language arts, with the common denominator being how teachers draw on students' funds of knowledge and promote and support language use in the classroom. This literature informed the work of the LSciMAct Program and, in turn, informed the teachers' action research, even those teachers were not math or science teachers. In this regard, the research and the practices that come from it served as models and guides in the teachers' conceptualization of their teaching and their action research. For many of the teachers, the research also served to challenge their beliefs about ELs and how best to teach content while also helping ELs learn English.

Teacher Perspectives on Language, Content, & Literacy Diversity

In a review of the research on teacher beliefs about multicultural issues, Byran and Atwater (2002) proposed that "beliefs are part of a group of constructs that describe the structure and content of a person's thinking that are presumed to drive his/her actions" (p. 823). The authors argue for developing science teacher education programs that examine teachers' beliefs about multicultural issues and their impact on science teaching and learning. The same argument can be made for other content areas, too. Yet, there is a dearth of research that looks specifically at how teacher beliefs about ELs and second language learning mediate their practices in math and science classrooms populated with ELs. Research that speaks to content teachers' beliefs and practices regarding ELs is in its infancy, becoming prominent only in the past few years in response to the growing and often contentious debate about English language learning (August & Shanahan, 2006) and bilingual education.

Prime and Miranda (2006) responded to Byran and Atwater's (2002) call for research that addresses high school science teachers' "beliefs about issues of multiculturalism and its impact on science teaching and learning" (834). Their study draws on the literature on the impact of teacher beliefs on student outcomes to suggest that these beliefs about students are likely to have a profound effect on teachers' instructional decisions. Although the focus in this study was on teachers of African American students, the findings are relevant to the teaching of ELs because of teachers' concern about dialectic difference in their students. The teachers' beliefs about the nature of science were linked to four characteristics that students need to possess to be successful in science: qualities of mind, attitudes, prior experiences, and home and school factors. For the most part, the teachers employed a deficit model for understanding the problems urban children face with respect to school achievement. In turn, the teachers were hesitant to modifying the

curriculum because they saw their descriptions of curriculum adaptations as watering down the curriculum. To modify the curriculum, the teachers tended to eliminate more complex concepts and reduce the depth of coverage. The teachers reported only making adaptations that were accommodations to deficiencies, and appeared to be unaware of ways of making the curriculum culturally relevant. From this study it is evident that teacher beliefs influence not only their practices but also their willingness to modify their practices based on student needs. Keys and Byran's (2001) study of the gaps in research on inquiry-based science instruction suggested more research is needed in the areas of teachers' beliefs about inquiry, teacher knowledge base for implementing inquiry, teacher inquiry practices, and student science learning from teacher-designed, inquiry based instruction.

Highlighting several studies conducted over the past 10 years, Gomez and Madda (2005) found that most teachers lacked the strategies necessary to address ELs' needs. They also failed to recognize their role in supporting the English language development of ELs. Most significantly, teachers often failed to introduce ELs to science and math literacy through scaffolding both their English language and science and math content development. Content area teachers often do not have the pedagogical background to work with EL students nor the pedagogical content knowledge to teach science. Gomez and Madda concluded that mainstream science and math teachers need professional development that will help them identify students' science literacy and language challenges. Gomez and Madda's analysis of the research suggests that there is a need to investigate how mainstream science and mathematics classroom teachers' beliefs about language and literacy influence their practice with culturally and linguistically diverse students.

In preparing all teachers to work with English learners, Karabenick and Clemens-Noda (2004) suggested that effective programs should "dispel unwarranted beliefs about language and cognition that, unchallenged, can impede attempting new instructional practices that are more conducive to EL student success" (56). Preparing mainstream classroom content teachers to work with ELs, particularly in the content areas of math and science, requires not only bridging gaps in teacher knowledge of second language and content learning, but also examining their beliefs of teaching of nonmainstream and language diverse students.

Teachers' attitudes toward ELs can also affect their receptivity to professional development efforts to improve EL-related capabilities and to dispel unwarranted beliefs about language and cognition. Stodolsky and Grossman's (2000) case study and large-scale survey study demonstrated how math and English teachers' different patterns of goals, beliefs, and conceptions informed how they engaged EL students and adapted curriculum to meet their needs. Different patterns of goals, beliefs, and conceptions of subject matter and of students were evident across teachers who did and did not adapt their instruction to the needs of ELs. The teachers who changed their curriculum and instruction expressed a very strong commitment to students' personal development and to fostering interpersonal skills, in addition to academic goals. In contrast and similar to the teacher in the Prime and Miranda (2006) study, the two teachers who did not adapt adjusted their curriculum by slowing the pace of content coverage and eliminated difficult material. They maintained subject matter attainment as the preeminent goal for students and rejected personal growth and enhancing self-esteem as goals in their classes. These patterns were similar in both the English and math classes. The survey data of public high school teachers confirmed the patterns suggested in the case studies. The researchers argue that as the student population changes, so must approaches to teaching. In addition to

teacher education programs responding by providing multicultural education courses, they advocate for building strong professional development communities that address the needs of diverse learners in schools.

In a similar study to Stodolsky and Grossman (2000), Karabenick and Clemens-Noda (2004) analyzed the distribution of teacher attitudes and the constellation of associated beliefs that characterized teachers as more accepting, versus those as less accepting, of EL students in their classrooms. This quantitative survey study examined a Midwestern suburban district's effort to develop a professional development program for regular teachers with EL populations. The study surveyed 729 teachers on: 1) their beliefs, attitudes and practices on EL-related issues and 2) differences between teachers who were more versus those who were less accepting of ELs in their classes. Some key findings included teachers more accepting of ELs in their classes were more likely to believe that (1) an EL's first language proficiency promotes school performance and does not impede learning a second language; (2) bilingualism and bilingual education are beneficial; (3) ELs should be tested in their first language; (4) lack of fluency in the second language does not imply lack of comprehension; and (5) ELs do not consume additional teacher time or district resources. Teachers with more favorable attitudes towards ELs also tended to favor a performance approach over a mastery approach to instruction, and had a higher self-efficacy for teaching ELs. Although it did not identify any specific correlations between beliefs and practices, the study suggests that teachers who hold positive beliefs attitudes of ELs and recognize the value of these students' existing experience and language, approaches instructional issues differently than other teachers. Whether that meant being more constructivist and striving to create third spaces in the classroom is a question that is not answered. So the implications of these data for professional development are not clear, although such positive

attitudes and beliefs hold out promise for professional development framed by sociocultural theory.

In a three-year study of six first-generation Cuban-born teachers working with fourth grade first-generation Latino students, Lee (2004) examined teacher instructional practices with ELs. She used multiple data collection methods including: (1) fieldnotes (including teachers' feedback on lessons); (2) six individual interviews at beginning and end of each year that examined (a) teachers' beliefs in the importance of and their confidence in the areas of science knowledge and instruction, (b) incorporation of students' home language and culture in science instruction, and (c) English language and literacy development as part of science instruction; and (3) fieldnotes of professional development meetings. The interviewers explored teachers' beliefs. Classroom observation looked at teachers' instructional practices. Multiple data sources allowed for triangulation of data to examine teachers' beliefs and practices in establishing instructional congruence. The framework of 'instructional congruence,' like third space, is a pedagogy that merges academic content with students' language and culture to promote high academic standards for all students. Lee categorized teachers' beliefs and practices into four areas: science instruction, students' language and culture, English language and literacy, and integration of the three areas in establishing instructional congruence.

The data showed that teacher learning and change occurred in different ways in the areas of science instruction and the integration of students' language and culture, in English language and literacy instruction, and in integration of these areas in establishing instructional congruence. Establishing instructional congruence was a gradual and demanding process that required teacher reflection and insight, formal training, and extensive support and sharing. A significant finding was that initially teachers saw little relation between students' language and culture and science

learning, but through professional development they were encouraged to reflect on their own experiences as immigrants. The intervention led to teachers' affirmation of their own language and cultural identities, which helped them incorporate cultural congruence in science instruction (Lee, 2004). The construct of 'cultural congruence' maintains that, when teachers and students share the same language and culture, teachers tend to communicate and interact in culturally congruent ways that promote students' participation and engagement. Extending the literature on cultural congruence and culturally relevant pedagogy, Lee developed a framework of instructional congruence that promoted a co-mingling of students' cultural and language practices with academic science learning. Lee's work suggests how professional development can influence teacher beliefs and practices. Notably, this professional development was structured to facilitate teacher reflection on their own language and cultural practice as an entry point to reflect on the viability of students' culture and language practice in transforming instructional practice in the teaching of science.

The four studies of teacher beliefs presented here suggest a strong relationship between teacher beliefs about student experiences and languages use and their classroom practices. The latter three studies also highlight the importance of professional development in creatively transforming both teacher beliefs and practices. Yet, none of these studies draws a correlation between teacher beliefs, practice, and student achievement. This was not their purpose. The concluding section ties the research on language and literacy use in math and science classrooms to the research on teacher beliefs to suggest future courses of research and professional development.

A Call for Professional Development

Culturally relevant pedagogy (Ladson-Billings, 1995) offers support for the belief that teachers are the most important factor in promoting students' opportunities to learn. However, most mainstream classroom teachers have little or no preparation to provide the types of assistance ELs need to successfully learn academic content and skills through English while developing proficiency in English (Lucas, Villegas, Freedson-Gonzalez, 2008). In addition, teachers who have knowledge of language methods that support ELs must also possess and utilize teaching approaches that invite, rather than distance, students (Yoon, 2008).

In Janzen's (2008) review of teaching English language learners in the content areas, she notes there is "room for further research in the mechanisms of professional development; that is, how teachers can arrive at a full understanding of the relationships among language, content, teaching, and context, and how they can implement that knowledge in their disciplinary fields" (1031). Research could shed light on the specific means by which mainstream classroom teachers in specific content areas are brought to understand and teach the essentially variable nature of language use – the differing ways in which languages are used in different contexts by different people for different purposes. Finally, research can investigate how to assist teachers, administrators, and native English-speaking students alike in viewing the presences of ELs and their differing cultural practices as resource, not simply as a problem to be dealt with or ignored.

The professional development should, however, include teachers as research participants. They should share in shaping a research agenda for identifying effective approaches to meet the needs of students learning English in content areas such as science (Fradd & Lee, 1999; Rosebery & Warren, 1998) and math. As such, researchers need to take a collaborative approach to conducting action research with urban teachers as researchers (Pappas & Zecker, 2001;

Pappas, 2007; Wells, 2001). Such research, often called participatory action research, is also identified as teacher research (Cochran-Smith & Lytle, 1993), action research (Carr, 1989; Carr & Kemmis, 1986), and reflective practice (Schön, 1983, 1987). At the heart of all of these investigative enterprises is a common focus on practice-as-inquiry (Newman, 1992). Donald Schön (1983, 1987) advocates practice-as-inquiry conducted principally to inform and change on-going practice.

Teacher research is the term I will use in this study to describe the type of research that the teachers did in this study. Such research allows teachers to develop their reflective practice utilizing data sources in their classrooms and schools to improve their teaching. Data are gathered with the intension of teachers initiating change based on reflective inquiry. Thus, my research focuses on mainstream content classroom teachers who have ELs as part of their student population and who are doing teacher research on the development and implementation of a curriculum that is grounded in the sociocultural research on math, science, and literacy instruction.

Teachers themselves have said that participation in teacher research groups with university partners or other outside experts gives them the support and impetus to change both their classroom practice and their approach to professional problems (Gordon, 2008). And as far back as 1904, Dewey emphasized the importance of teachers' reflecting on their practice and integrating their observations into their emerging theories of teaching and learning. Schön (1987) depicted professional practice as an intellectual process of posing and exploring problems identified by practitioners themselves. A review of professional development through teacher research shows that these efforts are enhanced and become transformative when teacher researchers (1) have opportunities to meet with peers in collaborative environments; (2) receive

feedback from others with diverse perspectives; and (3) are guided to question effectively self-assumptions about teaching and learning (Zeichner, 2003). Collaborative action research (CAR) positions researchers and practitioners to "contribute their knowledge and skills to a jointly defined research project and process" (Oja & Smulyan, 1989, p. 13). The purpose of the study groups in my collaborative action research project was to transform teaching through dialogue and reflection and create a sense of community among teachers and with me.

Summary

Although we have research that demonstrates effective ways to engage ELs for success in science and math while developing their English language skills, mainstream classroom science and math teachers still struggle with meeting the needs of these students. Professional development has been shown to have the potential to transform teachers' perspectives and practices, helping them to engage students and promoting the use of their language skills, their experiences, and their funds of knowledge to shape the classroom so that math and science learning is meaningful and relevant. There is much evidence to support the need for preparing mainstream classroom math and science teachers to address both the language and content learning of ELs. How that might be done is still an issue, and it is a focus of my research. I argue for the need to conduct research on the preparation of mainstream math and science classroom teachers to address both the language and content learning of ELs.

Methodology

In the introduction, I posed three research questions that arise from my past work and continued interest in how mainstream classroom content area teachers meet the academic and language needs of ELs, including what types of professional development would support these teachers' efforts. The three questions are: (1) *How do mainstream classroom teachers working with language minority students use discourse analysis as a tool to examine their teaching and students' learning in the content areas of math and science?* (2) *How does the use of discourse analysis inform mainstream classroom teachers' understanding of ELs and the development of curriculum to meet these students' needs?* (3) *And how does reflection on classroom practice using discourse analysis inform teachers' pedagogical practices?*

To answer these questions, I conducted a case study of two middle school mainstream teachers—Eva and Susan—one a mathematics and science teacher and the other a language arts teacher, and one elementary teacher—Cara. The teachers participated in the pilot study presented in the Introduction. I also used ethnographic methods, such as teacher interviews, classroom observations, and classroom artifact collection, to support my description and analyses of how Eva, Susan, and Cara used discourse analysis as a tool to examine their teaching practices.

In this chapter I describe the context of the study, the participants, data sources and analytic techniques, limitations, and the rationale for using these methods to address the research questions. The next subsection provides a review of the research that informs my choice of case study and ethnographic methods and why they are appropriate for the proposed study.

Review of Methodologies

A number of research studies have investigated teacher beliefs and professional development using qualitative (Lee, 2004; Prime & Miranda, 2006); quantitative (Karabenick &Clemens-Noda, 2004; Lee, Deaktor, Enders, & Lambert, 2007); and mixed (Stodolsky & Grossman, 2000) methods. In this review of methods, I focus on qualitative studies because of their focus on understanding interpretations that are in flux and changing over time and context (Merriam & Associates, 2002). Such methods facilitate the development of descriptions of practices and beliefs that are evolving throughout the data collection process, allowing the researcher to track evolution across time and space and provide descriptive detail that captures the context in which the evolution occurred. The methods are contingent on the belief that reality is not a fixed, single, agreed upon, or measurable phenomenon but a fluid, complex, dynamic, and even sometimes contradictory interpretation of experience.

My methods are informed by several studies that draw on a variety of ethnographic methods to examine how teachers work with ELs (Amaral et al., 2002; Moje et al., 2001) and the nature of language and literacy practices in science (Lemke, 2001; Varelas & Pineda, 1999; Rosebery & Warren, 2008) and math (Gutstein et al., 1997) classrooms. Many case studies describe and analyze practices and interactions involving ELs in mathematics (Gutiérrez, 2002; Khisty & Viego, 1999; Moschkovich, 2002), science (Ballenger, 1997; Warren et al, 2001; Fradd & Lee, 1995), and other content area classrooms (Valdéz, 1998). These studies use discourse analysis to demonstrate, either explicitly or tacitly, how power relations are constructed among teachers and students (Gutierrez, 1995; Christoph & Nystrand, 2001), how students' funds of knowledge can be used as a learning resource (Moll, Amanti, Neff, & Gonzalez, 1992; Calabrese-Barton & Tan, 2009; McIntyre, Rosebery, & González, 2001), and how teacher

researchers documented and made iterative changes to their practices (Ballenger & Rosebery, 2003; Pappas, 2007). I have already discussed many of these studies in the literature review, so will not provide any additional details here. However, even as the research for discourse analysis as a method and ELs and content classrooms as participants and sites is extensive, there is a dearth of research on teachers' use of discourse analysis as an analytic professional development tool to reflect on their understanding and practices and ultimately to inform their practice, especially for teachers working with ELs.

Case Study Method

The term "case study" can refer to either single-case or multiple-case studies (Yin, 2006), with each reflecting the number of "cases" from which data are collected. A case can be thought of as a bounded or integrated system (Merriam, 2001), or as Merriam suggests a unit of study that can be fenced off and made sense of as a unit. As such, a case can focus on an individual, a group wedded by common practices, beliefs, etc., a program, a setting, and so on. In the proposed study, the case is a cohort of three teachers' practices in regards to teaching content to ELs.

Both types of case studies require careful consideration of the researcher's ability to do data analysis while collecting the data. Because they are both linear and iterative, case study methods require the researcher to set out a work plan that has not only clearly articulated data collection methods and processes but also allows each activity of the process and method of data collection to iteratively inform one another. The process requires constant reflection on what is happening and on the data being collected. Thus, as it unfolds, the process of data collection should be informed by what is happening and shaped or reshaped to address evolving understanding and needs (Yin, 2009). By using a single case study method I was able to answer

my research questions using the data collected and, where necessary, revise my process of data collection based on the teachers' activities, responses, and evolving understanding and participation. This provided me opportunities to describe the dynamic and complex nature of both the professional development the teachers experienced and the expected transformation in beliefs and practices that occurred. What makes my study a single case study is that I focused on a cohort of three teachers working in the same school who were collaborating on, developing, and implementing integrated curriculum. The case is also delineated by the teachers' participation in action research or teacher research. They used discourse analysis looked their practices. Thus, discourse analysis was used as not only as a research method but also as a tool for professional development with teachers.

As a research method, case study methods do not presume generalizability. And reliability and validity are embedded in the richness of the descriptions and the collection of data using multiple data collection methods, such as interviews, surveys, field observation, and artifact collection. Also essential are member checks, or the sharing of data, findings, and even analyses with participants to ensure that the findings and analyzes are reliable interpretations of the data.

The limitations of case study methods are the flip side of its strengths. Case study methods, as already noted, do not allow for generalizability and, thus, their analyses are confined to what can be said about that particular case. Hence, it is important to draw on multiple data collection methods, engage in rich description, and use carefully done and clearly articulated analyses. The accumulation of such research efforts over time and space, or across multiple research reports, goes far toward addressing concerns about generalizability.

Also of concern are researcher integrity and bias. These are concerns that, like generalizability, can be assuaged through detailed reporting, including a clear, descriptive accounting of research methods and data collection processes. The use of multiple data collection methods and member checks also can help minimize bias and provide confidence in the findings.

It is important, too, that I do not overstate any claims I make, and thus as a researcher I recognize the biases I bring to my work, including the desire to identify how best to prepare mainstream teachers to meet the academic and language needs of ELs. Also, my affinity for public education and public school teachers, having been one myself, is a particular type of bias that wants badly to see the teachers succeed and prove their ability in the face of the daily onslaughts on public education and teachers. It is that bias that led me to this work, and I recognize that it, too, can color my perceptions. By following closely the heuristics that guide my analysis framework, I hope to alleviate any concerns of bias and contribute both to research on the language and academic development of ELs and to the field's evolving understanding of professional development.

Before describing how I analyzed data, I set out the context of my study, the data collection methods, and who the participants are.

Context of the Study

The study was contextualized and extended on a larger, multi-year project. Project *LSciMAct* (*Transforming Literacy, Math and Science Through Participatory Action Research*) professional development is a grant-funded in-service teacher professional development program designed to provide mainstream classroom teachers with academic coursework and in-class mentoring on addressing the language and content needs of English learners (ELs). The teachers

designed authentic and academically rigorous activities that integrated math, science, and literacy for ELs. The project focuses on integrating language and content development with an emphasis on improving ELs' abilities to read and write for meaning as required in more complex text and tests found in mathematics and science. The project integrates instructional knowledge from Bilingual/ESL, mathematics education, and science education with teachers doing action research and developing collegial communities.

Participants

As noted in the introduction, the study included three teachers with whom I worked in my pilot study and who were part of the first LSciMAct cohort. Eva is an immigrant of Eastern European descent. Cara and Susan are female European-Americans. Cara taught second grade and Susan and Eva both taught a 6th grade class and a combined 7th-8th grade class. They teach at a small urban, public K-8 community elementary school with 269 students that I refer to as Adams Elementary. The school is located just blocks away from the neighborhood high school where I once taught. The neighborhood has changed during recent years due to gentrification. Consequently, the membership has decreased significantly during the last few years. Latino/as make up 82.5% of the enrollment, 24.2% of the student population identified as Limited English Proficient and 95.9% as low income (2007, School Report Card). All three teachers have mainstream classrooms with some ELs in their classes. The year of the action research was Cara's second year teaching, Susan's eleventh, and Eva's third teaching in the U.S. (Eva previously taught high school biology in Romania for six years).

Over the last few years, Adams Elementary School has seen a substantial increase in reading and math ISAT scores with a ranked school wide reading proficiency of 70% and a ranked school wide math proficiency of 82% (2007, School report card). Only the 6^{th}, 7^{th}, and

8th graders were tested. For Susan's and Eva's classroom overall, there was a 5% increase in scores for both math and reading. There was also a 5% increase overall in math in the classroom.

English was the second language for the majority of the students and approximately a third of the students came from homes where only Spanish is spoken. However, the number of students classified as English Learners had decreased significantly. Additionally, with the NCLB law, if a school has a subset of less than 40 students, then the school was exempt from the requirements of NCLB for that subgroup in meeting Adequate Yearly Progress (AYP). Thus, Adams school was exempt from this sub-grouping requirement. In their thesis, the teachers explained how this law affected their students, writing, "our students have been 'pushed' out of the status, as English Language Learners through the ACCESS testing and funding for ELL resources is limited" (p. 22).

Although the teachers were not fluent in Spanish and did not share the cultural or ethnic background of their students, they had diverse experiences learning language and interacting in different cultures. Cara grew up in Chicago speaking Serbian at home. Susan grew up in an Amish community. Her parents spoke Pennsylvania Dutch at home, but did not teach the language to their children. Susan later went to Africa for 9 years and learned to speak the local African language. Previous to her move to Africa, Susan studied French in Brussels for 10 months. Eva is from Romania and came to the United States four years ago. She speaks Romanian, French, English, and is learning Spanish. Eva and Susan teach the same group of students. They teach middle school math, science, and language arts.

Data Collection

My research questions determined the source(s) of data that would yield the best information. I used an iterative process of observing, collecting artifacts, and interviewing

teachers, including video- and audiotaping classroom interactions and weekly cohort meetings, collecting written teacher/student artifacts, writing fieldnotes, maintaining a personal journal, conducting interviews and focus groups, and collecting participant reflections. The use of multiple methods enhances the validity of the findings.

Study group meetings. I met with the cohort of three teachers typically one time per week for at least one hour to help them plan their units, discuss the implementation, and faciliate the analyses of classroom activities and interactions. Table 4.1 provides an outline of the meetings. At first, these meetings were not regularly scheduled even as we seldom went a week without meeting. Later, as described in the following chapters, they were more structured and scheduled outside of the school day. We collaboratively developed an agenda for each meeting. I audiotaped and transcribed the discussions as well as wrote journal notes after each meeting. In addition, I shared my meeting notes and transcriptions with the teachers to help them plan and reflect on their teaching and their own data analyses and to provide member check feedback.

Table 4.1 Adams Study Groups

	DATE	UNIT	TYPE OF ACTIVITY
1	2/16/09	1,2	Individual report 1; Planning 2
2	2/26/09	2	Planning
3	3/5/09	1,2	Group report 1; Planning 2
4	3/12/09	2	Activity triangle; logistics
5	3/16/09	2	Planning
6	3/24/09	2	Planning
7	3/25/09	2	Coding; FNs
8	3/30/09	2	Coding
9	4/9/09	2	Coding; Transcripts
10	4/22/09	2	FNs, Choosing clips
11	5/1/09	2, 3	General
12	5/7/09	2, 3	Choose clips 2; Planning 3
13	5/13/09	2	Choosing clips
14	6/2/09	2	Coding; Transcripts
15	6/18/09	2	Individual report
16	6/23/09	2	Group report
17	6/30/09	3	Choosing clips
18	7/7/09	3	Transcripts, Themes
19	7/20/09	3	Group report

During the data collection period, teachers designed and implement three thematic units grounded in action research based on students' interests and community knowledge and orientations toward math and science. During the planning phase of each unit, teachers worked individually and as a cohort to develop an Inventory Table and Activity Triangle (Appendix A1 and A2). The Inventory Table helped teachers align and organize state standards, content objectives, students' community knowledge, and values and principles of math, science, and literacy (language arts) for the unit. The Activity Triangle helped teachers to demonstrate the broader activity system for each unit and to think about learning and development in the context of activity and the global developmental process of the unit. The weekly meeting provided the cohort with time to discuss their Activity Triangles and Inventory Tables.

At our weekly meetings, I provided each teacher with a copy of a videotape from one of the previous week's class periods. The videotapes were of teachers' self-selected student focal groups. Each group included at least two English learners, including students who have been transitioned into mainstream classrooms in the last two years. During the implementation phase, the teachers discussed the videotapes from three class periods of the unit (one at the beginning, middle, and end). Using a coding sheet (see Appendix A3), they coded the presence of different items in 2-minute increments by marking a tally. The coding sheet included the following categories: peer assistance, funds of knowledge, multiple languages/discourses, questions, points of tension, third spaces, shifts in participation, role shifts, and rule negotiation. The following week, the teachers brought hard copies of their lesson plans, fieldnotes, and the completed coding sheet (in Excel). In the meetings, I encouraged teachers to share and discuss video clips in order to gain an understanding of how the teachers coded the videos.

During the analysis phase, teachers used their coding sheets to decide where the most action was happening to select and transcribe a 1-minute episode from each video. They used the episodes to identify and represent emergent themes from the protocol and write a brief report, including how integrated students' funds of knowledge and future modifications to the curriculum. At the end of each unit, we met as a cohort to discuss their analyses and write a brief group report. The cohort used these reports to complete their cohort thesis at the end of the year.

Focus groups. I conducted a total of four focus groups. Table 4.2 provides an outline of the focus groups.

Table 4.2 Focus Groups

FOCUS GROUP	UNIT	DATE
1	Pilot	6/10/08
2	Unit 1	3/24/09
3	Unit 2	6/23/09
4	Unit 3	7/24/09

The pilot study focus group interview was conducted at the end of the spring 2008 semester serve as a baseline for examining teachers' initial beliefs and practices. I conducted 3 focus groups after the teachers completed the full cycle of planning, implementing, and analyzing each unit as a way to have the teachers reflect on their professional development and gain an in-depth look at how teachers conduct the analysis. Focus group interview questions are in Appendix B.

Field (classroom) observations. Observational data provided a context for collaborative support (Merriam & Associates, 2002). I observed and videotaped the teachers' classrooms every school day for approximately 10 weeks during the spring semester implementing two integrated units. While observing, I took descriptive and interpretative (more value-laden, subjective, and evaluative) fieldnotes using the protocol in Appendix A7 to analyze their

classroom practices for the focus group discussions. This protocol facilitated an examination of the social organization of language and learning practices taking place in the classrooms and facilitated later focus group discussions. Within the protocol is space for additional introspective thinking or observer's commentary (OC) about the events taking place.

During field observations, I videotaped classroom activities. Because 60 hours of video is an enormous amount of data to transcribe, I used fieldnotes and observation protocol as a guide for coding and analyzing video sequences. The videotapes were important for capturing when and how various gestures and multimodal tools are used. In addition, they served as a means of capturing actions that are not included in the fieldnotes. Finally, video data provided a means for me to document the participants' discourse.

Artifacts. Artifact collection included teachers' fieldnotes, coding spreadsheets, transcripts, individual and group reports, lesson plans, activity triangles and inventory tables, and student work. These data included the teachers' discourse analysis of their classroom interaction using the protocol identified in the Introduction. The teachers began using this protocol during initial LSciMAct activities, and thus are familiar with its use. Other artifacts include emails from teachers, continuing the weekly meeting discussion online. I also drew on classroom artifacts from the graduate course, such as classroom blogs and pilot report, to establish a baseline for examining the shifts in teachers' practices. I coded all artifacts deductively and inductively for themes.

Data Analysis

I transcribed 19 study group sessions. I coded and analyzed data as I collected it so that I could modify data collection plans per case study methods. For example, after each classroom

observation I reread my fieldnotes in an attempt to expand them by adding details of conversations, sensory impressions, contextual information, and noting follow up questions.

Using QSR International's NVivo 9 software (2010), I inductively coded these data for generative themes and developed categories. Then I deductively analyzed and coded self-selected and teacher selected episodes of video transcriptions for themes. Some of the codes I developed to capture the process of how teachers talked about becoming teacher researchers included *planning, analysis, data collection,* and *reporting*. To understand how the teachers used discourse analysis to inform their practice, I coded instances of teacher talk using fieldnotes, coding sheets, and the selection and transcription of transcripts. For each of these categories I further examined questions, assistance, disagreements, classroom examples, shifts in thinking/practice, definitions of theoretical concepts, and awareness(s) developed. As I inductively coded, I became aware of other talk, such as issues related to responsibilities the teachers had but that were not directly related to using the research tools. These issues included talk about student teachers, the school, student problems, and graduate classes to name a few. I also coded for my own researcher reflexivity to examine my role as a classroom participant and facilitator of the professional development.

Initial interviews, surveys, focus groups, and artifacts each were coded for themes as they were collected. After themes were identified, data were deductively coded, with themes being constantly checked against and across data collection methods. Initial findings were shared with participants for feedback. Together, all the data collection methods allow for triangulation (Merriam & Associates, 2002) by creating overlapping layers of data across methods.

Triangulation refers to collecting data from a variety of different sources to clarify meaning and verify interpretations (Stake, 1994). Triangulating sources with different biases and

different strengths are gathered in order to complement one another. According to Stake, if different types of data lead to the same conclusion, one can be more confident in that conclusion. To investigate how the participating prospective teachers make use of discourse analysis as a tool to examine their teaching and students' learning in science and mathematics, all data sources described above were used and provided a means of triangulating key patterns of their discourse. Analyses of the data focused on patterns in the participants' talk (written and oral) revealing how teachers used discourse analysis as a tool to examine teaching and learning and for reflection on their classroom practice.

Significance of the Study

Currently, in schools that serve great numbers of ELs, there are few examples of mainstream classroom teaching drawing on sociocultural theory to teach language arts, science and mathematics to ELs. There is a need to develop examples of this type of innovative and effective instruction for ELs. This work begins with effective teacher preparation programs and, related to my work, in-service teacher development that positions teachers not only to develop and implement research-based curriculum but also reflect on their own beliefs and practices as a way of informing their efforts. Classrooms that model this kind of instruction are important since all teachers need to be able to see concretely what the innovation looks like in order to critique their own practices. Furthermore, current research on professional development has demonstrated better and more lasting effects when teachers are active learners in and designers of their professional development, when it is immediately connected to their practice, when they are encouraged to be independent thinkers and problem-solvers, and when teachers develop new ways of working together. Having teachers examine their teaching using discourse analysis informs not only the literature on discourse and discourse analysis but also on teacher education.

Negotiating Researcher Role and Positioning Teachers as Experts

Teacher researcher voices historically have been marginalized (Cochran-Smith & Lytle, 1993; Zeichner, 1995; Meyer 2006), and thus, university researchers have often positioned themselves outside the discourse of teacher research in their collaborations with teacher researchers. Pappas (2007) challenged herself and her colleagues to overcome their resistance to share ideas or interpretations in collaborative inquiry, defining true collaboration between university and teacher researchers as each "claiming their respective expertise in the research process" (p. 226). This challenge requires university researchers to confront how they negotiate their authority in developing relationships with teacher researchers. Such negotiation becomes even more complex when part of the university researcher's role is to mentor teachers into the role of teacher researcher and to identify expectations on the type of action research that is to be done.

In the first half of this chapter I examine how I negotiated my role as a university researcher and attempted to support the Adams' teachers with whom I worked as not only expert teachers but also as experts in making sense of their own classroom practices—as teacher researchers. I trace the evolution of our work together and my own growing awareness of my role. Related to this endeavor are issues around the nature of collaboration and participants' roles in that collaboration and how that changes over time. In the second half of this chapter, I explore how my changing role in the project and my efforts to engage the teachers in a more collaborative way—and a less hierarchical university-researcher—teacher-researcher way—mediated the teachers' action research and efforts to make sense of their practices. The data presented are from fieldnotes and study group meeting transcripts, which I coded for researcher reflexivity and for challenges of conducting teacher research on three levels: (1) program

challenges, (2) school/district challenges, and (3) ethnographic (personal) challenges. Program challenges included those related to learning methodological tools (coding, transcripts, fieldnotes) and conceptual/theoretical ideas – Third Space theory (Gutiérrez, 2008), Discourse/discourse (Gee, 2011), sociocultural theory (Vygotsky, 1986). School/district challenges included those related to implementing mandatory curricula and/or other required professional development and the nature of administrative support for what the teachers were doing. The ethnographic challenges were associated with diverging and converging researcher and participant perspectives, experiences, and goals.

Researcher Reflexivity and Shifting Roles

While it was of interest to me and something I was aware of at the outset of this research project, research reflexivity, notably my role as a university doctoral student and former public school teacher working with teachers on their own teacher research projects, became a guiding interest and challenge of mine as the project evolved and the teachers conducted their action research. Kleinsasser said that researcher reflexivity represents a "methodical process of learning about self as researcher, which, in turn, illuminates deeper, richer meanings about personal, theoretical, ethical, and epistemological aspects of the research question" (2000, p. 155). Early on in our work together, I realized my role as a university researcher put me in a position of authority with the teachers. I thought that if I identified myself as a former teacher who could empathize with what the teachers were experiencing, I could alleviate any discomfort the teachers might experience having me in their classrooms and talking about their teaching practices. I did not consider, however, the reticence on the part of the teachers to challenge or question my thinking and the requests and expectations placed on them as part of the Master's program in which they were enrolled.

Gordon (2001) described the relation between researcher and research participants as an "exchange relationship," which highlights the importance of there being a mutual exchange of data and insight from two different perspectives to develop both theory and practice. In my case, the research participants were teachers becoming, with my guidance, teacher researchers, which made our relationships even more immediate. I felt I was experiencing in my work as a doctoral candidate doing dissertation research much of what they were experiencing in their work of becoming teacher researchers. The fact that I had been a teacher and was doing research just like them led me to think that what authority my role conveyed could be alleviated by reminding the teachers of how I was like them. In this regard, our "exchange relationship" was premised on our similarities, as I perceived them. Initially, however, there was not much exchange of data and insights, as the teachers looked to me for guidance, and I waited for them to take what they were learning in their Master's coursework and apply it their action research.

Wells (2009) began his chapter, *Dialogic inquiry as collaborative action research*, by describing a pivotal point in his career as a researcher. He realized that by including the participants in his research as collaborators he was creating a different type of relationship with them than the one he had with them as participants. With teachers and students as collaborators, he concluded that "it is necessary to be an active participant oneself, joining in activities and treating students and teachers as experts about their own learning and teaching" (Wells, 2009, p. 52). In confronting some of the issues that arose early in my collaboration with the teachers, such as the difficulty of getting them to identify segments of video to transcribe and the difficulty of getting them all to meet and, when we met, to focus on their action research, I realized, I had to engage in reflexivity as a process of critical self-reflection. I had to interrogate my own role as a university researcher, realizing that the teachers and I were different in that I was no longer a

teacher and was not experiencing what they were experiencing in their classrooms as teachers who were trying to become teacher researchers. I, in fact, was never a teacher researcher.

As such, I had to become aware of 1) how I positioned myself in relation to the teachers and 2) what it meant to work collaboratively with them as they made teacher researcher decisions, such as choosing their own lessons to videotape, selecting video clips to transcribe, and making decisions about focal students, instead of simply instructing them on what to do. At issue was how I balanced my role as a university researcher and the most immediate person associated with the teachers' efforts to complete a Master's degree program while teaching full-time. In their eyes I could be both a welcomed supporter *and* the symbol of a project that had increased their workload and challenged them to think differently about their teaching. In my own eyes, I had to figure out how to participate actively in the work they were doing so that we could develop theory and practice.

A serendipitous series of events. I cannot say that my efforts to become a participant observer in the work of the teachers arose from a conscious, premeditated decision. In truth, it rose from an unease I was feeling with the progress of the work we were doing, including my own data collection for my dissertation and the teachers' action research work. I desired to do things differently than we had been doing them. In this regard, my process of reflexivity began with unease about what was happening and an unwillingness to allow things to continue as they were. These were feelings shared by my university colleagues who made up the LSciMAct Project Team. My first move was to speak with other project team members to understand how their work with their teachers was going.

All along, my university colleagues and I knew we were navigating mostly uncharted waters in our efforts to help the teachers use discourse analysis to reflect on and inform their

teaching practices. There is a dearth of studies that examine how teachers use methods and theory to inform practice. Brock, Helman, and Patchen (2005) examined instances of one practicing teacher's opportunities to learn to conduct teacher research in a university seminar that focused on learning to conduct classroom research. They defined opportunities to learn and design a teacher research project as occurring when the teacher in their study discussed her sources of learning and her insights about how to draw on theory and interpretations of her findings. The results revealed that a complex set of significant instances—or events or activities that took place over the course of the research—shaped both what and how the focal teacher learned. They concluded that careful descriptions of the focal teacher's instances of learning can inform individual instructors about moment-to-moment instructional decisions when working with teachers in teacher research courses. Although it is not clear what constituted an "instance of learning," in this work, my university colleagues and I faced the same issues with trying to understand what and how the teachers with whom we were working were learning. How were they taking what they learned in the university classroom and using it as teacher researchers of their own classrooms? How can we engage them in a timely and consistent way to understand how they were using what they learned and address any questions or concerns the teachers might have? Part of the problem we had was that there was no formal structure to engage the teachers about their learning outside the university classroom.

After the teachers completed Unit 1, the university project team members and I discussed how all four school sites were experiencing similar problems implementing and analyzing units. We identified delays between unit implementation, identification of video clips to transcribe, and analysis of those clips. We also identified difficulty in finding time to meet with the teachers, as they all were also taking evening classes as part of their Master's program and seldom could

meet as school teams. We decided to introduce collaborative action research study groups as part of the professional development coursework for the remaining two units, believing it would provide us a more consistent and structured way to support the teachers in their work and support our own efforts to implement the professional development that had begun with the teachers initial university coursework.

The university team created a structure to introduce to the teachers as a way to provide them with better support in planning, implementing, and analyzing the units. Because each site had its own needs, I drew on the Adams' teachers' feedback from the Unit 1 focus group and my observations of the Unit 1 implementation to develop a process to work with them to analyze videos for Units 2 and 3. On March 25, 2009, SG #7 (InS) one week into Unit 2 implementation, I formally introduced the new process of planning, implementing, and analyzing the units to the teachers Although I introduced periods of time dedicated to planning, implementing and analyzing, I recognized, too, that the process was and should not be a linear one. Instead, it needed to be dialectical in nature. For example, data collection and analysis time was used to inform continued planning and to revise plans as the teachers taught their units. To assist them with data collection, I outlined when each piece of data would be collected. Due to the many demands of teachers' professional and personal lives, the data collection often overlapped with planning and implementing the curriculum.

Table 1 outlines the data the teachers collected during the planning, implementation, and analysis process. During *planning*, each teacher worked on an inventory table and activity triangle for the unit. The Inventory table was intended to help teachers align and organize state standards, content objectives, students' community knowledge, and values and principles of math, science, and literacy (language arts) for the unit. Likewise, teachers used the Activity

Triangle to demonstrate the broader activity system for each unit and to think about teaching and learning in the context of activity and the global developmental process of the unit.

Table 5.1 Teachers' Data Collection

Planning the unit	Implementation of the unit	Analysis of the unit
Inventory Table Activity Triangle	Lesson plans *Fieldnotes *Completed coding sheet	*Choosing clips *Transcribing episodes Individual report Group report Student work

* The data is the focus of my work.

As they *implemented* their units, I provided each teacher with a copy of a video from a previous week's class session for her to code. Between units, working in study groups, we examined the completed coding sheets and used them to choose significant clips to transcribe. In *analyzing* their data, the teachers used the coding and transcripts to identify themes and write individual reports, and together they wrote a unit group report that synthesized the data.

Becoming a participant observer. While facilitating one of our first study group meetings, on April 9, 2009, (SG #9) at my house, I encouraged the teachers to take fieldnotes of important decisions related to their research (I will discuss the shifts in teachers documenting their praxis in the next chapter). The teachers immediately expressed concern about how they were already viewed in the school because of their participation in the LSciMAct Program and the action research they were doing. They said they felt pressure from other teachers to teach in a more traditional way, but at the same time, they were critical of colleagues who relied on prefabricated worksheets and maintained an overly quiet classroom. Susan and Eva boasted that their above average standardized test scores allowed them a degree of freedom to teach how they

wanted that other teachers did not have. For example, the principal often observed Cara's classroom because she was only in her second year of teaching and had yet to demonstrate the level of ability that Susan and Eva had. However, Susan and Eva also talked about the growing pressure, as a result of the LSciMAct Program, that came from students wanting them to teach more traditionally. The students, the teachers believed, experienced traditional teaching in other classrooms and had come to associate it with what it meant to be a student. Not accustomed to sharing their expertise through group work and instructional conversation, students expected to be told not only what they needed to know but also how to act in the classroom at all times. Susan explained: "Even with video games there are, you know, three students that are still up and walking around the room and disrupting others" because they see the less traditional classroom as a breakdown in teacher authority and an opportunity to do what they want. She added, "I mean if video games can't help, what can we do? And then Obama is talking about merit pay." Susan was verbalizing a pressure that she and the others felt was coming from many fronts, and that what we were asking them to do only exacerbated all this. My asking them to evaluate their own teaching and to share that information only increased the pressure they felt from their students all the way up to the White House.

Eva extended on these new concerns by explaining how she preferred that I come to her class to videotape after a lesson began. I had arrived late on only two occasions, and prided myself on being on time and believing the teachers appreciated my promptness. Eva said, however, that on those two occasions when I arrived late she felt she had been more effective in her teaching:

01: **Eva:** I go with the flow, I forget about you coming and then it's okay I can be me because (.) to tell
02: you the truth for me, teaching is something natural. I have a plan in my mind but I never learn
03: something in the beginning. It's what I have in that moment and what I'm going and then if I am very,
04: I am pressure, I kind of block myself and it's not me
05: **Bev:** What's the pressure?

06: **Eva:** and I don't like it when I'm not... kind of somebody you know (.) analyze me wherever I'm doing
07: what I did the moving, what it's any kind of you know every steps

I was surprised to hear that my presence caused her to feel as if she were being evaluated (4, 6-7), especially considering I had visited her classroom dozens of times and had never offered an evaluative comment on her teaching. I could not help wonder what the benefit was of my observing, if it hindered Eva's ability to teach the way she wanted, and of the professional development project itself.

08: **Bev:** Well, I'm not analyzing you so let's [let's get that straight.] Let me explain
09: **Eva:** [That's really good (laughs)]
10: **Bev:** what I'm doing okay? So I'm coming in, I'm videoing **your** focal students and what **you** tell me
11: to come in and video. So if you say I'm going to move a student over here now. I'll say okay. You
12: made the decision to do that. I mean we can sit and talk about it all I want but you will do what you
13: want to do. This is **your** action research, okay? We're not administrators from the district. We're
14: researchers (.) teachers. I mean I'll always be a teacher okay?
15: **Eva:** Uhm. Okay.
16: **Bev:** And we come in, I come in and I video your three sessions from uh the unit and then **y::ou**
17: need to look at it and **you** need to decide what are you seeing. What is developing out of this? How are
18: you going to use this what you are seeing to develop your next unit? And then when it is all over
19: **you're** going to say what you learned from all this.

I tried to align myself with the teachers in line 14, implying that as a former and current teacher I was empathetic and understanding for their work, but I had already begun to realize that this was more a rationalization than a reality. I tried, too, to clarify my role as a researcher assisting them in studying their classrooms (10-14; 16), and that I was not there to judge or evaluate their teaching (8, 13). And finally, I reiterated the responsibilities of a teacher researcher to make informed decisions using data as evidence (11-13; 16-19). I realized that this last point was where collaboration became a possibility and where changing theory and practice would happen. Up until this point, I was willing to take on an authoritative role based on my university researcher position and suggest to the teachers what they should be doing as action researchers while distinguishing these suggestions from making comments on their teaching.

For example, later during the same meeting, Susan explained how her student teacher entered her focal student group's discussion and interfered with her data collection. I explained

that student teachers were a part of what was happening in the classroom, so they were fair game as data. No sooner had I said that, I realized that during the pilot a year earlier I had tried to avoid interfering with what was happening in the classroom. I explained:

> When I went back and looked at what you guys did from the pilot last spring with the trade investigation. I mean that night when you came up and presented, I was shocked that you picked the second clip that had me in it talking with the kids. I was like, "oh why did they do that," and then I realized that you were looking at these different types of questions and it could have just been an accident the way it happened. Um, you know, I have may not always but I try to stay out of the videos for that reason (laughs), but those student teachers they are part of your classroom. I am part of your classroom when I'm there. We are all one whole story, so those are interesting things to look at too if you decide that's something you want to look at (April 9, 2009, SG #9, OoS).

In thinking about how I tried to position myself in the classroom during the pilot and Susan's concerns about her student teacher, I realized that I had been deceiving myself by believing I could impact what the teachers were doing while trying to remain apart from it all as they were doing it. I had tried to create a barrier between the teachers' role of teaching and analyzing their data and my role of videotaping lessons in the classrooms and assisting teachers in analyzing their data in the study group meetings in an effort to define myself as a university researcher apart from the teachers' roles as teachers and teacher researcher. I was teaching them how to analyze their data while concurrently thinking that their analysis would be free of my influence. Similarly, I believed if I stayed invisible in the classroom, my presence would have no effect on what was happening there. I was not part of the messiness of classroom life, and similarly, I tried to stay above and even alleviate the messiness of becoming teacher researchers that the

teachers were experiencing, as demonstrated by their difficulties reconciling their roles as teachers and researchers and their difficulties meeting the expectations of the professional development project.

As we continued to talk, the teachers explained how much they appreciated my helping their students while I was in the classrooms:

01: **Susan:** It would be really nice to have you helping when the students are just kind of asking questions
02: about how to document it.
03: **Eva:** Yeah. That will be much better.
04: **Susan:** And bring in the camera.
05: **Bev:** It definitely shifts my role then. It makes me more of a participant
06: **Susan:** Participant.
07: **Bev:** than of an=
08: **Eva:** And you want this?
09: **Bev:** =observer. Yes.
10: **Eva:** Okay. That would be great.

The teachers encouraged me to become more of a participant, maybe as a way to alleviate the tension I appeared to create by being there only to videotape. Regardless, after the meeting ended, I left thinking about what my role should be as a researcher and what it truly meant to collaborate with teachers. I made a conscious effort to be more of a participant.

Although I continued to want to provide the teachers with the best video recording I could in my role as LSciMAct research assistant, I began to move around the classroom as students worked in groups. I left the camera running and directed at the focal group. As I moved around, students readily spoke with me about their work. For example, Anita, a student with a troubled background who had dropped out of school for a while and who Eva had on occasions bought food for, told Eva one day that she did not need her help on an assignment because I had already helped her identify the main ideas in a reading about plant essences lycopene and capsicum.

In the April 22, 2009, SG #10 (OoS), Eva spoke about my participant role in the classroom: “I really like it, you helped my kids in class. I really need your help you know. My

kids, they really need help… so when you explain to the kids what they are supposed to do, they get moved." I began moving around Susan and Cara's classrooms, too, and learned about individual students' academic and out-of-school lives. I never co-taught lessons with the teachers, but I did begin to support student learning and assist the teachers in their work, which no doubt impact the implementation of the units and their data collection efforts.

At the time, I viewed my changing role as an effort to support the teachers in their work and facilitate the work of the LSciMAct Project. That is, I saw my changing role as a participant observer as meeting the needs of both the teachers and the project. In time, however, I have come to realize, especially in the time since the project ended and I have had a chance to take stock of the teachers' and my work together, that my changing role helped facilitate the teachers' development as teacher researchers because they came to view me differently and I came to understand better the pressures they felt. I do not know to what extent my changing role alleviated those pressures, but I do know now that it made it possible for us to understand better what we all were experiencing as collaborators in the project.

Moving from instructor to facilitator. The teachers knew me as not only a university researcher but also as one of their instructors in one of the first courses they took in their Master's program. Our relationship as instructor-student became solidified when I worked with them on the pilot project that was part of their class with me, and I instructed them on how to use activity triangles to plan their curriculum and to collect data to inform their practice.

Not realizing it at the time, my instructional role continued into the implementation of Unit 1. I emailed the teachers suggestions of which video clips to choose for their transcriptions. I had done this during the pilot, and the teachers said it was helpful. I specifically told them to

take my suggestions as only suggestions and choose whatever they wanted transcribed. The teachers always picked clips from those I suggested.

At about the same time that the study group meetings were starting and I was contemplating my role as a participant, I decided that it was important that the teachers begin making researcher decisions about the data they collected and analyzed. I reflected on my facilitator role and on when I should intervene, pull back, and help them reflect on their practice. While the LSciMAct program had provided a theoretical framework for teachers to examine their practices, I now wanted to provide them opportunities to discuss their findings, so that they could take control of the analysis and let it inform their work in ways they wanted. I saw this as a major reason for starting the study group meetings.

In meetings leading up to Unit 2, I let the teachers know of my interest in having them take the lead in making researcher decisions:

> Next time [in Unit 2] I am not going to give recommendations cause I feel like I influence your thinking and other teacher thinking too much in doing that. But, we will have a discussion about it, and I think we will all influence each other in our discussions, but I am not going to specially email you and say take a look at these things. So we're going to do things differently. I just want to say that upfront (February 26, 2009, SG #2, InS).

In my efforts to encourage the teachers to see themselves as experts in analyzing their own teaching, I was often unsure how much guidance to provide. Even as I became conscious of what my guidance could mean for the teachers' development, it was not easy to step back and let the teachers work from their understandings. For example, as late into the unit implementation

as June 2, 2009, SG #14 (InS) Cara asked me about a clip from her teaching that featured a student named Shelton:

01: **Cara:** I have a question for you Bev
02: **Bev:** Okay
03: **Cara:** Everybody was going to take out a sheet except for Shelton and write and then you come
04: over and you are asking everybody what they did and so Ian is explaining and that's when he
05: says oh Isabel doesn't talk
06: **Bev:** Oh yeah I remember that
07: **Cara:** so they choose Crystal to do the writing. So I thought either that part or that part
08: earlier when they are having all that tension and rule negotiation about whose doing what part
09: **Bev:** I think you have enough of the tension in the other clips
10: **Cara:** Okay
11: **Bev:** especially with Shelton (laughs)
12: **Cara:** so maybe this would be interesting

I thought the clip Cara was suggesting was too similar to other clips she had chosen (9). Cara immediately identified another clip (12), without our discussing why she had chosen the original one. Later, I considered how quickly I had responded to Cara's suggestion. Cara not only didn't use the clip, but she later re-assigned Shelton to another group. She said Shelton distracted other group members and thus should not be part of the focal group for Unit 3. Instead, with Unit 3, Cara began to focus on Isabel's nonverbal participation in the group. My quick response to Cara, without even understanding why she had chosen a particular clip, changed her focus for Unit 3, and I could not help but wonder what role I played in her making this change. This is not to suggest that the change was not appropriate or that it did not come from Cara's work as a teacher researcher but to suggest that Cara's willingness to heed my advice so quickly and without any collaborative discussion—that would have also involved Eva and Susan—was eerily similar to our earlier (the pilot and Unit 1) interactions.

Although, with the study group meetings, I began to meet with the teachers more frequently, I tried to minimize my influence and give them more control over the analysis of data. Learning how to mediate their learning, while also being a collaborative partner, was a complex process that I tried to track in my own fieldnotes. As university-based teacher

educators, Martin, Snow and Franklin-Torrez (2011) described the nature of relationships in their collaboration with student teaching partnership settings. They described the tensions shaped by the complexities of relationships and the ways they negotiated tensions to foster relationships that productively mediated processes of teacher education. They proposed that clinical contexts be understood as potential collective third spaces. Through individual and group conversations with school administrators, teachers, students, and student teachers, the authors facilitated "developing and fostering interactions that could move the student teaching context from one of *cooperation,"* in which the school simply agrees to take student teachers and comply with university expectations, to one of *collaboration,* in which "university faculty and P-12 teachers work together for joint aims" (Boyle-Baise & McIntyre, 2008, p. 311). They saw their role as critical to fostering and mediating relationships to work toward a collective third space, as Gutiérrez (2008) had defined it. Although the work the teachers and I were doing was not part of their pre-service teacher education, my role was that of an inservice teacher educator, Martin, Snow, and Franklin-Torrez captured well how I wanted to mediate the work of the teachers as they became teacher researchers.

I wrote in my research journal on January 20, 2010, as I reviewed a transcript from the March 30, 2009, SG #8 (InS):

> I like the way I led this discussion. I asked open-ended probing questions and directed the discussion to the group, such as, "Well what do you think it's called when they are totally off task?"; "What else?"; and "What do you guys think?"

I then listed examples of how I engaged the teachers in discussing what they observed and how I assisted them in describing what they observed. For example, Susan and I had disagreed with the way Eva had marked the code *funds of knowledge*. I explained to Eva that "as long as [she]

can talk about why [she] marked" the coding sheet as she had then that was more significant that the tally mark itself. It was these types of explanations that led the teachers to expand categories and develop new ones when needed, as will be discussed in the following chapters.

Most noticeable to me was how I was thinking along with them, having moved from instructing them to guiding them to being a collaborative partner. For example, as the teachers began to prepare for writing their thesis, on July 7, 2009, at one of our final SG #18 (OoS), we talked about the differences between qualitative and quantitative research designs and how my experience doing my research was similar to theirs:

01: **Bev:** Yeah I mean I'll tell you guys too the thing is I'm part of the process too I
02: don't I didn't know where everything was going to either that's a difference
03: between an experiment and a qualitative study is like an experiment you want
04: it to go like this qualitative study you just look at the process.
05: **Susan:** hmmm

Susan includes me as part of the process.

06: **Eva:** you don't expect anything
07: **Bev:** you don't expect anything [as results] and you use that kind of research to inform
08: **Susan:** But I remember one time Bev that you didn't know where you where going to go with this
09: and I said that's just part of the process. (laughs)
10: **Bev**: Was I frustrated?
11: **Susan:** **Yes** you were very frustrated!
12: **All:** (laugh hard)
13: **Eva:** I would say I don't know where I'm going either you aren't the only one (laughs)
14: **Bev:** It's hard to be part of a process

By this point in our work together, the teachers felt comfortable speaking not only to their experiences but also to mine, suggesting we had lived through experiences that bonded us in our similar yet different projects. Unlike my claims of having been a teacher like them, the claim of having had similar research experiences resonated with the teachers and me. It was a claim made to describe our experiences together and not to excuse or counter someone else's experience, much as the claim of my having been a teacher was used to alleviate concerns or tensions.

Much of what happened over the course of our study group meetings will be described in chapters (findings 2 and 3). What I want to suggest here is that the transformations I identify in the teachers' understanding of research and their own teaching practices is rooted in the collaborative work of the study group meetings and how we came to see another and interact. The LSciMAct project team's concerns about the direction the teachers' professional development was going precipitated this collaborative work and helped me begin a process of reflecting on my own interactions with Eva, Susan, and Cara. It is no coincidence, however, that once I began the process of reflecting on and transforming my role as a university researcher to be more of a participant in the work of the teachers and a collaborator in their efforts to make sense of that work, the teachers' roles changed, too. The next section describes holistically how their roles as teacher researchers changed and examines how the teacher researchers appropriated the data and the challenges they encountered.

The Changing Dynamic of the Study Group Meetings and Becoming Teacher Researchers

The study group meetings that began unofficially in February 2009 were opportunities for the teachers to share data from their classrooms and consider both their action research and their teaching practices. In this regard, the meetings were similar to Birchak et al's. (1998) study group description: "the study group serve[d] as a place to share, get support and receive suggestions from the other teacher researchers" (p. 20). However, our study group meetings did not officially begin until after the teachers had analyzed the first unit. Our first official study group meeting took place on March 5, 2009, SG #3 (InS). Prior to this, there was little opportunity for the teachers and I to meet and discuss our work. Susan, in her write-up about her Unit 1 implementation said:

> Comparing this [first] unit to our pilot unit, I felt that the group's collaboration [during the pilot] with reviewing videotaping, tallying and transcriptions made for a more thoughtful and enlightening process. Doing this alone made it difficult for me to review and reflect on my teaching and the participation or, lack thereof, of the students during the activities.

In their individual and group reports for Unit 1, all three teachers talked about the need for more collaboration. More specifically, they talked about the difficulties of analyzing the videos, which took them several months to analyze on their own. The teachers and I recognized that too much time had elapsed between teaching the unit and conducting the analysis. This elicited the teachers' concerns and sent me reflecting on my role as noted in the first part of this chapter. The rest of this chapter describes and analyzes the nature of in- and out-of-school study group meetings and my changing role as researcher.

Study group meetings. Between mid-February and July 2009, the teachers and I met as a study group 19 times, or about once a week. Eleven of the meetings took place at the school either before, during, or after the school day; I refer to these meetings as *in-school (InS)*. On holidays and during spring and summer vacations we met at my or one of the teachers' homes, in a coffee shop, or at the university; I will refer to these eight meetings as *out-of-school (OoS)*.

With the first OoS meeting and continuing for the duration of these meetings, the teachers said they felt more relaxed and able to focus on the tasks at hand, especially during the meetings that occurred during summer vacation. OoS meetings ran on average just over one hour and twenty-seven minutes (1:27:41); whereas our InS meetings average only forty-four minutes, thirty-six minutes (44:36). The time for each meeting was determined by the length of each audiorecording of the meeting, with recording beginning only after the teachers and I had

sat down and began our discussions and ending when we adjourned. The tape always ran the duration of the meeting.

The disparity in time between InS and OoS surprised me because we never set an established time limit for our meetings, although the end time for before- and during-school meetings coincided with the start of the school day or the end of lunch, respectively. Typically, even with those meetings, we planned to meet at least an hour and began the meetings earlier enough to meet this goal. Table 2 provides a breakdown of both InS and OoS meetings. What these meetings tended to look like is described in the following two sections.

Table 5.2 Adams Study Groups (Extended)

	DATE	LOCATION	UNIT	TYPE OF ACTIVITY	LENGTH
1	2/16/09	OoS Coffee shop	1,2	Individual report 1; Planning 2	1:30:51
2	2/26/09	InS Adams	2	Planning	1:00:41
3	3/5/09	InS Adams	1,2	Group report 1; Planning 2	1:24:00
4	3/12/09	InS Adams	2	Activity triangle; logistics	1:11:44
5	3/16/09	InS Adams	2	Planning	0:14:15
6	3/24/09	InS Adams	2	Planning	0:29:53
7	3/25/09	InS Adams	2	Coding; FNs	0:19:31
8	3/30/09	InS Adams	2	Coding	0:19:57
9	4/9/09	OoS Bev's house	2	Coding; Transcripts	1:47:30
10	4/22/09	OoS UIC	2	FNs, Choosing clips	0:55:23
11	5/1/09	InS Adams	2, 3	General	0:25:10
12	5/7/09	InS Adams	2, 3	Choose clips 2; Planning 3	0:49:50
13	5/13/09	InS Adams	2	Choosing clips	0:30:00
14	6/2/09	InS Adams	2	Coding; Transcripts	0:41:27
15	6/18/09	OoS Susan's house	2	Individual report	1:26:25
16	6/23/09	OoS Eva's house	2	Group report	1:32:00
17	6/30/09	OoS Bev's house	3	Choosing clips	1:28:00
18	7/7/09	OoS Bev's house	3	Transcripts, Themes	1:33:43
19	7/20/09	OoS UIC	3	Group report	1:27:39

The disparity in time between InS and OoS meetings does not suggest much in and of itself. However, the brevity of InS meetings does contribute to understanding the nature of those meetings, which often began later than planned, ended sooner than planned, and were continually

interrupted. These meetings were often hectic to say the least, and the length of time of these meetings compared with OoS meetings captures but does not confirm this nature. Similarly, OoS meetings regularly ran longer than the hour for which they were scheduled.

Meetings in school. Before we initiated the study group meetings, I asked the teachers where and when they would like to meet, knowing that we would have to work around the school day. They said they preferred to meet at school because it would be convenient for them. Adams school is a large brick school building that is about 100 years old. Its wide halls and tall ceilings give it an openness that belies the smallness of the classrooms, which were built for 30 students but could quickly fill with the clutter that often defines a teacher's life: book cases, filing cabinets, computers, etc. We usually met in Susan's or Eva's classroom, sitting at desks built for students 12 and 13 years old. Even without students, the room felt small and filled, with student work posted on the walls and their books on chairs and desks that were grouped in fours.

The school day and all the responsibilities that entailed for the teachers blended into our meeting time regardless of the time of day we met. Early morning meetings were often interrupted by hurried parent-teacher conferences as a mother or father dropped a child off or by meetings with the principal, who always had priority on the teachers' time. And there were always last-minute things for the teachers to do in order to be ready for the school day.

Lunchtime meetings were not much different, with time compressed by the need to ready themselves for the return of their students. The meetings were fast-paced and often conducted around the teachers taking care of other business, such as mentoring student teachers and observers, completing paperwork, and supervising students who chose to stay in the classroom instead of going to lunch. Our meetings were never private nor intimate, as there were typically student teachers, field experience observers, and students in the classrooms. Our lunchtime

meetings often focused on other matters than the teachers' research, such as curriculum and field trip planning and finding appropriate resources from readings to video games, with no time to discuss classroom interactions and our teacher research work. Time was spent planning for the rest of the day, and I found myself trying to be of as much assistance as I could.

Things were somewhat better during after-school meetings; however, these meetings were difficult to schedule because some of the teachers taught in an after-school program three days per week and on other nights they often had graduate classes to go to. Seemingly when we could meet we would have been able to relax and debrief in a building emptied of students. However, at the end of the school day, students lingered behind and other teachers trickled into the room to discuss their day. It became obvious to me that these short interludes were important to all the teachers, helping them cope with issues that had arisen during the day and steel themselves for the coming day. However, they impeded the work we had met to complete. And because they shared students, Susan and Eva always wanted to talk about how students were doing in each of their classes and compare notes on student progress. Our time after school usually began after the various interruptions and discussions of students and ended abruptly with someone, often Cara needing to go to her second job, saying she needed to leave earlier than we had planned.

The InS meetings quickly became an imposition to the teachers, an invasion of their school day. The immediacy of teachers' teaching lives could not be clearly demarcated simply with the removal of students from the setting. Their teacher lives bled into everything they did in school and took precedence, and it was hard to make room for the work of teacher researchers when (1) it was not immediately part of how the teachers defined themselves and (2) its relevance to the work the teachers were doing was not immediately evident. Too many other

things were too pressing to ignore and many of them needed immediate attention. The teachers could not take on teacher researcher identities within the context of school when faced with the constant demands of teaching.

Meetings out of school. With the pending completion of the Unit 1, the teachers suggested we meet in a neighborhood coffee shop on President's day since the school would be closed for the holiday. This was the first time we had met outside of school since the previous summer, when we were meeting to plan the action research. Although it predated the announced plan to create study group meetings, this meeting was in reality our first study group meeting. The seven subsequent meetings had taken place in school.

Seven weeks after that first study group meeting we met at my home over the teachers' Spring Break. The change in environments changed the mood of the entire meeting from the moment the teachers walked in the door. The typical hurried looks and brief snippets of discussion before being interrupted by students or other teachers were nonexistent. For the first time, the teachers arrived without needing to recount something that had just happened or quickly trying to finish something else so we could start the meeting. They arrived and for the first 15 minutes or so we exchanged greetings and settled into my dining room after taking a tour of the small apartment. I had prepared some food and drinks, and Eva had brought me a chocolate bunny and wooden brightly colored eggs. "It's a tradition in my country to bring something," she said. We admired the fine craftsmanship in the eggs painted designs, and then talked about the photos that were displayed in the room and enjoyed the food and drinks. And for the first time since we began our study groups, we began our work and didn't stop for over an hour.

For the rest of the school year, we met frequently outside of school, moving the meeting from one person's home to another's. We each appeared to take pride in inviting the rest of us into our homes, and always began by sharing food and drinks and relating something personal about ourselves that had nothing to do with who we were as teachers. Typically photos or belongings would elicit comments and a story would follow. We began to see one another as more than teachers, as we were also travelers, cooks, mothers, wives, caretakers, and women with different interests, abilities, and worldviews. Things we had never known about one another inside of school became more than cause for discussion. They also became a basis for building relationships that would inform our work together, some of which I described in the first part of this chapter in how the teachers' and my roles changed and our work became more collaborative.

Analysis of meetings InS and OoS. The changes in the mood and nature of our discussions between in- and out-of-school were evident to the teachers and me from the outset. We sensed, too, that we got more work done outside of school even as we also socialized more. My fieldnotes revealed that we did more, as the notes I collected consistently surpassed in length what we I collected in school. The study group transcripts, as noted above, were longer as the meetings themselves were longer. After reviewing these patterns in my fieldnotes, I examined the coded study group meeting transcripts in NVivo for the frequency of specific codes in and out of school. I identified five codes to examine in greater detail, three of which get at the nature of the meetings—*interruptions, planning,* and *other talk*—and two of which get at the development of the teachers as teacher researchers—*analysis* and *teacher researcher awareness*. Table 3 outlines how each code was defined and is accompanied by examples from the coded data.

Table 5.3 List of Codes In-School (InS) and Out-of-School (OoS)

CODE	DEFINITION	EXAMPLE
Interruptions	Interruptions, teacher arrived late or left meeting early, scheduling	Cara: The tools and artifacts was one of my questions (receives call from parent on her cell phone).
Planning	Activity triangle, inventory table, planning units	Susan: I want the students to learn how to ask in depth questions…
Other talk	Student teachers, student problems, graduate classes, field trips, standardized testing	Eva: The student teacher is going to do a soil experiment with the class.
Analysis	choosing clips, coding sheet, fieldnotes, themes, transcribing, challenges	Bev: So you're not using the coding sheet to choose clips, or you didn't this time?
Teacher researcher (awareness/change in practice)	Develops an awareness about the analysis, such as in using the codes and choosing clips and in recognizing changes in practice	Eva: In this unit it's more student discourse. I allow students to talk more. I put that at the beginning, I have to give them and yes it's a lot of talking.

Interruptions and *other talk* (e.g., talk about graduate classes, student behavior and problems, standardized testing, student teachers, etc.) reveal the degree to which outside forces (students, other teachers, administration) and outside concerns imposed on and disrupted our meetings. *Planning* reveals, in some ways, the logistics of our work and how it is we defined and carried

out the research. I also looked at the transcripts for evidence supporting a teacher researcher identity, such as analytical codes (coding, transcripts, reports), or what I coded as *analysis*, during the meetings. *Teacher researcher* as a code reflects those instances of the teachers take on the role of a teacher researcher as demonstrated in how they talked about their instruction. The graph in Figure 1 compares the average word per minute InS and OoS for each of the codes. Words per minute, as a way of capturing the prevalence of a particular type of talk, allow a comparison between and across codes for meetings of different time lengths.

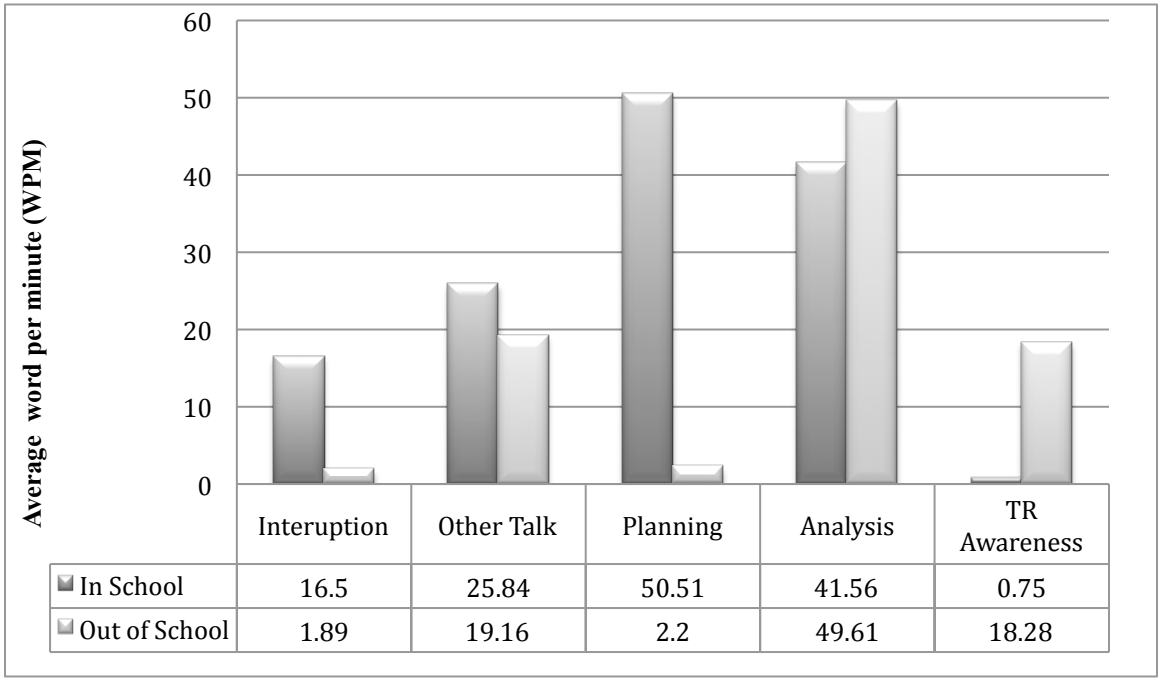


Figure 5.1 Study Group Meeting Codes IS and OoS

Evident in the graph is the decrease in *interruptions* and *other talk* from InS to OoS meetings. These decreases were immediate with the move to OoS meetings and remained consistent across all meetings. While it was significant, as already noted above, OoS *other talk* was qualitatively different than InS. OoS *other talk* focused on personal experiences and socializing.

Also evident is the large amount of time spent on *planning* InS, with *planning* taking more time than any other meeting activity in school. *Planning* was often a priority in our InS meetings, especially when we were hurried and wanted to ensure next steps in our work were identified. Together, *interruptions*, *other talk*, and *planning* took up the majority of in school meeting time, capturing the disjointed and hurried nature of these meetings.

Analyzing the research process and the data collected (*analysis*) was consistent across settings, possibly reflecting the one goal that was consistent across all meetings during the duration of the project. We were meeting to analyze data. However, the *awareness* of themselves as teacher researchers was much more evident OoS, which can be attributed to a number of things. First, as already noted, the change from InS to OoS meetings facilitated more opportunities for the teachers to take up teacher researcher roles as the interruptions of school were eliminated, but also OoS meetings fostered ethnographic relationships through the sharing of food, personal artifacts, laughter, and comfortable chairs. Second, my efforts to redefine my role in the group was designed, in part, to support the teachers' development as teacher researchers. And third, because most of the OoS meetings took place near the end of our project, it is quite possible that the teachers had begun to appropriate the language of teacher research. They had begun to master the Discourse of teacher research and by bent of experience had developed a level of expertise both warranted by and evident in the work they had done.

Conclusion

These data, as general as they are presented in this chapter, raise questions about support mechanism that can facilitate action research and the development of teachers as teacher researchers. Some general observations, which I will develop further, include:

1. There appears to be an incongruity between the roles of teacher and teacher researcher, at least based on how teachers often understand their roles as teachers. That is, being a teacher in the typical sense, especially in this era of high stakes testing and teacher evaluation, does not appear to allow for being a teacher researcher.
2. Time and experience appear to be key factors in professional development, which should be no surprise, since research suggests as much. What may be surprising and related to #1 is the importance of place or where professional development takes place and the types of relationships, including the nature and intimacy of the talk and the immediacy of the collaboration, that are fostered. While I cannot disentangle time from place in the limited data I have, I suspect they work in tandem based on the clear differences that became apparent when we started meeting outside of school.
3. Related to #2, is the role of reflexivity in how I went about working with the teachers. As noted above in my discussion of ethnographic challenges, my reflection on my role and the teachers' and my relationship initiated much of the changes that made the observations in #1 and #2 possible.

I have touched on in this chapter some of the professional development program challenges we faced and how we addressed them with the study group meetings. I have also touched on the school and district challenges, which included the challenges of meeting in the school. In other places, too, particularly in chapter (Discussion), I take up these challenges in greater detail. However, it was through the study group meetings and the changing roles of the teachers and me as researchers that what I call ethnographic or personal challenges were

addressed, and in being addressed, relationships were built that facilitated the collaborative work at which the teachers and I eventually arrived.

I use the term *ethnographic challenge* to capture those challenges that are innate to who we are as human beings, most particularly those challenges that arise from our individual existences and are uniquely ours even as there may be similarities of experience and challenges across individuals. Building collaborative relationships requires a full accounting and addressing of such challenges. By accounting, I mean the need to recognize one's own position within the collaborative framework and the role one plays in relations to others and what that role facilitates and hinders. In my case, various roles, such as that of a former teacher, a university instructor, and a university researcher affected my relationship with the teachers, and while I did not shed these roles over time, I did reflect on what they meant to the teachers and me and looked for ways to transform them in the service of our work together. Similarly, I perceived in the teachers a changing understanding of who they thought they were as teachers and what they were capable of doing. This is reflected in the work they did as teacher researchers, which I describe in the next chapter.

Related to these role transformations is what we learned about one another beyond our public roles as teachers and researchers. The data suggests getting to know one another outside of teacher and researcher roles facilitated relationship building and collaboration, and also relationship building and collaboration facilitated our getting to know one another. I believe it was probably dialogical in that the evolution was contingent on our efforts both to get to know one another and to build relationships and collaborate. That is, one could not have happened without the other. Additional inquiry is needed to better understand the nature of this dialogical

relationship. For the purposes of my research, the work of the teachers speaks to what all this meant and why it is important.

Becoming Teacher Researchers

Teacher research has been critiqued on methodological grounds that challenge "the very notion that practitioners have the skill, the distance, or the analytic capabilities to conduct research about their own professional contexts" (Cochran-Smith & Lytle, 2004, p. 626). Such challenges are rooted in a long history of teaching de-professionalization and the chasm between P-12 education and post-secondary education. In this chapter, I pick up where I left off in the previous chapter to describe how I facilitated professional development that helped teachers use fieldnotes, coding, and transcripts to study their praxis and inform curriculum development. I describe how the teachers evolved as researchers and how this evolution informed their classroom practices. In turn, I will make a clear distinction between praxis and practice that is important to understanding the value of the professional development to the teachers. I suggest that the teachers' evolution as researchers was informed by their data collection and analyses efforts that focused in praxis and not practice.

In becoming teacher researchers, the teachers experienced tension negotiating their roles as teachers and their roles as researchers. Reflecting on the implementation of Unit 1 (June 23, 2009, SG #16, OoS), they joked about how they just followed the procedures outlined by the university researchers – "I just did it because you told us to," Eva said—in analyzing their classrooms as part of the program requirements. However, in the write-up for their second unit implementation, they identified the tension they experienced in using the analytic tools as creating "a disequilibrium" in their understanding of what it means to be a teacher researcher, marking the first time that they questioned the role of teacher researcher that was thrust upon them by the requirements of their professional development. Susan explained it in terms of how her students learned: "We go through cycles in learning, we get frustrated and [we] catch onto

something, and then we get frustrated again." She extended this process to her and the other teachers' work in the study group meetings. Tension arose from disequilibrium, or when things did not go as planned or their beliefs and expectations about teaching were challenged, and they had to think anew about their roles, their students' roles, and the nature of the work they were doing as teachers and researchers. Those times when they "caught onto something," or seemingly suddenly had a breakthrough in their thinking and realized other possibilities, were times in which they began to change the tools they were asked to use by making them their own, that is, by making them tools that could be used to inform their practices and not just facilitate the completion of what they were told to do. By the time the teachers implemented the third unit, Eva used the term "opening up" to refer to the type of classroom she had created, one that I interpreted as dialogical. Similarly, she applied the term *opening up* to the productive spaces mediated by the study group meetings, where they now identified new codes or began using transcription conventions to make sense of their learning. How they worked through tensions is significant for what it says about the relationship of theory to practice and how the teachers were positioned to take up theory in meaningful ways. First, however, I want to pick up from my literature review and establish how a CHAT and action research framework informed the teachers' interactions.

CHAT and Action Research

Educational researchers have adopted CHAT as a theoretical framework primarily for its overt articulation as a theory *for* praxis and practical action (Razfar, Khisty & Chval, 2011; Roth & Lee, 2007; Wells, 2011). Roth and Lee (2007) drew on Bakhtin (1993) to define *praxis* as "the moments of real human activity that occur only once" and distinguished those individual moments from the notion of practice, which is "used to denote a patterned form of action,

inherently a theoretical signified" (p. 190). For example, when a teacher teaches, she is participating in praxis in that the in-the-moment interactions that take place within a classroom community can never be repeated. In this regard, those interactions can never be predicted either. However, when she reflects on what she has done in her classroom, a teacher is examining her practices. By analyzing classroom videos, the teachers in the professional development were able to revisit past praxis to the extent that they can witness again something that could only occur once. An analysis of these videos, however, can serve to inform their practice as teachers and their praxis going forward, with such information accessible in the moment of praxis and potentially transformative. Eva, Cara, and Susan's action research drew on the CHAT framework just as my dissertation work draws on it.

The Master's program in which the teachers participated was designed to apprentice them into using activity theory as a way to think about learning and curriculum design. They read articles, conducted action research, and studied and shared their understandings of their classroom practices in study groups, and developed interdisciplinary units guided by problem solving activities. In their thesis, the teachers defined cultural-historical activity theory (CHAT) as, "examin[ing] the activity of an interactive *community* where the culture of collaboration and the knowledge or expertise of all members is valued and explored" (p.11). The teachers recognized the fluidity of relationships that must occur within such a community, especially in regard to expertise roles.

As noted in the Introduction, the LSciMAct Project team adopted a cultural-historical activity theory (CHAT) framework (Engeström, 1999; Wertch, 1991; Cole, 1996; Vygotsky, 1986) to learning and development because this framework allows for both a questioning of the structural determinations of current educational practices and a way to analyze data in

classrooms. Thus, it was a framework that we thought would allow the teachers to look systematically at their classroom practices and study change over time. The teachers' work was given direction by their development of an "activity triangle" (Engeström, 1999), which was used as a heuristic to develop activities and analyze an activity system, such as the classroom. The term *activity* is not to be equated with relatively brief events with definite beginning and end points – characteristic of school-based tasks – but with evolving, complex structures of mediated and collective human agency. Here, learning is equivalent to the mutual changing of *object* and *subject* in the process of activity. All components of the activity triangle – subject, rules, community, division of labor, object, tools and artifacts –reinforce a goal (Roth & Lee, 2007). The focus is on problem solving a goal-mediated activity. Language – anything used for meaning making such as signs and symbols – is the primary mediational tool and medium in which learning occurs. Thus, for the teachers to analyze their classroom activity, classroom discourse samples had to be collected and the analysis of these became one of the main foci of the action research.

The activity triangle is composed of 6 inseparable elements: *object, subject, mediating artifacts, community, rules,* and *division of labor* (Cole & Engeström, 1993; Engeström, 1987). The activity triangle that defined the teachers' and my work is shown in Figure 1. The *object* was to use research tools and third space theory to develop an authentic integrated curriculum. The *subject, mediating artifacts, community, rules,* and *division of labor* for our work is identified and taken up in this and other chapters with the outcomes being the findings for this and the next chapter. These elements are mutually constitutive as shown in Figure 1, with the interconnections among elements integral to the development of each element. It is the relationship amongst these elements that is the basis for the analyzing of praxis and the

supporting of interaction. However, as Latolf and Thorne (2006), acknowledge, "Relations are unstable, contentious, and constantly negotiated and transformed, even in contexts [such as schools] where historical-institutional inertia would seem to predict simple reproduction" (p. 224). Thus, analysis should be seen as ongoing and interactive, something we tried to build into the teachers' professional development.

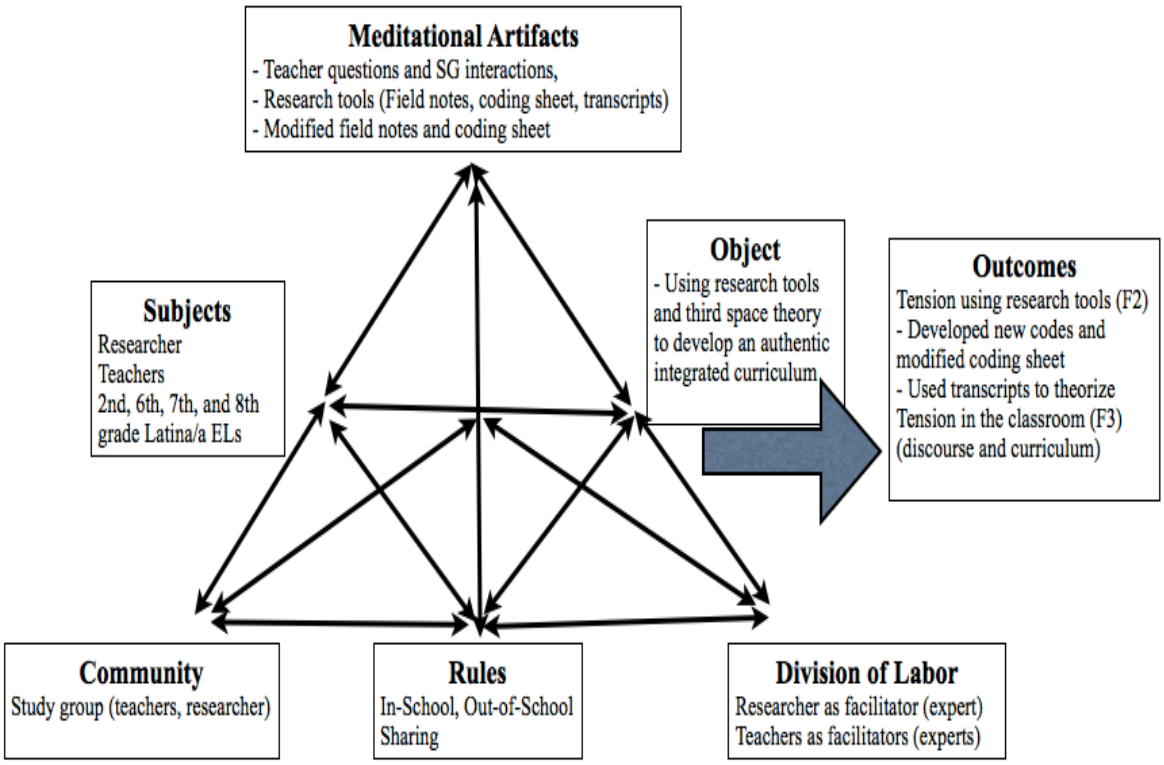


Figure 6.1 Activity Triangle

The value of a framework like CHAT resides in its ability to disassemble any notion of reproduction that suggests interactions are repeatable or can be controlled. It also suggests that professional development in its strongest sense arises from consideration of one's own practices and the praxis that are engendered by those practices. A CHAT framework, according to Razfar, et.al, (2011), allows teachers to consider "how the subjects are shaped by the tools, the rules are shaped by the interactions, and the division of labor is not static as roles are expected to shift"

(2011, p. 204). Any effort for the teacher to control all this is more than just folly; it is detrimental to student learning. The issue becomes how to recognize the relationships among these elements and negotiate role shifts to the benefit of students.

In my use of CHAT, Eva, Cara, and Susan's action research guided the *object* of the activity, which in turn guided individual action and connected actions to collective activity. The object of the teachers' research was to use third space theory to develop an authentic integrated curriculum, which was the goal of the LSciMAct Project. As the *subjects*, the teachers and I worked toward the object of developing authentic curriculum using third space theory that was implemented in each of their classes with a focus on the learning of English learners. The teachers' work was mediated by various tools to "carry out cognitive and material functions" (Lantolf & Thorne, 2006, p. 213). Mediating artifacts are both material and symbolic, and they constrain and afford actions. Much of this chapter looks at the mediating artifacts that were the research tools. In our research, the teachers and I used fieldnotes, video coding, and discourse analysis as *mediating artifacts* to study and inform praxis. The object culminates in outcomes that are both desired and unintended and a source for continued activity.

As noted in the previous chapter, in mid-February, 2009, soon after the completion of Unit 2, I introduced the idea of study group meetings to the teachers, framing the meetings as an opportunity to discuss emergent research understandings. As described in the chapter, the study group's *rules* and *division of labor* shifted based on where we met—inside or outside of school. This shift is captured in the changing *community* and *rules* that mediated the object of the study group meetings.

The rest of this chapter describes how the outcome that was the teachers redefined the research tools—the fieldnotes, coding, and transcripts—became mediational tools for continued

study and informing of practice. This redefinition was mediated by the tension the teachers experienced in using the research tools as part of their efforts to become teacher researchers.

Navigating the Tension of Finding Time to Document Classroom Praxis

Teacher researchers are often encouraged to use journaling as a tool for tracking and reflecting on classroom practice (Cochran-Smith & Lytle, 1993). Such practice can, no doubt, be a valuable tool for exploring the dynamics of the classroom and identifying trends over time (Pappas & Tucker-Raymond, 2011). As part of the LSciMAct project, we asked the teachers to write descriptive and analytic fieldnotes about their teaching practices, drawing on the theoretical concepts of CHAT and third space that they learned about in their coursework in the early part of their Master's Program. During this coursework, we taught the teachers how to take descriptive and analytical fieldnotes (Glesne, 2006) as a way to identify problems, develop questions, and understand patterns and themes in their classroom practices. These notes provided them with a way to revisit, analyze, and evaluate their experiences over time and in relation to broader frames of reference. Likewise, the notes provided access to the ways they constructed and reconstructed their interpretive perspectives using data from their classrooms.

However, assisting the teachers with writing in-the-moment fieldnotes, or fieldnotes as they were teaching, or immediately after teaching, was a challenge for me as the facilitator of the professional development. While implementing Unit 1, the teachers turned in fieldnotes late or not at all, which led me to use the study group meeting time to discuss the challenges of taking fieldnotes. In our April 22, 2009, SG #10 (OoS), I reviewed how to use the fieldnote template[3] to take descriptive and analytic fieldnotes, and encouraged them to document their thinking using a fieldnotebook during class. The teachers responded, saying that taking fieldnotes was the hardest part of being a teacher researcher:

[3] Fieldnote template in Appendix A.4.

01: **Bev**: I know the fieldnotes has been hard from the beginning.
02: **Susan:** That's the hardest. That really is the hardest.
03: **Eva:** Uhm. Yeah.
04: **Bev:** What can we do?

Prior to this revelation, our conversations about fieldnotes had focused on logistics, such as getting into the habit of taking fieldnotes and finding time and a method that worked for each teacher.

In an earlier meeting (March 25, SG#7, InS), I had commented on how I liked seeing Susan carry her fieldnote book during class and encouraged that Eva and Cara to do the same. All three teachers immediately noted the challenge of taking written fieldnotes, and we discussed alternatives or modifications to the process:

01: **Susan:** A recorder is easier because you can just stick it in your pocket whereas when you're carrying
02: a notebook and you need to use your hands so you sit down and you have to go looking for it,
03: and I hate that part of it too.
04: **Cara:** Yeah where is it? Where'd I put it?
05: **Susan:** I set it down and then I forget where I put it, and then I'm looking for a hand it's just like, it's
06: just so discombobulating. (laughs)
07: **Bev:** What about a smaller notebook? What about something that you can even put around your…
08: **Eva:** I lost it. I forgot where I put stuff (laughs) Have you seen my notebook? (mock voice)
09: **Bev:** What about something like you could put a string around and put around your neck and so
10: when things happen during class you can write them down?
11: **Susan:** Do you see how much jewelry I wear?
12: **All:** (laugh)
13: **Bev:** Alright. I'm just throwing ideas out there

The teachers articulated how during a busy day a fieldnote book can get lost in the shuffle of the classroom life (2-5, 8). To write notes while teaching was not easy (6). I saw how the notebook became an impediment to taking in-the-moment fieldnotes, and attempted to offer solutions (7, 9-10) without much success (11-12). For the teachers, the taking of notes, regardless of how they would do it, just could not be done while they were teaching. This accoutrement of teacher researcher impeded teaching, and the teachers saw no way of integrating this practice of teacher research with their practice of teaching. I realized that I needed to consider other alternatives offered by the teachers (1-2) that did not interfere with teaching. Until being a teacher researcher became part of being a teacher, anything done while teaching would be an impediment.

At our meeting on April 22, (SG #10, OoS) I was frustrated with the fact that the teachers continued to find it difficult to take fieldnotes during class and mostly wrote their fieldnotes retrospectively later in the day or even days or weeks later. It appeared the difficulty of writing fieldnotes was more than only a matter of developing the habit or routine of using a field-notebook or voice recorder.

For the teachers, taking fieldnotes took away time from doing what they thought they should be doing as teachers:

01: **Cara**: And it definitely will, it is just trying to get into the habit of doing it you know? And I think
02: we'll get so caught up in being in the middle of everything instead of being able to step away
03: for a minute to our desks to do anything. I mean we just are not those kinds of teachers you
04: know? Okay you guys to sit there and do your thing for five minutes, you know.
05: **Susan**: I'll tell you, one day this week I have been playing games. It was wonderful. I did go an
06: clean up my desk. Boy I should do this more often.
07: **Eva**: I can never do that even when they have tests. I have to be there to see what they are doing. If
08: they are not doing it, do it again. I cannot stay, do something else, I have to be there with my
09: students. Like I cannot sit.
10: **Susan**: I felt guilty. Ye::ah

Cara and Eva said they were teachers who "don't sit at their desks." Susan, too, expressed guilt the one time she tried to take fieldnotes during class. I remembered my own teaching experience and understood the teachers' dilemma:

11: **Bev**: Yeah yeah I remember when I was teaching [high school] I would hardly ever eat because the
12: whole day you would just go and go…
13: **Eva**: At the beginning when I start, I didn't even go to lunch to eat or to have my break. I in my
14: room and do my stuff and eating at the same time.
15: **Cara**: Oh not me, I gotta eat. You want me to stand up and focus I gotta eat that is so::: bad.
16: **Bev**: Ah ha ha ya it is really bad. It is a bad habit.
17: **Eva**: This is the first year or I go in the lunchroom and eat. I take the 20 minutes.
18: **Susan**: It's nice isn't it?
19: **Eva**: Yes it's nice.
20: **All:** (laughing)

Eva's recalling of the guilty pleasure of a 20-minute lunch reminded me how I had never seen any of these teachers sitting down at their desks (line 17). To take fieldnotes would have required them to become a different type of teacher, at least in the teachers' minds. Knowing this, I encouraged other means and methods of taking fieldnotes.

I drew on Loflands (2005) distinctions among mental, jotted, and full fieldnotes to suggest to the teachers that there were other ways in the moment to track what was happening in their classrooms. *Mental notes* are a way of tracking a discussion or capturing an observation when stopping to write it in a notebook is impossible to do. They involve no effort to record anything in the moment but do require conscious attention to what is being observed and a commitment to record the observations later. *Jotted notes* are the few words jotted down to help one remember a thought or a description that can be used later to write fuller, more detailed observation. The *full fieldnotes* are the running notes written preferably throughout the day, but sometimes depending on the circumstances, after the observational period (Glesne, 2006).

By expanding the possibilities in our study group meeting of how to track what was happening in their classrooms, each of the teachers adopted and further developed a method for taking fieldnotes that supported her research and professional development. Eva used mental notes for weeks until she found time to put them in the fieldnote template. Cara began to record fieldnotes in her notebook while students worked in groups or directly after teaching a lesson during her prep period. However, she did not reflect on and type her fieldnotes until days or weeks later, and sometimes not at all. Susan used a voice recorder to capture her thoughts and then tried to write her notes in the evening; however, she found writing notes during class and later typing them "a waste of time" (March 25, SG #7, InS). And all three teachers came to articulate what they would and would not do.

012: **Susan:** We're supposed to be doing both this [typed fieldnotes] and that [fieldnotebook]?
013: **Bev**: Yeah.
014: **Susan:** Oh, there's no way (laughs).

As we began implementing Unit 3, I continued to stress the importance of taking detailed written notes or audio recording notes as soon as possible (Merriam, 2001), but I understood the balancing act the teachers thought they had to play between being a teacher and a researcher.

Navigating the Tension of Making Fieldnotes Meaningful

Issues of finding time to write fieldnotes were not the only tensions the teachers faced in taking up teacher-researcher methods as part of their classroom practice. At the March, 25 meeting (SG#7, InS) Cara, in expressing concerns about finding time to write fieldnotes every day, stated that "taking fieldnotes was difficult to do during class time. There was a time gap between learning the concepts in our action research class and the time when we implemented our plan." And Eva explained about the time needed to "think exactly what to look for" when she writes fieldnotes and referred to making connections to the tally categories in the analytical section. Although time appears to be the major concerns expressed by Cara and Eva, underlying the issue of time is one of value: What purpose should the fieldnotes serve? Cara suggested that it was difficult to draw on what she had learned in her action research course to support her fieldnote taking. And Eva noted, "I need time to think about what to write", suggesting that fieldnote taking had a specific purpose.

Also at the March 25, 2009, SG#7 (InS), Susan shared an example from her fieldnotes, saying that she "described the activity and then I just try to think of all those categories we have when we tally and I try to think of **one category** that I really noticed that day." She explained how she was making connections to the coding when writing fieldnotes during class:

01: **Susan:** So I do a lot of third spaces because we talked about that in the first unit and for myself I like
02: the rule negotiation and the role negotiation and I like when they become the experts like what
03: we have been talking about.
04: **Eva**: That's good, that's good

Susan focused on third space as an on-going theme, studying the intricacies of how it emerged and using other codes to support her work. The excerpts below show how Susan's fieldnotes changed from Unit 1 to Unit 3. I have highlighted words and phrases in the text to show how Susan appropriated the codes.

Retrospective Fieldnote: Excerpt of Susan's Unit 1 Fieldnote (written at end of unit, 4-2-09)

I had students write a paragraph about their favorite game and try to explain how they see math, science and reading in the game. After presenting the names of the games, students chose what game and group they were in. I wonder if it would have been better if I had collected the games and placed them accordingly to the game instead of letting them choose the group. I realized they chose groups according to friends instead of games. I really wanted them in groups by game. I also noticed I even encouraged some of the girls to stay in all girl groups instead of heterogeneous groups. I think I thought that the girls would **participate** (talk) more in homogenous groups. However, except for two girls, one who has never played video games and one who plays less often, all of the girls were as actively involved as the boys.

I've noticed in their small group interactions that they spend a lot of time on **role negotiation** – who is going to do what. They also spend a lot of time trying to decide what the rules are – who should talk when, who should record the brainstorming, and who should work on the poster. For any writing activity the person who had 'good handwriting' and knows how to spell generally ends up being the recorder. How could I help establish rules for roles?

At one point the students started talking about how their parents view video games. They were very engaged and animated during this conversation. I'm wondering how I could 'use' this issue – is this a **third space**? Could I expand on the differences and disagreements they have with their parents? Is this an issue that the students would like to talk more about and explore?

In-the-Moment Fieldnote: Excerpt of Susan's Unit 3 Fieldnote (5-19-09)

Today in the focus group we saw a lot of **participation shifts**. At first Arthur wasn't participating at all. He had his head down on the desk and was very quiet. I went over to ask him what was wrong and if he was tired. He stated that he was bored because the girls didn't want him participating since the 'accused' him of being the one in control in the past and doing everything. This lasted for about 10 minutes, I think. At that point, I saw him **assisting** and making recommendations again, although he wasn't playing the game. In fact, now that I think about it, I don't think he played the game at all – except one time when the girls were stuck and he **helped them out**. Grace and Sonia mostly took turns playing the game and they both looked very comfortable doing that while Iris verbally **assisted** them with the game. Iris and Arthur **argue** a lot about what to do and **accuse** each other of building things. For example, they were arguing about a road that was built. Iris accuses Arthur of building it, but he says it was there when he started helping them out. Even while the girls are playing, Iris continues to **blame Arthur** for what's going on in the game. The girls don't like what's happening. Sonia continues to **talk in Spanish** while Iris continues to **be the expert** (and taking turns with Arthur when they get stuck). At one point Arthur blames Iris for destroying a factory – she doesn't deny it. At one point A. also tells Iris to ask Grace since she's in control of the game. These are examples of **participation shifts, role shifts, tension**, and possibly finding the **third space**.

The major differences between the Unit 1 and Unit 3 fieldnotes are (1) when Susan wrote them in relation to Unit implementation and (2) the nature of the details. Susan wrote her Unit 1 fieldnote retrospectively at the end of the unit. She wrote the Unit 3 fieldnotes the same day as the observations were made. Both fieldnotes provide a description of activity observed; however, in Unit 3, Susan integrated the codes into the description of the activity. In the Unit 1 fieldnotes, she commented on the student groupings around *role negotiation* and *participation*. In the Unit 3 notes, she identified examples of four codes: *participation shifts, role shifts, tension*

and *third space*. Susan shifted in the Unit 3 notes from a "wide angle" lens to a "narrow angle" lens to focus on specific interactions and events (Merriam, 2001).

During our March 25, 2009, SG #7 (InS), I used Susan's fieldnote from Unit 1 to clarify the difference between describing and analyzing an experience. The teachers wrote descriptive fieldnotes but struggled with analyzing those notes. Eva explained, "I wrote what caught my attention, that's it." Entangled in their descriptive notes was plenty of observer commentary, so the teachers did go beyond only describing events to begin to engage in some preliminary analysis (Merriam, 2001). The teachers' comments about the setting, people, and activities, however, raised questions about what they had observed and what those observations meant to them. I explained how to use observer commentary using Susan's fieldnotes as an example:

> Since Susan did hers like this, what I would do is maybe go through and write, OC, see observer comment, since some of this might not be descriptive. So what you can do, you can do it two different ways. You can do it all on one [inserting OC] or you can do the descriptive summary and then the analytic narrative. If you combine them together you need to just note where your reflections are. So you do that with OC in parenthesis.

Susan's fieldnote was missing the "OC" marker to distinguish the analytical from the descriptive. Her fieldnotes, however, were full of OC examples, such as "I've noticed in their small group interactions that they spend a lot of time on **role negotiation** – who is going to do what" or "I'm wondering how I could 'use' this issue – is this a **third space**?" Toward the end of the study group, Cara asked me to share an example of using "OC" in my fieldnotes. I shared my fieldnote from a recent visit to Eva's class:

> So I'm writing down things that I think are interesting points so here's the descriptive. I said, "teacher asked students for example of desert. My observer comment is, here we

see their funds of knowledge. Students say first Mexico, Arizona and then Eva moves in. Descriptive. Teacher asks students to come up and point to Africa and then find the Sahara Desert. OC. So she moved from funds of knowledge here to the largest desert". So when students say things like, you know tell me about a desert where do you know a desert, it's in Mexico, it's in Arizona, you know in your mind that oh, those are deserts, they are familiar with so that's a good point where you might want to extend upon it.

The teachers went back to review the themes they identified in their Unit 1 written reports and to make connections in developing themes for Units 2 and 3. Some of the themes they discussed included the nuances of grouping students, engaging in third spaces, and observing multiple languages as tension among students. I will discuss these themes in more detail in a later section of this chapter.

Taking a cue from Susan's examples, I reiterated the importance of jotting down a thought or description, during class, in-the-moment, to support their later fieldnote writing:

01: **Bev**: So when you see examples of those types of codes happening, that's when it's good to
02: have your notebook with you because you can't go and type it up right away at the computer,
03: so I want to look at on the video where I saw this happening today or say I saw a good
04: example of third space today with these two students. And that is even enough to jog your
05: memory when you go back and look through this stuff.
06: **Eva:** those notes as soon as you, for me I start writing and then I have a lot of whoosh it comes
07: back
08: **Susan:** then it starts coming back

The teachers continued to struggle with the fieldnotes but began to use codes and themes as a guide to their later writing of fieldnotes.

As the teachers began to implement Unit 3, Susan realized that her lengthy emails to me could serve as a form of fieldnotes, as she often debriefed about the day. She shared this realization with the study group on May 7, 2009 (SG #13, InS):

01: **Susan**: When I sent you a new e-mail, I went back I thought wait a minute I should be putting this in
02: my fieldnotes too.
03: **Bev:** Yes!

04: **Susan:** so I went back and copied them and [put them in and then added things.] (laughs)
05: **Bev:** [I keep all my e-mail.] (laughs)
06: **Susan:** So I added that
07: **Bev:** Oh that's good.
08: **Susan:** I added a bunch of other things so that was a really interesting day, yesterday was a very
09: interesting day. To me the students were just so much, and I should write about this, I don't
10: think wrote about it, they were so much calmer as the rest of the day.

For example, Susan's email the previous day, on May 6, 2009, at 10:38 p.m. included:

> … I just finished reading the writing responses and I'm blown away. There were some incredible responses - like I learned how to get along with someone and now I think I can be their friend. This is a very unexpected outcome! There was only one group that didn't work well together and I think I know why. There were 3 groups downstairs and one group was with Eva. That group has 2 girls in it and the 'boyfriend' of one of the girls was in my room - so when I went down to check on them, there they were sitting and talking in my room. I was afraid that was going to happen. I think you will be very interested in the responses!
>
> I thought of the last box after you left - a ladder - which symbolizes helping someone. So some of them did reflect on how they helped someone or were helped by someone. A lot of them talked about how the talking in the group helped them form new ideas. One boy even said he discovered he was creative. No wonder they like video/computer games!
>
> I did pick up another game - there were 4 at this Best Buy! I'll think about bringing my laptop tomorrow - if I can find my bag for it. If we could get 3 more laptops, I think we could have everyone working upstairs. But since I'm making an additional group I think we'll need 4 laptops. Some kids talked about bringing their laptops, but I'd rather not go there.
>
> See you tomorrow.
>
> Susan

An on-going theme for Susan had been grouping students. She recognized emails as a reflection or analytic comments that helped inform future planning. Over time the teachers saw the benefits of writing in-the-moment fieldnotes even as they struggled to do it. In this regard, there was always that tension between knowing what needed to be done and finding the time and inclination to do it. This really hit home when they had to write their unit reports and, later, their cohort thesis and felt much of their fieldnotes lacked detail. Important, however, was the teachers growing understanding of the work required of a teacher researcher and their efforts to negotiate that work within their understanding of who they were as teachers.

Navigating the Tension of Using Coding and Transcripts to Informing Practice

Coding is a technique used routinely by qualitative researchers to organize and manage data at two levels: identifying information about the data and interpreting constructs related to doing analyses (Merriam, 2001). In order to interpret data collected, researchers develop categories (Burnaford, Fisher & Hobson, 2000) that define in some way not only what they observed but also relate to and/or support the construction of theory. The LSciMAct Project introduced the teachers to a conceptual framework for coding in their *Action Research and English Learners* course, one of the first courses they took as part of their Master's Program. I reviewed this conceptual framework with the teachers when they began to watch videos of student groups of the Unit 2 implementation. We set aside meeting time to discuss how they were coding their videos using the coding sheet[4] developed by the Program.

The original coding sheet had nine codes that the teachers marked in two-minute increments as they watched the videos. The teachers said that coding videos during the first unit implementation had made them aware of which students talked in a group, the conflicts and power dynamics of groups, and the topics (such as video games) that engaged less vocal students, particularly ELs, to participate. The teachers also spoke of challenges with coding, such as needing to view videos multiple times and the difficulty of understanding and appropriating the categories that were established by the Program. Thus, we decided to spend some study group meeting time viewing one another's video clips and discussing coding.

Although the LSciMAct Project team developed the codes, I encouraged the teachers to interpret them in ways that met their needs and to develop new codes based on their data. In our study group meetings, we talked about coding decisions, and how we interpreted codes when we applied them to particular classroom activities. The teachers used these discussions to question

[4] Coding sheet template in Appendix A.3.

not only the boundaries of what a code could mean but also the theoretical concepts from the articles we had read and they were now using in their own work. They questioned just how fixed these concepts were.

As noted in the previous chapter, the study group meetings served as a space for teachers to make sense of their research in light of what they had been studying, including shaping the boundaries of concepts that informed their theoretical framework, in the context of their classrooms. They used the coding sheet as evidence of changes in their practices that they then documented in their unit reports and cohort thesis. In the process, they also modified the coding sheets, based in part on what they wrote in their fieldnotes and on the coding sheets and, in part, in the study group meetings, to make them relevant to their classrooms. Figure 6.2 provides a diagram of the reciprocal process in which the teachers engaged that made it possible to revise the coding sheets based on their practice and subsequent theorizing. It evolved from joint activity in which the codes were discussed and critiqued to using the revised codes to theorizing their classroom practice based on those revised codes to again discussing and critiquing codes and so on.

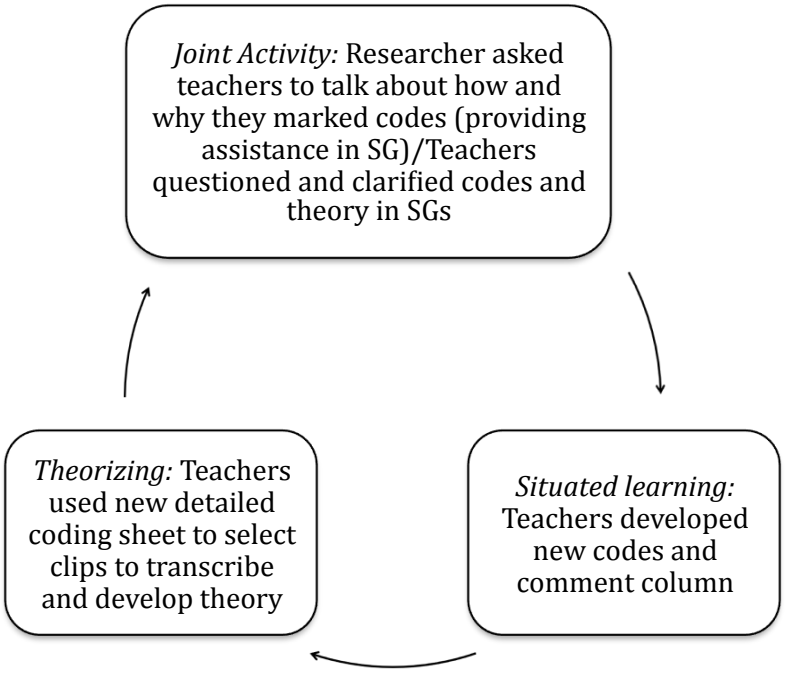


Figure 6.2 How Teachers Extended the Codes/Concepts into their Own Contexts

However, this process did not become possible until after the teachers began to problematize the codes—redefining and developing new codes as needed—as given to them by the LSciMAct project. The following subsections describe the evolution of the teachers from teacher researchers being told what to do to teacher researchers reflecting on their work as researchers.

Learning to negotiate the tools of research. As mentioned in the previous chapter, the teachers wanted to bring back the collaboration they experienced planning and analyzing the pilot unit. A sociocultural view of learning conceptualizes the nature and purpose of collaboration as "joint activity," or coordinating learning with others, where learning is a socially mediated process. Thus, collaboration in this sense, is understood as co-participation and co-problem-solving in the study groups to create new knowledge, or to "clarify their own emergent understandings of the task and its goals, share knowledge, assist one another, and shift roles in the process" (Gutiérrez et al., 1999, p.88).

Beginning with the implementation of the second unit, I asked the teachers to bring in clips to share and to talk about how and why they had coded them. At the March 30, 2009, SG#8 (InS), Susan said:

> I'm glad we're going to do it together because I find it a little frustrating and sometimes I feel like I'm almost trying to be into it **too** much. Like I'm really trying hard to find things, where I don't know if these things really are going on.

Eva and Cara were also struggling to code the video clips. For example, during the March 30, SG#8 (InS) Eva identified how she had coded a segment of a video as *tension* and *peer assistance*. Eva explained how in the clip she was preparing the sixth graders to create a community garden as part of a science project while the same students were reading Paul Fleichman's *Seedfolks* (1997) in Susan's language arts class. In the video, Eva can be seen setting up the lesson. During the study group meeting, she explained how she was introducing a lesson on soil. In the video, she held a globe in her hand and asked the class, "What percentage of earth is made of water?" The learning objectives for the lesson were for students to convert fractions and percentages, measure in inches and centimeters, and understand the geometric features of 2-D and 3-D shapes. In the following excerpt, Eva described her class example and asked the group for assistance in marking the coding sheet:

01: **Eva:** Well so, I put a question and so I had the globe, the Earth globe, and I said what is this and
02: they said what shape does a globe have and Anna, it's a circle. And Anita said **that's** not a
03: circle, but this is Anita that's not a circle that's a sphere. Okay? And so what is this? <u>This is</u>
04: <u>tension or it's peer assistance?</u>
05: **Cara:** Well what did, it's definitely peer assistance, I think because she's helping her but there's kind
06: of tension there too I think.
07: **Eva:** Yeah so that's
08: **Susan:** [Just in the way that it was done. And the tone of her voice.]
09: **Cara:** [The w::ay it was done but then it's like]
10: **Eva:** Uhuh and the tone of voice. Says Anita, **n::::o**, **it's not that**. And I said w:::ell think again
11: **An::na**, this is a sphere or a circle? Why it's a circle? Why it's a sphere? And so I... so that
12: was the idea that's a kind of tension so I can put twice?
13: **Bev**: Yeah.
14: **Eva:** Tension and peer assistance.

Susan's interjection about "the tone of her voice" (8) was the first time in the teachers' work together that any of them had suggested that tone of voice needed to be considered when coding videos. It was the first time that prosody was presented as an interpretive tool (8-12). The study group meetings provided the teachers with an opportunity to share their coding and get feedback, which in turn led to discuss how to interpret particular activities in light of the complexity of the interactions. It had not occurred to the teachers that an activity could be coded not only in more ways than one but also with multiple codes to captures the nuances of an activity (12, 14). The teachers were beginning to understand the codes and the theoretical concepts that gave them definition as malleable and in need of shaping to capture what the teachers were seeing and understanding.

Challenging theoretical concepts: Can academic Discourse be funds of knowledge? Up until the implementation of Unit 3, the codes *funds of knowledge* and *Discourses* had been separate codes on the coding sheet. During the March 30, 2009, SG #8 (InS), Eva asked Cara, Susan, and me to help with coding a part of a video as *funds of knowledge*. After we watched the video clip of a whole-class math and science lesson discussion about producible land using percentages and fractions, Eva described what she thought was happening. Susan then attempted to help her code the excerpt:

01: **Eva:** So Octavio said two thirds, no 70% of the whole earth is water and Edmundo said two
02: thirds is water. And I said, let's look who is right? What does it mean two-thirds and what
03: does it mean 70%? Two-thirds is 66.6% and I said go on convert two-thirds and so see what
04: this is when they uhm (.) try to…
05: **Susan :** It just shows that they're really thinking
06: **Eva:** When they try to say you know I know you're not right, I am right. And so that's tension
07: or peer assistance? [This is like the whole class discussion.]
08: **Susan:** [It's **di:**:course. Isn't it?]
09: **Eva:** It's discourse too?
10: **Susan:** But it's not it doesn't fall under that category here.
11: **Eva:** I put questions, I put tension. Anytime one day I put tension, but I didn't know about the
12: peer assistance. If that [happened only in groups=]
13: **Susan:** [Is it's kind of is it kind of a]
14: **Eva:** =or is it the whole class discussion.
15: **Susan:** Is it kind of a participation shift too? (.) Because they're coming off as experts then. Do you

16: know what I'm saying?
17: **Bev**: Could be.

Eva set up the activity describing how she used instructional conversation with the students, asking them to convert fractions into percentages and vice versa to support their answers (1-3). While Eva struggled to mark the students' participation as *peer assistance* or *tension* (6-7), Susan saw the larger activity as classroom discourse (8). Susan realized that the category on the coding sheet was big *"D"iscourse* and reconsidered her initial response (10). As Eva summarized her tallies (11), she questioned the validity of using certain codes, such as *peer assistance*, in whole class discussions (12-14). Susan continued to add her input, mistaking *participation shift* for a *role shift* (15-16).

18: **Eva:** I don't know, I just note, I put like like you said, I put the <u>fund of knowledge</u> for all of
19: them because this is their fund of knowledge. At the question and I said I don't know, [what
20: do you think] and they come and they clarify but I'm not sure if this...
21: **Susan:** [Peer assistance (laughs)]
22: **Bev**: I think I agree with everything you said except the funds of knowledge part.
23: **Susan:** Yeah, it's not funds of knowledge.
24: **Bev**: Why would it be funds of knowledge?

Eva's excerpt was of a chaotic classroom event. In marking the tallies, she drew on several codes. However, when I asked how she defined *funds of knowledge* (24), Eva defended her decision to code the interaction as *funds of knowledge*:

25: **Eva:** Because I'm not saying anything, I just put a question and they come with the answers
26: and I never mention in my [class that 70%] of the Earth...
27: **Susan:** [That's <u>academic knowledge</u>.] That's academic knowledge that's not funds of
28: knowledge. <u>Funds and knowledge comes out of their community, out of their home life</u>...
29: **Eva:** Well well this is home. This is home. This is from the TV. I never mentioned. I never
30: did a whole, you know about the water, the percentage of the water. I didn't do it before.
31: **Susan:** They do come up with things like that quite often. Yeah. They do.
32: **Eva:** That's why I said this is funds of knowledge. Yeah, Anna she said that's a sphere,
33: [it's a 3-D shape]. Yes, I know that because I I I know that but this one with the water, I
34: never...
35: **Susan:** [That's <u>academic</u>]
36: **Bev**: This is this is a little difficult. I see what you're saying. I see your point now. It could
37: also be <u>scientific misconceptions</u> that they have carried with them from somewhere along the
38: way in school. You see what I'm saying? Uhm because [66 percent and 70] percent are pretty
39: close so...
40: **Eva:** [No this is not 70 percent.] Yeah, it's pretty close yeah. So I think of / <u>I consider a fund</u>
41: <u>of knowledge something that I didn't teach↑ and they supposed to have it from someone from</u>
42: <u>their parents from someone.</u>

Susan's (28) and Eva's definitions of funds of knowledge are different (40-41). Even as Susan and I offered alternative codes (lines 27, 35, 37), Eva's thinking did not shift.

43: **Bev**: This is what I think you need to think about, is it background knowledge or is it funds of
44: knowledge?
45: **Eva:** (speaking softly) It might be better.
46: **Cara:** Yet because they may have learned here first at school with a different teacher so that
47: it's not but I guess we don't really know for sure, but
48: **Eva:** Hey guys! (talking to students in the hall. Walks toward the door.)
49: **Bev**: But this, I hate to say it without her here but this idea of doing the tallies, as long as you
50: can talk about why you marked it, then it's valid, so if you see it but Susan doesn't see it then
51: you know, well I just said Eva had this idea of doing the tallies is that you should just be able
52: to explain why you marked it, so nothing is really wrong, okay? So if you say well I saw this
53: as a funds of knowledge and Susan says well that's not really a funds of knowledge, and I say
54: well like maybe it could be background knowledge, but you are seeing something there that
55: we don't see and you mark that as funds of knowledge, you can explain it. And that's the
56: important part.
57: **Eva:** Okay.

When I introduced the *background knowledge* as a possible code (43) Eva began to reconsider her position but never fully accepted *background knowledge* as an alternative code (45). Instead, she broadened what could be coded as *funds of knowledge*, even considering *academic discourse* as potentially funds of knowledge.

The LSciMAct Program did not ask the teachers to be ethnographers of their students' family and community resources. It prepared them, instead, to design classroom activities to discover students' common knowledge and experiences that could support content learning. Thus, it came as no surprise in the study group meetings, that in time the teachers drew on their classroom experiences and the data they collected to challenge the boundaries of concepts such as *funds of knowledge.* During their Master's coursework, they had learned Moll et al.'s (1992) definition of *funds of knowledge* as "historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and wellbeing" (p. 134). As the excerpt above demonstrated, relying solely on Moll et al.'s definition appeared to confine the teachers' ability to make sense of what they saw going on in their classrooms. The desire

was not to dismiss Moll et al.'s definition but to try to understand within the context within which the teachers were being asked to use it. As Glaser and Strauss (1967) point out, "Merely selecting data for a category that has been established by another theory tends to hinder the generation of new categories, because the major effort is not generation, but data selection" (p. 37). Making sense of *funds of knowledge* as a code required the teachers to (1) expand the definition of the code or 2) develop a new code. In this regard, the teachers moved beyond what they had learned in the graduate course to accommodate or account for what they were experiencing in their own classrooms, something for which what they had learned in the university classroom could never have fully accounted.

During the April 9, 2009, SG #9 (OoS), Eva brought up the possibility that parents can teach academic Discourse at home, and, if they did so then that could be part of a student's funds of knowledge. As an English learner, she provided the example of her efforts to teach her daughter academic Discourse at home. Susan and Eva discussed the meanings implied in the codes *background knowledge* and *funds of knowledge*:

Susan: To me, background knowledge is like academic knowledge, things that they have learned in school, so for instance because we're building, we're working on the board games, they're creating board games and they're supposed to integrate science and math, I see them incorporating a lot of background knowledge about science and math, but not funds of knowledge because funds of knowledge comes out of their homes and their communities. So for example if Sophia, is a good example of someone like, when we wrote about the plants that we would choose, Sophia wrote about Bolivia and the soil there and the plants there. Those are funds of knowledge.

Eva: Are you sure she didn't learned it in school in Bolivia that?

Susan: She could have but…

Eva: See that's the point in here. And I have another question. I know I teach my daughter at home lot of stuff

Susan: Uhm.

Eva: so that can be academic knowledge too. It's not necessary to be you know from home or community to be a fund of knowledge.

Susan: Uhm.

Eva: [That's my point too.]

Bev: [I can I can see] that in Susan's classroom when your daughter talks in Susan's class that these are things that she didn't necessarily learn in school

Eva: [Oh she didn't necessarily learn in school]

Bev: [but she has learned at home], but it's not so clear cut…it's not linear, so these codes are could be overlapping.

Eva and Susan concluded that codes such as *background knowledge, academic Discourse,* and *funds of knowledge* should not be defined in terms of place (7-10), that each of the codes could potentially transcend location (14-15). They also concluded that just because a student comes from a nonmainstream background does not preclude academic Discourse from being part of their homes' funds of knowledge (8, 18-20). This conclusion led them to question where other knowledge(s), such as technology knowledge that is not learned at home or school, should be coded. To restrict a code based on location in which it should is learned restricted the use of the code by the teachers and, in turn, limited how they might understand their students.

Gonzalez, Moll and Amanti's (2005) did acknowledge that a household study does not provide comprehensive information about students' funds of knowledge. Funds can also be derived from independent activities in other settings. Thus, the teachers were onto to something when they began to question what constituted funds of knowledge. For example, Hogg's (2010) review of the literature on funds of knowledge examined valid sources of funds and questioned if they are limited to the home and community or if they can derive from knowledge from other relationships and experiences, such as schooling, peers and popular culture. Drawing on their classroom data, the teachers posed a question that extended funds of knowledge even further: "Can academic Discourse be part of students' funds of knowledge?"

For the most part, the research literature defines *academic discourse* or *school discourse*—a secondary Discourse—as distinctly different from funds of knowledge. Sociolinguistic researchers believe that community-based discourse practices are a primary conduit through which children structure their school experiences (Hicks, 1995). If these practices are consistent with those found in formal classroom settings, children typically learn academic discourses with ease. If not, then children may encounter difficulties. Gee (2011)

suggested that children in different communities are enculturated into different Discourses reflecting the language practices, values, and ways of acting and believing characteristic of their communities. In the study group excerpt above, Eva recognized that her middle school students moved within multiple communities – home, school, peer – and even within those communities, she saw subgroups as existing to support student learning in different ways. Although her students were language minorities, Eva postulated that students may have access to academic Discourse outside of school, which may be part of their home lives and thus their funds of knowledge.

Developing new codes and detailed coding. As part of their professional development requirements, teachers had to turn in coding sheets at the end of each unit. The teachers always turned in paper copies of the sheet. When I suggested that they should do them electronically, the teachers balked. Their written coding sheets were chocked full of text, with it often extending beyond the lines of the grid. They said there was too much to write to try to contain it to an electronic copy. Susan said, "I thought when you looked at it you might want to photocopy it" (April 22, SG#10, OoS). In looking at their coding sheets, I agreed. The sheets included drawings of seating arrangements, asterisks marking significant sections, specific time frames, detailed notes as reminders of events, quotes, and codes within codes. In fact, the teachers were combining the fieldnotes, coding, and analysis all on one document. I encouraged them to continue doing what they were doing.

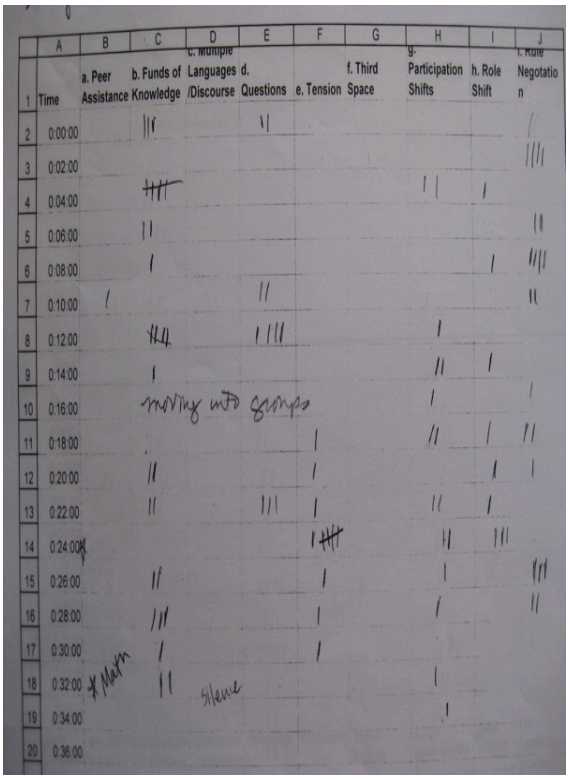
The teachers referred to the newly created column in the right margin of their coding sheet as their "comment column." They wrote details specific to their analysis in this column, a sort of catch-all column to pose questions, begin analyzing data, and capture any other information not already in the tally columns. Susan said, "I needed to see **how** it was occurring

not just a check mark," to explain the need for the comment column. In designing the coding sheet, the LSciMAct Project team created only tally columns because we wanted a quick way to see where the most action was occurring. The teachers found this to be insufficient and not of much use to them.

Eva described the importance of documenting details in the comments column. "It's important to have a lot of details in your tallies so you can go exactly to it and find what you're looking for." She gave an example of how her coding had changed: she marked the code *third space* and in addition wrote where the third space was, who was involved, and what happened. Coding this level of detail made it easier for her to later choose episodes to transcribe and write her analysis.

Figure 6.3 provides an example of how the teachers' coding evolved from Unit 1 to Unit 3. Susan, however, unlike Eva and Cara, wrote multiple tallies within a code to show frequency within a 2-minute interval. Eva and Cara marked one tally if the code occurred during that time period.

Unit 1 coding sheet



Unit 3 coding sheet

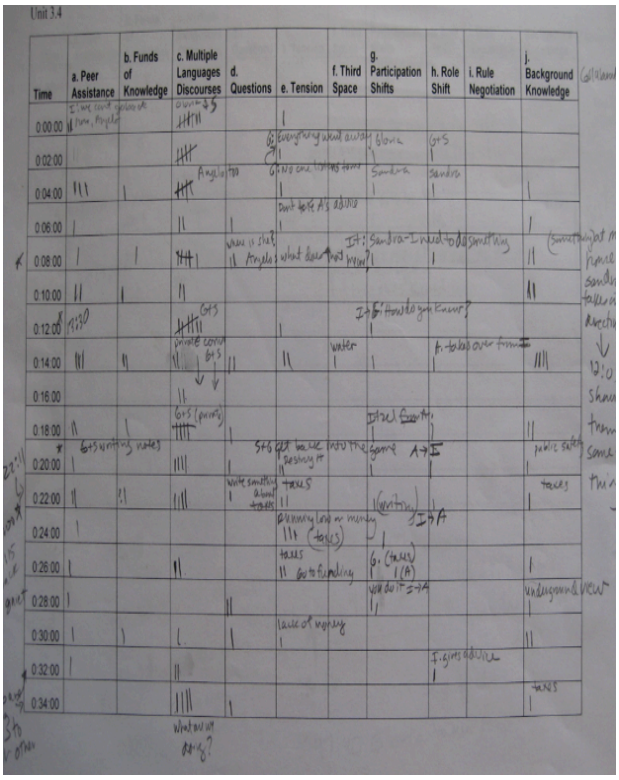


Figure 6.3 Shift in Coding Sheets from Unit 1 to Unit 3

Susan had begun writing some descriptive comments during the implementation of the first unit. By Unit 2, all teachers' comments included descriptions of classroom events and interpretative notes, asterisks to mark important parts, and other discourse features characteristic of transcription conventions (gestures, silence, and overlap talk) but not part of the program codes. Susan developed a new code to differentiate *background knowledge* from *funds of knowledge* after the March 30, 2009, SG #8 (InS) study group meeting's extended discussion about what *funds of knowledge* can be. By Unit 3 implementation, Susan had added the code *role negotiation* to the coding sheet after she had observed students defining their roles within the group. At the June 18, 2009, SG #15 (OoS), Susan provided an example of *role negotiation* as she saw it:

21: **Susan:** My students also used Spanish as um some role negotiation to control the group
22: sometimes too so
23: **Cara:** What do you mean?
24: **Susan:** Well there is an example where there were 6 students again. Three English-speaking
25: students were messing around they continued to play the game and talk about the game and
26: they were supposed to be making a poster so the girls are speaking Spanish to each other
27: because they were frustrated with the three English speaking students. So then the English
28: speaking girl says you should speak in English I don't know Spanish and their response was
29: really fun "well we do so it was a way for them to say "we know Spanish"
30: **Cara**: O:::h
31: **Bev**: kind of flip the power dynamic
32: **Susan**: flip the power dynamic

For Susan, the code *role negotiation* captured issues that developed with having multiple languages spoken within a group and the students' efforts to define their roles.

Eva continued to tweak her coding sheet, modifying the code *multiple languages/Discourse* by adding an *E/S* when students used English and Spanish. She wrote in *d* or *dialogue* to refer to instructional conversation, which was a concept that she valued and encouraged in her classroom. Under the code *funds of knowledge*, she wrote *BK* to differentiate background knowledge from funds of knowledge. For *third space* she wrote *lost* or *developed the idea* during Unit 1 and Unit 2 implementation to capture her successful and less-than-successful efforts to facilitate third spaces. During Unit 3 implementation, she wrote extended comments both in the tally box and in a comments column.

Cara, too, began to adapt her coding sheet in Unit 2. She wrote AAVE[5] under "multiple languages/Discourses" to show when an African American student in the focal group used African American Vernacular English. In Unit 2, she also provided more details using a comment column.

The teachers became more comfortable 'trying out' new codes. This new comfort fostered a willingness to reflect on and change classroom practices based on what they were

[5] AAVE (African American Vernacular English) is referred by linguists as a variety of English with a structured, rule governed grammar, spoken primarily by African Americans in social situations where African Americans are the majority (Gonzalez & Melis, 2000).

learning about their teaching in their coding sheets. Often times, issues of clarity and what exactly a code meant or could be used to identify became a catalyst for changing practice.

Cara: I realized that I needed to put another like in the peer assistance column that I needed to add a teacher assistance column. There were points where I go in and I scaffold and then explaining things. So I added that. I struggled with the tally sheet with rule negotiation, role negotiation, third space and trying to constantly remember and figure out what exactly those categories mean um. That was always..

Susan: I think the role and the rule negotiation sometimes blurred. I actually made another column for that, I think, if I remember right; role negotiation. There was a lot of role negotiating, who was going to be in control. That's part of the rules also, the rules of the group. So I kind of saw that overlapping and sometimes I would confuse them.

Bev: So there are role shifts and role negotiation.

Eva: And rule negotiation.

Susan: Rule negotiation, I saw that as when the students were struggling with it was going to be in control. Role shift was when someone who hadn't been in control, he or she became an expert and took over.

Cara: Which would be a participation shift as well. They kind of all somehow have blended together.

Eva: Or attitude change. Or shift. Those kind of things are attitude shift. I really want to put a student discourse rubric.

Cara: Have another column for student discourse?

Eva: Yes and a comments rubric, teacher comments.

Cara: Teacher comments.

The distinction between rule and role negotiations led all three teachers to identify nuanced distinctions in how students act in class and the relationship between their understanding of things (rules) and the roles they take up.

Ultimately, the Project team adopted the teachers' comment column for use with the next cohort of the Program. This and the other revisions to the coding sheet that the teachers made reflected their efforts to make the use of the coding sheet meaningful to them. It also reflected their ability to negotiate the unintentional tension that can exist in being asked to appropriate tools of research in particular ways. Much of this tension the teachers resolved or transformed through the study group meetings, where they shared and debated their interpretation of one another's videos. In the end, the teachers' efforts to use the research tools made available to them in ways that informed their practice demonstrate their development as teacher researchers. They were able to reflect and engage one another around their needs as teachers and researchers

and work through tensions in both the tools and the concepts to find ways to allow all of them to support their work. They also extended on the concept development that arose out of other researchers' work to redefine those concepts based on their own work.

Learning to use transcripts to see larger themes. At the March 5, 2009, SG #3 (InS), Eva insisted that she had no desire to look at the videos beyond coding the tallies. As we worked through transcripts (as described in the next section), she began to see a value on transcribing videos, noting at the July 7, 2008, SG #18 (OoS): "I could see different stuff when I was doing [the transcripts] compared with when I was doing the tallies." She came to see transcription conventions as a way of making sense of her classroom practices. Susan, too, came to embrace the intricacies of transcription as revealing more about her practice than she could have learned only by listening to the audio of student interaction:

01: **Susan:** They [transcribing videos] were hard ones
02: **Bev:** They were hard?
03: **Eva:** Cause they were talking (motions back and forth)
04: **Bev:** They were hard for both of you because of all the overlap. Another thing I see in both of
05: yours, well you didn't send me your transcripts, but I see so much more **detail** in your
06: transcriptions it's like she's using arrows
07: **Eva:** It's not fair. It's not fair not to say exactly if you read the transcript and put
08: nothing. I don't know why I didn't put anything on the other ones. It's kind of having an
09: idea what is that about and it's important if she is laughing and she's frustrated. It's
10: important to see that. That makes a huge difference.
11: **Bev:** Why? (laughs)
12: **Eva:** Because you see her attitude actually. She's not laughing. She's trying to fit in the
13: group, but she's feeling frustrated because David was making fun of her.

In lines 7-10, 12, and 13, Eva noted a distinction that can be made between only listening to an audio of students *and* listening and seeing the students in a video. She even framed it as one of fairness for the students (line 7) who could be misrepresented if only what they said was available to the researcher. She identified the role of gestures and facial expressions in helping her understand what is happening in a group interaction (lines 9 and 10). When I asked her why she had not considered the value of using the video recordings before, Susan interceded to explain the learning process that the teachers may have been experiencing:

14: **Bev:** So why didn't you do it before?
15: **Eva:** I don't know I'm sorry.
16: **Susan:** I think you become more comfortable with it because it's kind of like when you're learning
17: something first you are learning the technicalities of things and you just I think that's the way
18: you do a lot of things in life. We like if I'm learning how to cook I'm just going to learn the
19: technical things or whatever or learning how to sing you learn technical first. Once that's over
20: and you don't have to think about those processes any more it comes natural and you start
21: seeing and developing other areas and aspects

Susan, in lines 16 through 21 suggested that there is a learning curve that everyone needs to experience in order for some task, like cooking, to become natural or a part of how the person does things. She said that only then do "you start seeing and developing other areas and aspects," meaning possibly that only then can you creatively and critically begin to do new things with what you have learned.

The revisions the teachers made to the coding sheet and to particular codes changed how they selected clips to transcribe. During Unit 1, they looked at the tallies on the coding sheet and chose the sections where the most codes occurred within a one- or two-minute time frame. As their coding became more nuanced and situated during Units 2 and 3, they began to choose clips based on classroom events and themes that guided their research questions. In the final focus group (FG #4, July 24, 2009), I asked the teachers to talk about what they learned from using the coding sheet and any recommendations they would make for the Program.

01: **Susan:** I think the tally sheet could really be of more importance if it was more detailed because
02: that's what we can refer back to.
03: **Cara:** Yes it is very helpful definitely
04: **Eva:** Yes because that's your analysis.
05: **Bev:** Tell me, what would you do?
06: **Susan:** Because you can write specific examples down; you know exactly where they are.
07: **Eva:** You don't use twice the time. So you need to do the tally sheets, you look all over so if it's
08: detailed it will help you not just...
09: **Bev:** Yes, to choose a spot and remember where you saw that or this because we're not going to use
10: just our transcripts, I don't think. I wasn't planning on just using transcripts.
11: **Eva:** Me neither. When you do the analysis you have to talk more and connect more, not only about
12: the transcript but exactly what's going on in the process. I think that's important

For the teachers, becoming aware of what to look for was important. Also, the revisions they made to the coding sheets subsequently helped them select clips to transcribe. The teachers also

realized that the transcripts, even as they captured larger themes within the classroom, could not capture everything:

01: **Eva:** and I wasn't sure that I pick the best one so that's why when I did the report I kind of touched
02: a lot of other things too, not only what was in the transcript because pretty much what's going
03: on in the **whole** class during the unit, that's important too. And so that's why I thought it's not
04: fair just to talk just about to the transcript because it might not be reflective right there.
05: **Bev:** That's what's hard about the transcripts
06: **Cara:** Yeah, it is.
07: **Bev:** but I think you kind of have to go into it <u>with that lens that you are going to pick out</u>...
08: **Eva:** Yeah, that's a hard decision, for me it was very difficult.

In line 7, I referred to how researchers (Rex & Schiller, 2009) use transcripts to "freeze-frame a moment, replay and reconstruct it, and in the process of doing so, open up previously invisible choices of actions" (p.10). Eva recognized this (3-4), noting that the larger context could not be ignored and, in fact, should be a part of the analysis. While codes helped guide their analyses, selecting transcripts required the teachers to conduct a secondary level of analysis, one that required them to make decisions about themes and how those themes were informed by the larger classroom context and events not captured in the videos.

Choosing transcripts was an integral part of the teachers' theorizing. Selecting a transcript narrowed their focus, purposefully forcing them to leave something else out. It also, however, facilitated a need to consider the larger classroom space and the interrelationship between what was happening not only in the transcript but also in events leading up to the videotaped event that came to be transcribed. The teachers' development as coders of the transcripts required a level of analytical ability that related closely to what they had learned in their Master's coursework and professional development (although as the subsections above show, the teachers, based on experience, revised the codes, too). A more complex level of analysis, however, was involved in selecting what videos were to be transcribed because it required the ability to understand how themes were emerging across time and space to make the chosen video clips representative of those larger themes.

At first, the teachers assumed the codes were the themes, and had trouble using their codes to develop early findings. In our April 9, 2009, SG#9 (OoS), I suggested that they choose excerpts to transcribe that would help them identify larger themes than what the codes might offer: "You can pick out clips that are going to help you develop themes… think about what you wrote in your report for Unit 1 so you're kind of building on those emerging themes that came out of your individual reports." By the time they wrote their report for Unit 3, the teachers were thinking about themes differently than they had in Unit 1. Susan said, "Things that I wanted to look at from the first unit that would guide me, I'm not sure that they are there." I said, "One way you could look at it is a theme should be present in more than one of these transcripts, something you could track from event the first to last one or you see something kind of shift from one transcript another." I pointed to how Sonia's participation changed from the first transcript to the last transcript of Unit 3 as an example of a larger theme that transcended any one transcript and, therefore, could not be defined by one or two codes and could not be understood by looking at only one transcript. By the time the teachers wrote their thesis, the themes (Table 6.1) were larger than any one or two codes could capture, and they addressed more holistically what the teachers had learned about their teaching practice. The themes focused on changes the teachers had seen over the course of the academic year that they attributed to changes in their practice rooted in the teacher research.

Table 6.1 Themes from Teachers' Thesis

Change in Students	**Change in Teachers**
Video Games, Groupings and Participation Shifts	Participation
Students Utilizing Third Space Opportunities	Reflecting on our Practices to Foster Third Spaces Across the Curriculum
Using Code Switching for Solidarity and Academic Clarification	Valuing Students' Multiple Discourses

The tension that emerged around code switching or language choice was an example of a larger theme that not only transcended one transcript and one unit but all three units. In Units 1 and 2, when Susan's students used Spanish, non-Spanish speakers in her focal group tried to silence them. This example is from Unit 1:

01: **Grace:** (hands the paper to Iris) Yo no tengo un lápiz. (*I don't have a pencil.)*
02: **Felix:** Here you go I gave you one.
03: **Iris:** Fine, fine.
04: **Felix:** Alright. [Okay, well okay. First how do we find]
05: **Grace:** [Tú escribes mejor sin nosotros (*You write better without us.)* No te quejes. (don't
06: complain)
07: **Sonia:** Pa' que escribas bonito. (*so you write nicely*)
08: **Felix:** (speaking quickly) Shut your {language}.
09: **Sonia:** Tú cállate! (*Be quiet!)*

It was not until we transcribed the clip, that we realized Felix was trying to control Grace's and Sonia's language use in naming the science, math, or literacy in the video games discussed previously in class. Susan identified tension around language use as a theme, and began to track it. This short excerpt from a group of students who were playing a board game and identifying the different elements of the game in preparation for creating their own comes from Unit 2:

01: **Sonia:** Grace, Grace, nos estan grabando, mira. *(Grace, they're recording us, look)*
02: **Grace:** I know!
03: **Renae:** Please stop speaking in Spanish we don't get it.
04: **Grace:** Well we do.

Grace's response is different here than it was in the transcript above from Unit 1. In recognizing the tension around language use, Susan, Cara, and Eva rethought how they might group students

so that English learners could draw on their Spanish within groups. For example, in Unit 3, Susan added Arthur to the focal group for his video game expertise, linguistic tools, and flexibility. Grace, Sonia, and Iris were part of the group, too, but had not played *SimCity* before and were novice video game players. (The transcript is divided into three columns to show the interaction between Arthur in his video game expert role [column 1] and the three girls as video game novices [column 3] and where they negotiated a third space [column 2].)

Transcript: Problem-Solving: Building a City

EXPERT SCRIPT	**NEGOTIATED SPACE**	**NOVICE SCRIPT**
		1: **Grace:** Fix it.
2: **Arthur:** I'm being practical.		
		3: **S/G:** No::::
		4: **Grace:** (reaches for the keyboard)
		5: **Iris:** Arthur, no. I'm going to cry.
		6: **Sonia:** Iris.
		7: **Grace:** See the taxes. I told you guys to leave the taxes alone.
		8: **Iris:** (points to screen) **Raise** the taxes. (2sec)
		9: **Grace:** (laughs)
		10: **Iris:** It's telling us to raise them.
11: **Arthur:** Destroy the city.		
		12: **Sonia: No!**
	13: **Iris:** You know what we should have done [like] fifty percent taxes.	
	14: **Grace:** [No]	
	15: **Arthur:** You know what raise taxes as high as they'll go.	
	16: **Sonia:** (controlling the keyboard)	
	17: **Iris:** They'll go on strike.	
	18: **Sonia:** Donde era? (*Where is it?)*	
19: **Arthur:** (takes control of keyboard) (inaudible)		
		20: **Sonia: No::::**
21: **Arthur:** Raise taxes as high as they'll go.		
		22: **Sonia: No:::::::::** (2sec)

Susan had regrouped students based on the tension that Unit 1 and 2 transcripts revealed. The pattern of negotiating spaces was evident throughout Unit 3 transcripts. The tensions that arose in Unit 3 were not about language use but around problem solving or students efforts to

define courses of action based on everyone's feedback. Susan's analysis of the Unit 3 transcript reconsidered how Spanish can be used within the group dynamic to support not only the Spanish-speakers' learning but also the English-speakers', who benefited from the perspectives the Spanish-speakers offered. Susan also realized the value of non-verbal participation and how it supported the group in its work. For example, in the Unit 3 excerpt, Sonia controls the keyboard and, thus, the game play.

Negotiating Researcher Tools to Inform Curriculum Development

Just as they learned to make the coding sheets more meaningful to them, the teachers learned how, from Unit 1 to Unit 3, to use the coding sheets to inform their classroom practices and curriculum development. At the start of the 2008-2009 academic year, the teachers surveyed the students to identify their funds of knowledge, including their interests and perceived strengths. They planned Unit 1 using this information, honing in on the idea of using video games to teach science, mathematics, and language arts. During Unit 1 implementation, the students learned to evaluate the content of video games, and the teachers learned how to use video games to teach academic content. Throughout the unit, the teachers were guided by the students' video game expertise, which proved problematic for the teachers, being a point of tension they had to deal with early on in their professional development. Similarly, in the focal student groups they had set up, they saw, at times, a power struggle grounded, in part, in language use. Although the unit provided insights into why students like video games—they allowed for students choice, they were challenging, and, compared with traditional schooling, they were low risk endeavors—the dramatic shift created by using video games and positioning students as experts, led the teachers to retreat and reclaim authority in Unit 2, which for all three teachers were more traditional units.

The second unit was about community and environmental sustainability. This unit's theme originated from the funds of knowledge activities. Susan decided to use board games as a way to implement video learning principles, such as student choice in creating the game and problem solving in groups. The teachers created most of the curriculum in advance, unlike the first unit that was student-led, and thus the activities evolved from the students.

In coding the Unit 2 videos, the teachers agreed that there appeared to be a loss of excitement among the students. The coding showed a decreased shift in student participation compared with Unit 1. The coding also showed, and Susan and Eva observed in their fieldnotes, that students used English, and sometimes Spanish, to take control of the talk during group activities. Based on their interpretations of the coding sheets and their fieldnotes, the teachers decided that for Unit 3 they would return to using video games as a way to engage students and draw on their funds of knowledge.

Susan used the video game *SimCity* in Unit 3. Early in the unit, after observing and listening to small group talk, Susan developed activities based on the tension in student talk. For example, the students argued constantly about taxation while playing the game. So she decided to create a lesson and facilitate a class discussion on income, sales, and property taxes. When one student mentioned his aunt's salary was $64,000 and the other students did not believe it, Susan created lessons on careers, budgets, and what a livable income is. The coding of Unit 3 videos showed increased participation shifts and use of multiple languages within groups to support student learning and clarify content. Whereas Unit 2, in its implementation and analyses, was linear, Unit 3 in both its implementation and analyses was recursive and dialogical. The Unit 3 analyses were constantly informing curricular choices.

The teachers used their coding sheets as evidence of changes in their practices and student learning. For example, they saw an increase in tallies in Unit 3, which they attributed to the use of video games. During the June 30, 2009, SG #17, Susan discussed how her coding sheet changed during Unit 3 implementation because of the use of video games:

01: **Susan:** So I said as soon as we went to the video games (laughs) the tally sheets changed.
02: **Bev:** How did they change?
03: **Susan:** They changed there's so much more on the sheets. I mean I was doing one of these I aw
04: man this is so bor::ing I'd sit there and tally every once in a while. When I got to the
05: video games and I could hardly keep up (laughs). I mean I could but it was like totally
06: different. And even was more interested there was so much going on↑
07: **Bev:** That's amazing!
08: **Susan:** Yeah look at how Sonia is talking here um I think this first one is actually I'm not sure. I
09: think this is just a group in the classroom and here's the multiple language discourse (showing
10: Bev her coding sheet with her notes).
11: **Bev:** Wow!
12: **Susan:** So there's some and you know there's other things going on
13: **Bev:** Yeah.
14: **Susan:** But now we go to the video games and I know for sure. Look at this. The multiple discourse
15: increases significantly.
16: **Bev:** Wow!
17: **Susan:** Look at all of that. **Totally** different participation

In recalling Unit 2 coding sheets, Susan noted that she became bored (4) watching and coding videos because there was not much going on. That changed with Unit 3 and the use of video games, where there was multiple languages (9) and "other things going on" (12). The coding sheets proved to be not only a tool for analysis but also a resource for informing classroom practice and identifying what was working well and what was not working well. The next chapter takes up issues of classroom practices and the tensions that arose among teachers and students with changes in classroom practice.

Conclusion

The initial outcome in using the research tools (fieldnotes, coding, and transcripts) created tension between what the teachers had learned about using these tools in their coursework and how they tried to use them in their classrooms. However, as the teachers adapted the tools to the context of their classrooms, the fieldnotes and coding took on more

meaning and became a source for exploring other tensions that often resulted from the revisions the teachers were making to their practice. In this regard, the modified research tools became new mediating artifacts to study and inform the teachers' practice. The CHAT framework allowed the teachers "to learn from the—often unexpected—ways in which the experiments unfold to construct new understandings of both theory and practice" (Wells, 2011, p. 188). That is, the recursive process of exploring praxis facilitated a view of classroom practice over time and across new iterations that was informed by each successive view. The outcome became new mediational tools for implementing curriculum with each iteration. The next chapter will examine how the teachers engaged tension that arose in their classrooms because of their changing practice.

The findings in this chapter demonstrate the benefits of teachers writing in-the-moment fieldnotes and of reflecting on practice in a timely and ongoing manner. Such activity facilitates making connections among classroom events, codes and research questions that lead to changes in praxis. Of course, teachers need the administrative support of principals and other district supervisors to make this time available. Making time for reflecting on classroom practice has long been advocated (Schön, 1987). Teachers need scheduled time in their day to write fieldnotes and reflect on their teaching and curriculum development.

In commenting on the teachers' use of discourse analysis as part of teacher research, an anonymous colleague of mine wrote: "I'm not sure about teachers' abilities and or competencies in conducing discourse analysis, a methodological choice that has been a troublesomely murky even for many educational researchers." Point taken; however, I wonder if the reviewer would have said the same about a proposal to present educational researchers' use of discourse analysis to study teacher practices.

I agree that that the whole process was "troublesomely murky" for the teachers, and I suspect that they would agree, too, and in fact, they suggested as much throughout the year in which they were doing their research. However, I suggest, too, that using new tools, using a theoretical framework that is not one's own, and looking at one's classroom practice in an educational context in which such looking is not valued are murky endeavors for everyone. Add to that the tension of having tools and a framework thrust upon you in the midst of teaching. It is akin to a juggler being tossed knives as she peddles her unicycle in circles. Even if she knows the knives are coming, she feels the tension, especially if she is already being evaluated on her unicycle skills.

The teachers redefined the tools and theory—the knives—so that they could be used to make sense of and support their practice. They did this through a process of engagement with the tools and the theory that began with learning what they were in their university coursework and trying them out over time. They revised the tools and redefined the theory based on their practices and the needs of their work as teacher researchers. They also did this through collaboration. They discussed their coding and allowed one another to inform and complicate their thinking so that not only did their coding become more complex but so did their analysis of their practices.

As I suggested in the previous chapter, in becoming teacher researchers, teachers need time. They need time not only to be teacher researchers but to allow their experiences as teacher researchers to grow. They need collaborative opportunities. And they need room in which to explore and define their own research processes and the purpose of such research. Such work—such professional development—cannot be thrust upon them and should not be left to interlopers

who come into the school as if selling some elixir that will cure all ailments. It must be nurtured organically by those closest to the endeavor, in this case the teachers themselves.

Obviously, such a teacher researcher professional development project as described in this chapter is murkier than if it had been mandated and orchestrated from above by district administrators or if it had been aligned with preconceived concepts and tools that allowed no malleability or transformation. And while it did answer many questions the teachers had and changed their classroom practices, the project left some questions unanswered and raised new ones. But it also gave the teachers a new understanding of what it means to be teachers.

Teachers Using 'Third Space' as a Tool for Student Learning

The concept of *third space* was introduced to the teachers in their first Master's course in Spring 2008. It proved to be one of the more challenging concepts for them to understand and apply to the work they were doing. Throughout the unit implementation year, 2008-2009 academic year, they identified different types of challenges related to creating third spaces as authentic interaction negotiated by the shared expertise of teacher and students. The teachers recognized their efforts to foster third spaces as creating tension. This tension arose from the discomfort they felt in changing classroom practices as well as from the discomfort that developed among students when classroom routines were disrupted. It also arose within our study group meetings from efforts to identify what third space is and how it is made possible within the classroom. And over time, tensions even developed around what the purpose of third space was and whether the creation of third spaces was an end in itself or the means to student learning.

At the time of the shift from in-school to out-of-school meetings, the teachers began to talk about how to create discursive opportunities in the classroom that allowed for third spaces to develop. By analyzing classroom discourse as part of their professional development, they became aware of how their practices inhibited third spaces. They also understood, however, from their work with the CHAT framework, that third space was important to learning and development, that in fact the type of learning promoted by CHAT, with its grounding in Vygotsky's concept of the Zone of Proximal Development, can be "contentious "third" spaces, filled with struggle and difficulty as human beings move toward greater self-regulation and as well as intersubjectivity" (Razfar et al., 2011, p. 199).

At the outset of the professional development, the teachers believed that if they shifted their talk from a recitation script, where they controlled the content and direction of discussion, to a more conversational discourse, where student interest and expertise helped co-define the content and establish topics of discussion, the potential for third spaces would increase. It was in doing this in Unit 1 that the teachers experienced discomfort and tension that resulted from changing their classroom practices. In Unit 2, they responded to this tension by pulling back and asserting more authority and control over the content and classroom interaction. With this, a whole new aspect of tension was created that highlighted the difference between what the teachers were doing in practice and what they knew about and strived for in creating third space opportunities.

This chapter traces the teachers' evolving understanding of third space in their classrooms and of tension in their efforts to make sense of and change classroom practices based on their research. In Unit 3, the teachers went from developing most of the curriculum in advance and being the sole experts to allowing content to bubble up through students' funds of knowledge about video games, gardening, and community life and thus be negotiated and defined through collaboration among students and between teachers and students. Thus, in the study group meetings, the teachers began to experience tension as a mediating artifact in their evolving understanding of third space and to see tension as a mediating tool to developing third spaces in their classrooms. This chapter outlines the teachers' process of studying and engaging this tension at both the classroom interaction and curricular planning levels. It reveals how the professional development presented in the previous two chapters impacted the teachers' classroom teaching.

Typology of Tension

Vygotsky believed that children learn scientific concepts out of a "tension" that develops between their everyday notions and adult concepts with which they are presented. This process is often filled with tension, struggle, and sometimes frustration as learners use available mediational tools in pursuit of concrete ends (Razfar et al., 2011). As Razfar (in press) noted in looking at mathematics learning in fostering a dialogic activity system, "it follows that spaces for contestation, tension, and struggle *vis a vis* the exchange of ideas and thoughts were the most visible markers of learning and development" (p. 8). Significant to learning and development, however, is *how* contestation, tension, and struggle are used between teachers and students and among students within the learning context, as the outcome is not always positive and, as is often the case, contestation, tension, and struggle are purposely avoided or quickly alleviated through acquiescence. Figure 7.1 highlights a typology of tension.

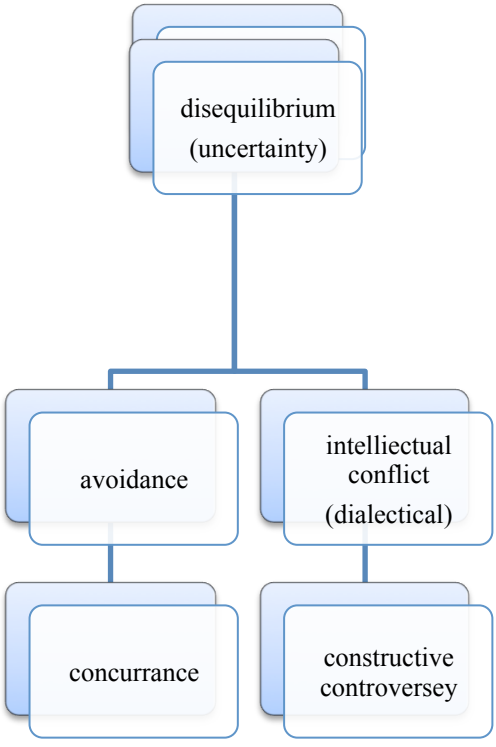


Figure 7.1 Typology of Tension

Johnson and Johnson (2009) identified 'constructive controversy' as an aspect of learning and development that arises from intellectual conflicts that are allowed to inform the discussion and activity of a context. They suggest that intellectual conflicts require open engagement or discussion among participants such as students. Parker (2006) noted, however, that discussion remains a rarity in U.S. schools, and even within professional development, discussion is often ancillary to direct instruction or structured activities. Instead of using it as a mediational tool for learning, educators and professional development providers often view intellectual conflict as undesirable (Johnson & Johnson, 2009) because it takes time and the outcome is not pre-established. Similarly, high-stakes accountability discourages the use of intellectual conflict among students for fear of losing control of the classroom discourse and content coverage. Instead, teachers and others, in the name of democratic practice, often strive for *concurrence* or the suppression of conflict through compromise. Typically, however, teacher authority is maintained and the development of interpersonal relationships is stymied.

For those in positions of less authority, engaging in 'constructive controversy' with someone who has more expertise can be threatening because adopting the expert's conclusions implies acknowledging one's own incompetence (Butera & Mugny, 2001). When they are confronted with different conclusions based on other people's information, experiences, and perspectives, people tend to become uncertain as to the correctness of their own conclusions, and a state of conceptual conflict or disequilibrium is aroused. To preserve one's own sense of competence, a person might be motivated to deny the expert's competence rather than attempt to solve the problem.

Thus, there can be a push from both sides—from those with authority and those without—to avoid "constructive controversy" and maintain a sense of *status quo.* To the extent

that those in authority and those outside authority do this, the desire among them is to avoid conflict, tension, and struggle. The feeling of tension or of disequilibrium is often the signal that things are not going as planned (e.g., someone has lost control, the purpose of the engagement has been compromised, and/or someone is being made to look bad). As the rest of this chapter demonstrates, the yearlong professional development began to help the teachers grapple with tension both inside and outside of their classrooms in different ways. It was tension that the research literature suggested is a common outcome of intellectual conflict, and it works to limit third space development and the type of idea generation that can lead to new knowledge or understanding of content or, in this case, teaching practices.

On the other hand, as will also be shown in the following pages, constructive controversy can result in open-minded inquiry that leads to refined conclusions (Johnson & Johnson, 2009), in this case, refined conclusions about *third space development*. As Johnson and Johnson noted, in cooperative situations, "distributed knowledge and different perspectives tend to be viewed as complementary and interdependent, which, in turn, increases accurate perspective taking, reduces competence threat, and focuses participants' attention on coordinating different points of view to enhance the cooperative effort, all of which tends to enhance learning and productivity" (p. 42). This is what happened in the teachers' professional development. And as Razfar (in press) asserted, "while a dialogic activity system can lead to contradictory views, this type of meaning-making tension is essential for learning" (p. 8). In this regard, tension is not so much a challenge but an impetus toward discussion and idea convergence that leads to new knowledge. It was in learning to recognize and name the tension for what it was and what it could do that facilitated the teachers' work as teachers and researchers.

Co-creating a Third Space Curriculum

This section provides an overview of the teachers evolving understanding of third space by showing how Susan's classroom discourse evolved from focusing on tension as an impediment to third space development to learning to see and use tension as constructive controversy that could be used to foster third space and, in turn, learning much as Vygotsky described in defining the Zone of Proximal development and the relationship of the interpersonal and intrapersonal. Although all three teachers came to understand third space development similarly, Susan best represents the nature and degree of transformation, as she, more than Eva and Cara, came to rely on students' funds of knowledge and expertise about video games as resources for more than only presenting content but also for creating it.

As shown in the previous chapter, in her analysis of the second unit, Susan thought students were not as engaged or interested in what the unit offered in terms of both content and activities. She, as well as Eva and Cara, saw a decrease in coding for third space during Unit 2. Susan decided, in planning for Unit 3, to re-introduce the use of video games, in hopes of eliciting student interest as she did in Unit 1. She chose the popular game *SimCity,* believing it afforded both opportunities for problem-solving and for students to work in small groups to gather information, identify choices, make decisions, and see the consequences and trade-offs of their actions. In addition, the game claimed to develop analytic and systemic thinking skills through building and managing a complex enterprise such as a city. Susan identified opportunities to develop students' mathematics and science skills through activities that would have them applying principles of taxation and budgeting, configuring zoning for residential and commercial infrastructures, and considering environmental factors, such as sustainability, as they built and ran a city.

I have selected the following excerpt from an activity on the first day of the unit, with the introduction of *SimCity* and the unit learning objectives. Susan had already identified four students who played *SimCity* regularly, and had given them access to the laptop, with the monitor projected onto the overhead screen for all to see. She wanted to demonstrate the features of the game, and was positioning the four students as experts. As part of my analysis, the two columns of the transcript visually divide discourse rooted in or representative of Susan's pedagogical expertise (column 1) and students' gamer expertise (column 2). As an exchange that takes place in an "official space," the interaction is representative of the type of exchanges that often occur in school. The teacher orchestrates the exchange, with specific goals and objectives in mind.

Transcript 1: "Reintroducing video games into the curriculum in unit 3"

OFFICIAL SPACE

Teacher Expert	**Student Expert**
01: **T:** What we're going to do today is look at *SimCity*. I know nothing about *SimCity*.	
	02: **Arthur:** (raises hand) I know a lot. I have the old [game]
	03: **David:** (raises hand)
04: **T:** Excuse me. Shh. Hold on one moment. I want to give you a little purpose for looking at this. Of all these values we've talked about, values and community, values and our architecture, values and the smart home that we looked at I want to see. Now *SimCity*, tell me a little bit about it. I think I know a little bit. Is it about building civilizations?	
05: **SS:** Yeah!	
	06: **David:** And you can destroy it.
	07: **Arthur:** Or you can…
08: **T:** (raises hand) What wait, I have to have one person at a time because I cannot have five people at a time.	
09: **SS:** (raise hands)	

Table 7.1 lists the various teacher practices Susan used to set up curriculum unit and begin to engage student expertise. From the positioning of the four students as having control over the

laptop to her introductory claim of ignorance (1), Susan set out to elicit student knowledge about *SimCity*. However, she maintained a level of authority in the discussion that allowed her to, first, tap into students' background knowledge as it related to what they had previously studied (4, 30, 33) and, second, guide the discussion to reveal what the students knew about the game.

10: **T:** Jesus.

11: **Jesus:** You can build a city hospitals and all that but then at the end you can choose to destroy or keep it
12: **T:** Destroy it or keep it. So you build the city from ground up?
13: **Ss:** Yes

14: **T:** Is there infrastructure?
15: **Arthur:** Yes there is?
16: **Ss:** Yeah!
17: **T:** Okay, I want you guys to identify the infrastructure for me.
18: **David:** You start with…
19: **T:** Shh! Hold on. (points to Leo and nods)

20: **Leo:** Basically, you're the mayor of the city and you need to build stuff depending on the people's needs. Like they'll say "oh we want more hospitals, we can't get from this place to another."

21: **T:** Are those values that we have?
22: **Ss:** Yes! (nodding heads)
23: **T:** Yes? David do you have something to add?

24: **David:** Ah I was just going to say that you don't start with like nothing. You start with a little piece of land and you build everything after that.

25: **T:** Okay, alright. Hold on, Arthur.

Susan allowed expertise to shift from her to students by maintaining control over the discourse, including providing directions (1, 17), asking structured IRE/F questions (12, 14, 21, 30, 33), and nominating students to talk (8, 10, 19, 23, 25). Susan also moved into the game experts' script twice (12, 27). In line 12, she re-voiced a student's explanation.

25: **T:** Okay, alright. Hold on, Arthur.

26: **Arthur:** Hmm, (.) like I don't know if they carried this over from the third one cause I had the one that came up the furthest. Like if you didn't live up to be a good mayor it would actually crumble down by itself.
27: **T:** Seriously?
28: **Ss:** Yeah, yeah.
29: Arthur: If you don't pay attention, it gonna fall, it's gonna collapse on itself.

30: **T:** Is that what happened in the *City of Ember*?
31: **SS:** Yeah

32: **Arthur:** Riots. There's going to be riots, fires, all sorts of stuff.

33: **T:** Did that kind of happen in the *City of Ember* to the mayor? It kind of fell in the end
34: **SS:** Yes
35: **T:** because he didn't take care of things.

36: **SS:** (making crashing sounds)

In line 27, she was surprised by the fact that a city could crumble if it had a bad mayor, which reflected a theme in the novel *City of Ember* (2003), a book they had recently finished as part of language arts.

Table 7.1 Teacher Practices

Teacher Practices	**Line Number**
Positions students as experts	1
Provides directions	1, 17
Asks structured IRE/F questions	12, 14, 22, 30, 33
Taps into students' background knowledge	4, 30, 33
Revoices student's explanation	12
Nominates students to talk	8, 10, 19, 23, 25

Susan used this introductory discussion to identify student game experts for later group assignments in which she assigned each group a game expert. However, as the discussion continued, a third space emerged, according to Susan's analysis during the May 7, 2009, SG #12 (InS). In picking up on the discussion captured in the transcript above, a few lines later, Leo said, "If you get too much of something, like, let's say, you build a real good school, they'll say, 'Oh, wait we have too good of an education here. Cut down the budget.'" Susan suggested that Leo was drawing on his knowledge of the game, as well making connections to Susan's

discussion about values. As the discussion was going on, Susan reacted with surprise, and, during the study group meeting, suggested that her questions initiated a third space (lines 44-56):

THIRD SPACE

44: **T:** So you can't have a perfect community?
45: **SS:** No!
46: **T:** Why don't they don't allow you to?
47: **SS:** (inaudible)
48: **T:** Because this is life?
49: **Leo:** Because it's life!
50: **David:** You're God!
51: **T:** And you're God. Oh Rachel?
52: **Rachel:** You can't have a perfect city; it will overpopulate.
53: **S:** Yeah
54: **SS:** No, no.
55: **T:** Seriously? In this game?
56: **Rachel:** I think it might in real life.

Susan's authoritative talk of the first excerpt (1-36) shifted from a restrictive IRE to a more open-ended conversational discourse in the second excerpt (44-56), as Susan, in her ignorance of *SimCity,* relied on the students to learn a unique feature of the game. Susan held the belief that anything was possible within the game world, including the possibility of creating an ideal society. The students, however, set her straight. They explained how the game simulates real life (49). In line 50, David referred to "playing God" by creating natural disasters, such as flooding, tornados, and erupting volcanoes, which can be used to bring the game to an end. In lines 52 and 56, Rachel made the connection between the scientific concept of overpopulation in the game and in real life, a concept the class had studied in Unit 2 while reading the *City of Ember* (DuPrau, 2003).

During the study group meeting of May 7, Susan reflected on the transcript above and talked about trying to foster a discourse that "is creat[ed] within [the student] space and what they already know and their funds of knowledge" to open up third spaces in the discourse. Susan did this by not only taking on the role of novice and asking the students to share what they know

but by also revealing her ignorance as a motivating force for students to expand their response beyond the game to include a comparison to real life (56).

During the class, Susan moved to conclude the discussion and the introduction of the unit. Again, I have visually divided the transcript to show where Susan directed the discussion (column 1) and where students revealed their expertise (column 2).

OFFICIAL SPACE

Teacher-directed	**Student expert**
57: **T:** How many of you play *SimCity*? Raise your hand please.	
58: **Ss:** (about 7 boys raise hands)	
	59: **Leo:** And you have advisors, people who tell you about energy and education.
60: **T:** Like who, who has advisors in our country?	
	61: **Jesus:** You gotta establish (inaudible)
	62: **Leo:** Because I was going to show you
63: **T:** Hold on. Just a minute. Who has advisors?	
64: **S:** (whispering) President Obama	
65: **T:** Here in our country?	
66: **S:** the mayor	
67: **T:** The mayor, yes he has advisors. The most important role the president can play is choosing all of his advisors	
	68: **Leo:** yeah that's…
69: **T:** because that shows, that demonstrates his what?	
70: **Arthur:** Trust	
71: **T:** What does it demonstrate? When they choose their advisors?	
72: **Ss:** Their trust	
73: **Leo:** their values	
74: **T:** Their values!	
75: **Arthur:** Tr:::ust	
76: **T:** and they have to trust the people	
	77: **Arthur:** If they don't have enough trust in these people then
78: **T:** Excuse me, what I want to do is I want Jesus and Leo right now to walk us through this but I'm going to ask for feedback. And I want whenever you guys have a comment, I want you to make a comment about this. Okay?	

As in lines 1-44 from the transcript, Susan took a position of authority in an effort to guide students toward a particular end (78). However, when Leo introduced the role of advisors in the

game (59), Susan attempted to build on students' background knowledge of political advisors in real life (60-67). She then moved the discussion back toward the purpose of the unit.

For Susan, the excerpt represents not only a shift in her teaching practices but also a shift in her curriculum planning. Although she could not predict what funds of knowledge students might draw on and how that knowledge may ultimately relate to the content, she had to plan in her curriculum time and opportunities to allow students to make connections to the content that were meaningful, which typically meant drawing on funds of knowledge. Thus, while she did not give up her role of curriculum planner, Susan had to plan for spaces in the curriculum where she could move into students' space and foster third spaces that ultimately helped define the curriculum. This proved to be a balancing act between knowing when to step back and allow students' knowledge to direct where the activities or discussions were going and when to make explicit and bring forward the content that needed to be covered.

The three excerpts above (1-78) lasted only four minutes. The discourse moved from an official space (teacher-controlled) to a third space and back to an official space. Each space, however, served a purpose, and was strategically facilitated by Susan. Susan was able to position her students as experts while at the same time introducing the Unit and identifying key themes the unit will take up. Later in the same lesson, Susan again fostered a third space. The game expert students were playing *SimCity* and explaining the rules to the rest of the class when, in the game world, a *SimCity* advisor recommended to the mayor that they build a jail. The students, however, disagreed, thinking that people would first have to live in the city before they would consider building a jail. At the time of the interaction, there were no jails, yet there were also no people in the city.

Once people started populating the city, however, the students decided they wanted to build a jail. In the excerpt below, Susan asked students to explain why they needed a jail in a city they were designing even as the population grew. Once again, with content dependent on student expertise and Susan's willingness to suspend her own beliefs and teacher authority, the discourse shifted from the teacher-directed goal of learning to play the game to a more conversational discourse about students' and teacher's views on crime in the game and in their lives.

Transcript 2: "It's not a perfect city: build a jail!": A third space emerges

THIRD SPACE (Negotiated Space)

01: **T:** Why would you want a jail?
02: **Arthur:** We need to!
03: **Leo:** For the criminals!
04: **Jesus:** For the criminals
05: **T:** [Why do you have to have criminals?]
06: **S:** Bad {inaudible}
07: **Jose:** [Don't put any jail there let the criminals run wild!]
08: **S:** [Because]
09: **T:** Do you have to have criminals?
10: **David:** Yeah, well not, you don't have to but
11: **T:** David, do you have to have criminals in the city?
12: **David:** Yes
13: **T:** You can't say there aren't going to be any?
14: **Jesus:** Disconnect the road
15: **Leo:** They're happy about the road.
16: **Jose:** Just kill them.
17: **Arthur:** Put a **jail** in there! And they'll be even more happy.
18: **Jose:** Kill the criminals!
19: **Bev:** Jose!
20: **T:** But what you / do you have to have criminals in your city?
21: **Bev:** Why do you [want to kill them?]
22: **Leo:** [Because of overpopulation.]
23: **David:** Exactly.
24: **Jose:** Cause [they're criminals.]
25: **Bev:** [What did they do?]
26: **David:** Because, you cannot complete the city without
27: {inaudible}
28: **T:** [Why not?]
29: **Jose:** [They're criminals!]
30: **Arthur:** That's right
31: **David:** Think about it
32: **T:** Why not?
33: **David:** What city has no criminals?
34: **T:** But in your perfect city you can have, you don't have to have criminals

35: **Ss:** It's not!
36: **Jose:** This is not a perfect city!
37: (rgh sounds)
38: **S:** Build it [jail] next to the power plant so they die!

The discourse was more fluid with layers of conversation occurring simultaneously: the expert gamers continued to build and advise each other, Susan returned to her utopian ideals which students dispute, and I questioned a student's strong feelings toward criminals. Susan again questioned the rules of the game, suggesting that a "perfect city" without criminals and prisons is possible. The students, however, found such a notion to be preposterous (33, 36), suggesting that criminality is part of life and a jail is necessary because of that (1-12). The discussion even touches on overpopulation, suggesting that overpopulation is likely without criminals (22). The students drew on their funds of knowledge as more than a supplement to the content but to define the content and to challenge the teacher's understanding. This is something that might not have been possible had Susan not left the content open to creation and stepped back from her authoritative role as teacher. Out of this intellectual conflict of what the world should and can look like learning took place (for both the students and the teacher). The tension that marked this conflict, however, was the catalyst for learning. In this regard, it presented itself as constructive controversy or a mediational tool and not an outcome of interaction.

When they first began to study their teaching using video coding and discourse analysis, Eva, Cara, and Susan saw missed opportunities for third space development. They blamed these missed opportunities on various forms of tension that were grounded in concepts about how teachers and students should act and what was allowable and expected in the classroom. Susan designed Unit 3 because she wanted to draw on student expertise or funds of knowledge about video games to foster third spaces, but she, as well as the other teachers could not design a unit that would alleviate the influence of these concepts about teachers and students. What she and

the other teachers noticed is that the Unit 3 activities facilitated third space opportunities but did not create them. That is, the teachers could not write into the curriculum times or places where third spaces would open up. Instead, third spaces arose in instructional moment-to-moment discourse because, in designing the curriculum, Susan, and to some extent Eva and Cara, allowed for opportunities for students to step forward in discussions as experts and, in turn, define the curriculum. Coming to understand this took time, as the teachers had to grapple with the tension between their existing beliefs and practices of teaching and what they were learning in their Master's Program and professional development. That is, they had to plan where their students would be the experts and they, as teachers, would be the novices, and create interactions that (1) had them, as teachers, relying on students to move the lesson forward and (2) had students engaging one another, with the teachers steeling themselves to withstand the chaos they anticipated, both of which are shown in the transcripts above. The remainder of this chapter provides a more detailed description and analysis of how the teachers moved toward teaching in this way and came to understand third space as a tool for student learning.

Learning about Third Space in a Master's Course

The graduate course *CI 575: Action research and English language learners,* taken during the Spring 2008 semester) was teachers' introduction to the LSciMAct program and the first component of their training to work with English learners (Razfar, 2007). The course introduced them to the project's sociocultural theoretical framework through primary research articles. The teachers responded to prompts about the readings on a course Blog and engaged other classmates on the Discussion Board about issues they found interesting or confusing and about any general questions they had. Each week, one school cohort was responsible for facilitating a discussion based on the Blog responses. The teachers also completed fieldwork

assignments, examining their own or other cohort members' classrooms, and developed and analyzed a two week integrated unit plan. All these readings and assignments laid the foundation for conducting the year-long action research.

The course immersed teachers into sociocultural theory and provided them opportunities to reflect on their development of curriculum using the theory. The teachers also read and discussed articles about teacher development and student learning, including articles about action research (Pappas & Zecker, 2001; Wells, 2001); bilingual education; cultural historical activity theory (CHAT) (Roth & Lee, 2007; Engeström et al., 1999; Wertch, 1991; Vygotsky, 1986); "D"iscourse and discourse (Gee, 2011; Hicks, 1995/1996; Gutiérrez et al., 1995); funds of knowledge (González et al., 2005); and third space theory (Gutiérrez et al., 1995, 1999, Gutiérrez, 2008).

Reading about third space theory. The teachers read Gutiérrez, Rymes, and Larson's (1995) "Script, Counterscript, and Underlife in the Classroom: James Brown versus Brown v. Board of Education." In the article, third space is introduced as "a place where the two scripts [teacher and student] intersect, creating the potential for authentic interaction to occur" (Gutiérrez et al., 1995, p. 445). During the week that the article was read, Eva, Cara, and Susan led the discussion of the blog entries that other teachers in the class had submitted about the article. The blog prompt created by the instructor read:

> In the Gutiérrez article, power displays itself through "scripts." Bourdieu describes third space as "a space of regulated confrontation" (p.18). By looking at the three transcripts in the article, describe how third spaces emerge. How can this struggle between teacher scripts and student counterscripts be transformed into learning opportunities? Also, how

does the tension in the interaction between teachers and students lead to learning?

(Course Blog #13, posted April 11, 2008)

In their blog responses posted on April 13, 2008, the teachers discussed how a third space briefly emerged in one transcript and critiqued how the focal teacher in the article retreated to a more comfortable script instead of using the racial tension to create new learning opportunities. The teachers posed alternative dialogue that could have transformed the teacher script and student counterscript. They also provided examples of ways the focal teacher could have used the student script about James Brown, the musician, to make connections to the historic court case of *Brown v. Board of Education.*

In her blog response, Eva described the teacher's discourse as "stiff… reflect[ing] dominant cultural values." She added, "I could see the teacher and students struggling to find ways of talking about topics which are often considered taboo." Eva went on to suggest that the teacher's authoritative discourse indexed his embarrassment as a white teacher discussing racial inequalities with African-American students. In their separate blog responses, Susan's and Cara's responses examined a mixed race student's question in the transcript, *What if a kid's half White and half Black? What school do they go to?,* and the focal teacher's response*, If you were even a teeny weeny bit Black, you were Black.*[6] Susan saw this moment in the discourse as creating potential for authentic interaction because the student question was full of "personal social relevance and it is highly controversial." But, she went on, the teacher "gives a matter a fact answer… and unfortunately that was the end of the discourse where this space could have mediated participation of the students." While all three teachers identified missed opportunities to expand on the history content, Susan and Cara honed in on one of the missed opportunities as

[6] The italicized text is the from the Gutierrez et al. (1995) reading.

a lost chance to discuss race issues of the past and present. Susan added, "Students could have done research to answer their own questions…[which would have] provided an opportunity for research and debate… This could have been the moment when students were empowered to understand and connect history to their lives and lead to authentic learning."

The teachers readily identified and critiqued how the focal teacher's authoritative discourse in Gutiérrez et al.'s article impeded authentic interaction. They even suggested alternative courses of action that could have created third spaces. However, they did not speak about their own classroom practices and how it was similar or different than what they had read about. They also had not looked at their own teaching and the nature of the interactions they had with students.

Conducting fieldwork to examine third space theory in praxis. As the course progressed, the teachers did complete fieldwork that looked at their own classroom practices. This fieldwork included observing English learners within their classrooms for at least 15 hours. Each school cohort created an action plan that was an extension of the fieldwork the teachers conducted. The action plan was designed to provide teachers with practice designing, implementing, and studying an integrated mathematics, science and literacy unit. The teachers designed and implemented a two-week thematic unit based on students' interests and community knowledge and orientations toward mathematics and science, as well as on district and state content standards. During the planning phase of the unit, the teachers worked individually and as a cohort to develop an *inventory table* that aligned students' funds of knowledge with state mathematics and science standards and the teachers' curriculuar objectives. Engeström's (1999) *activity triangle* was used as a heuristic to develop activities and analyze an activity system. The

activity triangle framework was an essential component of the course instruction and was used by the teachers in their development of their curriculum units.

Before beginning unit development, the teachers conducted fieldwork designing and implementing activities to explore students' funds of knowledge. Although they drew on Moll's funds of knowledge model (Moll et al., 1992), they were not trained as ethnographers to explore students' family and community resources. Instead, the teachers designed classroom activities to discover students' common knowledge and experiences that would be relevant to the classroom. As a cohort, the teachers developed activities based on a common theme, commercial trade, and planned activities according to the grade and subjects they taught. The teachers also selected a focal group of students to videotape. They included at least two English learners, including students who had been transitioned in the mainstream classes in the last two years, in each focal group.

The teachers used an observation protocol during the implementation of their units to analyze how learning was socially organized (Razfar & Rumenapp, 2011). In their protocol, they paid particular attention to the following discourse practices: the use of material artifacts and learning tools, peer assistance, expansion of student responses, language choice, the use of multiple registers (formal versus informal talk), points of disagreement and tension between students, shifts in student participation and shifts in learner identity (i.e., expert versus novice). Although all three teachers were videotaped, as a cohort they chose one teacher's classroom (Susan's) to analyze in depth. They watched two videos (one from each week of the unit) and used a coding sheet to mark the presence of items in the protocol in 30-second increments. The teachers used the tally marks to decide where the most action was happening – where the most codes were marked – and then selected two 1-minute episodes from each video to transcribe.

The cohort used the episodes as examples of emergent themes and report of their findings, which included reporting the funds of knowledge process and any future modifications they would make. At the end of the course, the cohorts presented their action research projects. In their action report, they wrote:

> The cohort is aware of third spaces that come up, that previously were skipped over, and we will make a conscious choice to try to expand on them as much as possible. It's amazing what students know when you give them an opportunity to have a voice. (Pilot, p. 10)

The initial fieldwork provided a chance to practice the writing of descriptive and interpretive field-notes and using an observation protocol to describe and rate the nature of classroom activity. The implementation of the two-week unit and the action research project that served as the graduate course's final project were the teachers' first opportunity to analyze their own teaching practices. In the action research report they wrote at the end of the course, they identified three findings: (1) missed opportunities for student talk limited the development of potential third spaces, (2) the relationship of open-ended questions to students' funds of knowledge and expertise, and (3) teacher authoritative stances. All three of these findings would re-appear in later discussions of classroom practice, and would form the bases for identifying tension as an impediment to third space. Each is briefly presented in the subsections that follow.

Pilot findings on missed opportunities. As part of their collaborative pilot report (April 28, 2008), the teachers transcribed part of a discussion from one of Susan's classes and identified it as an example of a missed opportunity for expansion. The transcript is from the first day of the trade investigation pilot unit. I present a selection of the teachers' transcripts in two parts. In the

first part, the four male students were brainstorming why nations engage in commercial trade, when Susan entered the conversation[7].

Transcript 3: Focal students brainstorming commercial trade

07:	**Miguel:**	They (.) they (.) make trades because (1) because / for the best of
08:		Their (.) their workers.
09:	**Enrique:**	In baseball they trade for the best of their te:am (3)
10:	**Susan:**	Right. "In baseball they trade players to make the best team", (1) right?

During a later focus group with the teachers, Susan used this excerpt to claim that Enrique's knowledge of baseball as an example of a fund of knowledge that could have been connected to the curricular unit's content objectives. However, in the excerpt, she became distracted by Darrell and Alonso, a student from another group, when Alonso took the focal group's glue stick. The conversation turned towards the immediate use of the classroom resources:

12:	**Alonso:**	You ripped us off
13:	**Susan:**	But they (inaudible)
14:	**Darrell:**	**No we didn't. Hey, don't take our glue:**
15:	**Alonso:**	It don't work
16:	**Darrell:**	**That's not our fault**
17:	**Susan:**	I'll get another one if it doesn't work
18:	**Darrell:**	**They can't take my glue**.
19:	**Susan:**	I'll get you another one if it doesn't work
20:	**Darrell:**	**Ripping people off. They're nasty.**
21:	**Susan:**	Okay. I'll get you another one
22:	**Darrell:**	**You should be ashamed all yourselves**
23:	**Susan:**	Shh! Excuse me. (3) What was the question?
24:	**Miguel:**	He / He says he doesn't understand it.
25:	**Darrell:**	I don't understand.
26:	**Susan:**	Okay. So, you go t::o (1) Africa (Student brings the glue back)
27:		(2) a:nd you get a product like u:hm (Student making noise in
28:		background) (1) like cocoa beans. Let's go with cocoa beans. Okay?
29:		What do they do with those cocoa beans?
30:	**Ss:**	They make chocolate!
31:	**Susan:**	They make chocolate! They make all kinds of chocolate. Well,
32:		how do you do that?
33:	**Miguel:**	Factories
34:	**Susan:**	"Factories." So they have factories t::o
35:	**Enrique**	They need workers
36:	**Miguel:**	Work
37:	**Susan:**	Employ peo::ple so it helps ou::r (.)
38:	**Miguel:**	Economy
39:	**Susan:**	"Eco::nomy". There we go. Okay. (.) S::o why do we trade things?
40:	**Darrell:**	To help our economy

[7] Transcription conventions are in Appendix A5.

41: **Susan:** "To help our economy" because we don't have tho::se (1)
42: **Darrell:** Resources

During the focus group discussion, the teachers analyzed how Susan had, after the glue stick incident, guided the students' conversation with IRE questions in lines 26-42, rather than picking up and exploring with the students their funds of knowledge. The teachers identified this excerpt as an example of a missed opportunity to expand on students' funds of knowledge, especially the concept of trading players in baseball mentioned by Enrique in line 9, and connect that knowledge to the concept of countries trading resources. The teachers, particularly Susan, saw how Darrell's talk in lines 12-25 disrupted the group's discussion and may have been an impediment to Susan guiding the conversation toward students' funds of knowledge. Instead, because of this disruption, she responded by guiding the discussion in a more familiar direction.

In their analysis, the teachers recognized what was happening as classroom tension, which is often created by the dynamics of the classroom, such as when personalities clash and disagreements arise. The teachers saw these types of tensions as impediments to creating third spaces. However, when they wrote their action report, they attributed the tension to students' lack of understanding in the content area, which is different than the disruption of a student asking for something out of turn. For the teachers, students' lack of content knowledge appeared to be an impediment to third space development. Later in the professional development, however, as will be shown later in this chapter, the teachers would realize that these missed opportunities were a result of a number of things, including classroom dynamics, but also their failure to invite student knowledge into the classroom and giving it a chance to inform the curriculum so that the content could make sense to the students. In other words, they would come to see tension formerly attributed to lack of student content knowledge as tension that could mark opportunities for constructive controversy.

Open-ended questions, student expertise and funds of knowledge. During the graduate class final presentation of their pilot report (Pilot, April 28, 2008), the teachers compared transcript #3 in the previous subsection with one from a different focal group of students. In transcript #4, students brainstormed the difference between a global and a local issue. Susan wanted the students to understand how trade is a global issue that affects other global issues such as global warming. In her field-notes, she described how students seldom took Felipe seriously. She explained that he has interesting ideas but sometimes has difficulty articulating his thoughts. Thus, other students often ignore him. When they watched a video of the focal group discussing water filters (transcript #4), the teachers noticed Felipe's position within the group changed when I asked the group open-ended questions:

Transcript 4: Focal students discussing water filters

19:	**Felipe:**	What about, u:hm (2)
20:	**Researcher:**	What did you say about those filters?
21:	**Felipe:**	Water filters? Water filters? That if you don't have
22:		freshwater you start uhm, running low on a lot of, uhm,
23:		freshwater, so that, uhm, you find a way to turn saltwater
24:		into freshwater.
25:	**Researcher:**	Okay. And where would that be a good place to use that?
26:	**Felipe:**	A place around the desert, (.) you know, like uh:m somewhere
27:		around Africa or something, Egypt.
28:	**Researcher:**	Okay. Why there?
29:	**Felipe:**	Cause you know the Red River, right? The Red Lake (.) where it's
30:		all salt, where it's one of the only salt water lakes.
31:	**Researcher:**	Okay.
32:	**Felipe:**	If you could find a way to clean that out.(.) If you could find a way
33:		to turn that into fresh water.
34:	**Victor:**	It's called filters. (1) But if they're too poor to get relief for the
35:		people "what makes you think they're going to have enough to
36:		afford for the filters?"
37:	**Felipe:**	Good point.

In their class presentation, Eva said that Felipe was frustrated before I began to ask open-ended questions. The open-ended questions, she said, allowed him to display his knowledge about filters, and Victor, another student, was able to pick up on that knowledge and add to it.

During the class discussion, the teachers explained the difference between the two

episodes in terms of the type of questions asked. And in their action report, they wrote, "In the first video the teacher is the expert whereas in the second video the researcher guides and expands on the knowledge of the students allowing the student to become the expert." In their analysis, the teachers said open-ended questions, as opposed to the Initiation-Response-Evaluation (IRE) question structure, were essential to revealing students' mathematical and scientific thinking. However, they expressed concern about when and how to ask the "good" kind of questions that will open up students' talk. In this regard, as Susan, demonstrated in the excerpts that opened this chapter, "good" questions, in part, are questions to which the teacher does not have the answer and/or has something to learn from the students beyond whether or not they know the answer. In other words, good questions are authentic questions that are asked to further the interaction.

Became aware of teacher authority. Missed opportunities and not asking good questions often stem from teacher authority, or what a teacher is willing to allow in the classroom and how he or she positions him- or herself in relation to the students. In their action research presentations, the teachers described how their experience of doing video analysis led to an awareness of their own teaching practices. Susan explained: "We became more aware in our classrooms and more conscious of what we were doing, that we found we were asking the IRE questions and wanted to move to the higher order questions." Eva, too, explained how her new awareness allowed her to "step back a little bit and use more (.) of this kind of (.) [conversational] discourse which was very beneficial to my students and to me." Susan and Eva recognized a need to transform their classrooms from a more teacher-centered discourse, where the teacher voice is dominant, to a more dialogic discourse. Dialogically organized instruction involves fewer teacher questions and more conversational style as students and teachers alike

contribute ideas to discussion (Christoph & Nystand, 2001). The opportunity to see videotapes of themselves teaching helped the teachers begin to develop a meta-awareness, including better understanding and valuing student discourse, seeing more opportunities for expansion, and being able to meaningfully engage struggling students. Using discourse analysis to study their classrooms, the teachers became aware of their authoritative discourse and how it might impede students' efforts to draw on their funds of knowledge. The teachers acted on their analyses and began talking about how they might engage students' differently to better support student learning.

After one semester, the teachers had become aware of things they could do differently and even identified what they would do, but still needed the opportunity to study how to change their practices. The graduate class pilot provided a critical framework through theoretical research literature and opportunities to "try out" methodological tools, which teachers used to evaluate their work. However, they had yet to implement change. They knew, however, that there were missed opportunities to create third spaces and that they often did not ask the type of questions that elicited students' funds of knowledge. They also had become aware of their own authority as teachers, yet were still unsure how to negotiate that authority with students. As the initial activity in the teachers' professional development, the graduate course, and their introduction to discourse analysis, served to position the teachers for the more extensive curriculum development and discourse analysis work that was to follow.

Teacher-Research: Reconceptualizing Missed Opportunities and Teacher Authority to Foster Third Spaces

The pilot action research study in the spring 2008 was followed by a year-long action research study (fall 2008-spring 2009). As part of the study, the teachers would implement three

integrated units throughout the school year. After each unit, they would use the video-coding sheet and transcripts to write a report about the unit. Teachers began to prepare for the study in the summer of 2008 by designing funds of knowledge activities to conduct the first month of school.

As I outlined in previous chapters, my role as the facilitator of the year-long professional development was to meet with the teachers, first as often as possible, and later in scheduled study group meetings, to discuss planning and teaching the units. During the study group meetings, I facilitated and modeled for the teachers the use of discourse analysis. As a researcher, I recorded and transcribed the study group meetings as part of my data set. I expanded the third space codes that came out of the graduate course work to include when teachers talked about *missed opportunities, asked questions, defined third space, provided class examples*, and *awareness development and drew on third spaces to develop and inform their curriculum*. My data collection also led me to examine how the teachers drew on video clips and transcripts to inform their understandings of third space. In this section, I show how teachers tried to create third space opportunities in their classrooms and subsequently began to redefine what *third space* is and identify the impediments to creating it.

Early conceptions of third space. The teachers created a funds of knowledge inventory for their students during the Fall and prior to implementing Unit 1. Unit 1 was implemented the six weeks prior to the winter holiday break. During this time, the teachers and I were not meeting regularly, although I would see them at least twice weekly. I encouraged them to set up a regular meeting schedule with me, and finally near the end of the year, the LSciMAct Project team decided to make study team meetings a required part of the professional development.

Unfortunately, January brought illness to one of the teachers and another lost her data and teaching materials when her computer crashed. I finished the month preparing for and completing my doctoral qualifying examinations. Finally, in late January and early February, the teachers began to code videos from Unit 1 and select episodes to transcribe. Two and half months had elapsed between teaching and analyzing the first unit.

When the teachers and I met on February 16, 2009, (SG #1, OoS) my goal as facilitator was to help them use the coding sheets and transcripts to identify emerging themes in their Unit 1 data in preparation for writing individual reports. I encouraged the teachers to think about how to use their data from the first unit to (1) examine potential third spaces, (2) identify reasons for when spaces did not open up in the discourse, and (3) consider what they could do in the future to mediate third spaces. Looking at their videos and transcripts, the teachers attempted to identify third spaces and missed opportunities and began to consider their role as teachers in creating or impeding third spaces and whether or not they even had to be present for a third space to happen among students.

Eva returned to the finding from the pilot study of missed opportunities to developing third spaces. She was frustrated in her failed efforts to foster third spaces. "Kids," she said, "don't have mentality to pay attention to new ideas. They see an assignment and want to get the job done fast." In an attempt to offer a different perspective, I pointed to an example in one of Susan's transcripts of focal students playing with language and creating a possible third space**.** In the transcript, the focal students discussed similarities and differences between the video games *ToonTown*, which was chosen by Susan, and *Rock Band*, which was voted a favorite game by students. Susan had asked them to examine the features of mathematics, science, and literacy in both games and create a poster using a Venn diagram or some other graphic to compare the

features. After Susan left the focal student group to work on their own, the students continued their discussion, honing in on the one video game, *ToonTown*. I divide the transcript to highlight where students used an "official" or school-like script (column 1) and a student script or one with underlying tones of funds of knowledge (column 2).

Official script	**Student script**
	48: **Jose:** And [*ToonTown* is] more toonish. (laughing)
49: **Felix:** More odd.	
	50: **All:** (laughing)
51: **Iris:** That's not a word.	
	52: **Jose:** Yes it is.
53: **Iris:** It has more	
	54: **Jose:** {In the toonish dictionary}
55: **Felix:** vocabulary	

In presenting the transcript, Susan attempted to identify a third space among the students:

01: **Susan:** Is this a third space? Or not? IT'S MORE TOONISH. MORE ODD. THAT'S NOT A
02: WORD.
03: **Bev:** Yeah there's this real struggle for rule negotiation.
04: **Susan:** Yeah. This student makes up a word and says, that the game is, they're comparing games, and
05: the student says that this game is more toonish
06: **Cara:** Toonish?
07: **Susan:** Yeah toonish
08: **Bev:** It's kind of playful because the game is called ToonTown.
09: **Cara:** Oh
10: **Bev:** And the other students critique whether or not that's a word
11: **Cara:** Okay! That's interesting
12: **Eva:** That's a good one!

All the teachers picked up on how Iris regulated, much like in the official space of the classroom, the language rules within the group, deciding that *toonish* was not an acceptable word. Iris, who recently exited from ESL services, may have not understood the play on words. In the unofficial space or peer-learning space, the students were not constrained by the evaluation of the teacher, and were free to collaborate using their literacy and language skills to clarify their emerging understandings (Gutiérrez, et al., 1999). However, the students used language to extend their officially sanctioned student role of responding to a teacher-initiated discourse pattern. Susan pointed to the code *tension in the discourse* to reflect Jose's attempt to create new language

rules, and Iris and Felix maintenance of the official script as they moved on to discuss the vocabulary in the game. Iris's regulation of language rules inhibited possible third space development by imitating teacher authority and not allowing Jose's knowledge and the language with which he conveyed that knowledge to inform the discussion.

In contrast to the above excerpt from Susan's transcript, earlier in their discussion, the focal students drew on their video game expertise to share knowledge and assist one another to brainstorm ideas about science, mathematics, and literacy in the video games:

32: **Felix:** How do we how do we how we see any type of subject in the game *Toontown* and
33: **Sonia:** Oh math because / no science because the game that we were playing
34: **Jose:** No no for science you have you have to do for the game you have to find a better way to
35: get into the circle.
36: **Felix:** But then compared to *Rock Band*
37: **Jose:** Compared to *Rock Band, Rock Band* only has like (.) physical stuff like you have to hit
38: the right [cords at the same time.]
39: **Sonia:** [In *Rock Band* hay tres jugadores y aqui no mas hay uno. (*In* Rock Band *there*
40: *are three players and here there is just one.)*
41: **Grace:** Sonia (laughing) Haha, no. In *Rock Band* también hay uno. (*No, in* Rock Band *there is*
42: *also one*.)
43: **Iris:** Like in this game (*ToonTown*) you've got like five games
44: **Felix:** {They both have math}
45: **Jose:** And there's more people in it (.) more than three.

In the second section (lines 32-45) of the same transcript, all students are contributing their understanding to the activity. No one is regulating the talk. However, Felix acted as facilitator of the group, asking an open-ended question to guide the group's discussion (32). Susan pointed out that her coding shifted from *tension* and *rule negotiation* (in the previous excerpt) to *role shifts, participation shifts, multiple languages* and *peer assistance* in this excerpt. Eva added, "Even though Sonia and Grace disagree, they are able to contribute in Spanish." In writing her thesis, Susan drew on this transcript to demonstrate how students' expertise is distributed across the group in this excerpt, and referred to Gee's (2007) Distributed Principal of Learning in which "knowledge is distributed across the learner, objects, tools, symbols, technologies, and the environment" (p. 227). Unlike in the first transcript where tension impeded the students'

interaction, in the second transcript language is the central mediating tool in fostering joint productive activity. However, what is not identified as tension in the second excerpt—the interaction comparing the video games and using both English and Spanish to do so—is a type of tension in that there is an intellectual conflict marked by the sharing of disparate understanding. To the extent that they engaged one another, and allowed that engagement to transcend language rules, the students created a third space that allowed for constructive controversy, which informed their learning. In other words, tension is part of any intellectual conflict, and it is constructive controversy that allows it to become a mediational means for learning and not the outcome of the activity. Thus, tension will and should always exist in intellectual conflict. It is in how it identified—as a mediational means or an outcome—that suggests what is possible in terms of learning and development.

Up to this point, the teachers had only considered third spaces occurring within the whole class interaction. The two excerpts presented by Susan led her to re-examine Gutiérrez and her colleagues' (1995) focus on teacher and student interaction as the focus of third space, extending third space to include the interaction among students in small groups when intellectual conflict was present. While the teachers discussed writing the Unit 1 group report (March 5, 2009, SG #5, InS), Susan described her interest in exploring how third spaces can be created among students in groups, and what role, if any, the teacher plays (lines 1-14):

01: **Susan:** I think I had mentioned looking at why, I'm curious about both [third spaces between
02: teacher and students and among students] and I would like to know, I would like to
03: learn better how to create a third space between the students and get them talking
04: about it but that's...
05: **Eva:** What do you mean by third space between students and students?
06: **Susan:** When they go <u>off topic</u> and they have a third space between them.
07: **Eva:** Well I'm not so sure that's the third space, third spaces just a moment of clarification.
08: I think it's has to go more in deep.
09: **Susan:** Well that's what I'm talking about, exactly. <u>How do you encourage that? How do you</u>
10: <u>create that depth with them?</u> And I think they do go off on it on their own.
11: **Eva:** They might be in your class, in my class they don't have [(.) not a lot of
12: opportunities (laughs).]
13: **Susan:** [I think students do it all the

14: time (laughs).] I think students do it all the time between themselves.

Susan was coming to understand what she and the other teachers would describe as "off-topic" interactions among students as possible third spaces, or at least as having the potential to become third spaces. Bicais and Correia (2008) described something similar in defining learning-oriented talk as the various roles children take on during peer interactions to create a context that combines the home, school, and peer-cultures. Susan saw learning-oriented talk as synonymous with students creating a third space, in that students drew on the official space of school to regulate and negotiate new knowledge they brought in from outside of school. In lines 9-10, Susan suggested that teachers can play a role in fostering third spaces within student groups, including encouraging students to work in small groups collectively and providing opportunities to talk with peers. These peer relations are not teacher-controlled, but do occur in the classroom so they could be considered teacher-governed, or teacher-facilitated indirectly.

Redefining the possibility of third spaces. In our study group meeting on April 22, 2009, SG #10 (OoS) Cara brought a clip from a read aloud she did of Paul Fleischman's *Westlandia* (1999), a children's book about a boy who experiments growing his own garden and creates his own civilization. She explained how students had shared their funds of knowledge and expertise, and from her videos of Unit 2 she chose clips of two students explaining their experiences building brick and paper houses with family members. She coded *funds of knowledge* throughout the video.

I asked Cara to examine other codes she had tallied concurrently with *funds of knowledge*. The group examined her coding sheet, and I pointed to an example where she had tallied multiple codes, including *third space, tension, rule negotiation, questions*, and *multiple languages*. She recalled how Shelton, an African American student in the focal group, had shared his funds of knowledge about gardening. When I asked her what was happening with

tension, *third spaces* and the other codes during this sharing, she was not sure. The teachers and I then watched and discussed her clip, which was recorded in her class on March 18, 2009. The transcript has three columns: the teacher script, the student expert script, and the teacher researchers' commentary during the study group meeting, thus columns 1 and 2 are from Cara's classroom, and column 3 is from the study group meeting. The teacher and student scripts are separate in the transcript to show the resistance of the teacher to move into the student script, which the teachers suggested created tension and inhibited a third space.

Transcript 5: Tension during a read aloud with study group commentary

Teacher Script	**Student Expert**	**Study Group Commentary**
1. **Cara:** Soil? What if there's soil already out there?		
	2. **Shelton:** No::: that's wrong Ms. C I know what you do with it.	
3. (students raising hands) 4. **S:** Dirt. 5. **Cara:** Dirt.		
	6. **Shelton:** I know what you do with it.	
5. **Cara:** What if there's already dirt out there outside like in your yard?		
	7. **Shelton:** You you you plant it in the dirt right. You put the seeds in	
8. **Cara:** That's what Jerry said.		
	9. **Shelton:** On you put water on it and it grow like carrots	
10. **Cara:** Absolutely then you can grow carrots or whatever you plant		
		11. **Bev:** Okay, he's talking about planting here so that was the
12. **Cara:** Uhm. Okay when you take out the dirt. But are you just digging a hole and then you throw in the seeds in. What do you have to do with that whole area? 13. **Students:** No!		
	14. **Shelton:** You have you have you have to dig first and put the seeds in, cover it back up, pour water on it	
15. **Cara:** Pick the spot. 16. **Jerry:** You gotta make the line 17. **Cara:** Right		
		18. **Bev:** Who said pick the spot? 19. **Cara:** I don't know.
	20. **Shelton:** No:: Ms. C. You're supposed to dig in the mud. Put the seeds in first.	

21. **Cara:** Ye::s
22. **Shelton:** Cover it back up.
23. **Cara:** Yes
24. **Shelton:** Pour water. Then you

25. **Bev:** Is that Sheldon?
26**. Cara:** That's Sheldon. Oh yeah

27. **Cara:** Yes you do have to water them but there's one little thing that you do kind of be::fore. Yes you do need sun also. Depending on the type of plant you might need a lot of sun
28. **Students:** Air
29. **Cara:** Air.

30. **Cara:** I don't remember why I am...

31. **Shelton:** (standing) And I got one more thing Ms. T. [If you put too too much water on it, it won't grow.]

32. Cara: [trying to get into think about like the spot they have to pick and why.] So if you put too much water on it it won't grow. Right. Some plants don't need a lot of water, right.

33. **Cara:** [I can't remember.]

In this vignette, the teacher and students can be heard talking over one another and speaking loud in order to be heard. Each had an expertise they wanted to share. When we finished watching the clip, I asked Cara why she marked *tension* on the coding sheet at minute 44:00 through 48:00 (lines 1-33). She was not sure. I asked the other teachers why they thought she used the code *tension*. Eva asked where in the clip a third space was. Susan identified the role of tension as impeding and then creating a third space:

Transcript 6: Study group discussion of tension

Teacher Expert	**Teacher Novice**
	01**: Eva:** So where is the third space?
02: **Susan:** Well I think the tension is	
	03: **Eva:** the tension is
04: **Susan:** the students overlapping, the talking. *I mean that's the way I would see it.* They want to be engaged. They want, they all want to participate in there and the tension is, *in my opinion*, the tension is that they don't have those opportunities. I mean think like if say *we* were in small groups talking about it or pair shares or something, then that tension wouldn't be there because they would have that opportunity to talk	
	05: **Cara**: to talk about it
06: **Susan**: because they want to talk.	

The teachers noted that Cara did not move into the third space but maintained her authority even as she took up what students were saying, particularly what Sheldon was saying. Susan pointed to students' overlap talk as the source of tension impeding authentic interaction and evidence that a shared space for learning was not created. She suggested that students need an opportunity to share their experiences and that having students share in pairs or small groups before opening discussion up to the whole class could mediate the tension. Most importantly, Susan defined third space as the shift in teacher talk into a negotiated space where expertise is shared, something Cara did not do.

Eva again asked Cara to provide evidence of a third space. Even though Cara marked the coding sheet at minute 46 as third space, she said could not remember why. I suggested we watch the video again and pay close attention to why Cara marked this minute as third space. But before we could replay the video, Cara replied (lines 7-23):

Negotiated Space

07: **Cara:** Maybe because I didn't address Sheldon's whole routine of how to plant.
08: **Eva:** I was thinking about that. <u>It can be that a third space</u>, Sheldon has something,
09: she (.) she kind of stops him
10: **Cara:** I don't acknowledge him at all. I'm trying to go with my whole thing about
11: picking a spot for some reason and I don't remember where we are in the
12: story or why that was important to me at that time…
13: **Susan:** That's right and you just don't acknowledge him at all. Look. (laughs)
14: **Cara:** Usually I do, but I'm trying to give. He gets so much attention all the time
15: and he
16: **Eva:** I'm doing the same thing in the class.
17: **Cara:** even though this, usually it's just other attention. This time it's academic. I
18: mean he is like trying to explain, usually it's just he wants... do you know
19: what I mean like? The focus to be on him whether he's banging into
20: something and I don't know, so I don't know I would have to re-watch it and
21: kind of pay more attention.
22: **Bev:** I think it's a good clip
23: **Cara:** (writes on her coding sheet '46:46 expert Sheldon')

With Susan's and Eva's assistance, Cara recognized how her teacher authority had impeded Sheldon's talk about his gardening expertise and, thus, the possible creation of a third space. I had stepped back, saying very little as Susan and Eva helped Cara arrive at her new

understanding. While the interaction was collegial, the intellectual conflict that could be seen in the teachers' different understandings of Cara's excerpt pushed Susan and Eva to challenge Cara's interpretation of her excerpt. Ultimately, Cara agreed that she had impeded the development of a third space, and later would talk about her failure to appreciate students' funds of knowledge. The teachers' work, however, had cohered into a community that was able to withstand and even draw on any disagreements that they had to create constructive controversy that could drive their own learning.

Later, during the June 18, 2009, SG #15 (OoS), the teachers talked about a lack of third spaces in the second unit. They attributed this to how they took back control of the curriculum. Cara talked about what had gone well in her class and what she still needed to work on. She read aloud from her transcript how Sheldon explained, "PUT A CARROT AND TOMATO SIGN. YOU HAVE TO LABEL IT. YOU, YOU, YOU AND THEN PEOPLE CAN GO IN THE GARDEN. And then I'm yelling at Patricia, LIKE WE DO AT HOME." Cara had expanded the previous transcript to include how Sheldon had labeled the plants in his garden at home. She said she provided opportunities for students to share their funds of knowledge but did not move into negotiated spaces where the student expertise informed the curricular goals. In talking about the theme of gardening in Unit 2, she said:

> The other thing was lot of opportunity with the funds of knowledge. I was very surprised I guess because you know them being in the city I took for granted that they are city kids and wouldn't know about planting but most of them had planted… [but] in the unit 2 video they are planting seeds in soil and sand they and are making predictions about which medium is going to help is going to produce a plant easier more easily (June 18, 2009, SG #15, OoS).

Cara said she had not planned for students to bring in funds of knowledge during the read aloud, but she later redesigned the unit so that students could experiment with planting their own seeds and talk about how their families planted gardens.

In planning for Unit 3, Cara focused on fostering third spaces by taking up those opportunities that she had missed in the previous units. She decided to have students study their own communities so they could discuss and write about their neighborhoods, and then create their own civilizations and build skyscrapers. Through experiential learning, students selected building materials and experimented with different geometric shapes to support the foundation of their skyscrapers. She knew from previous units that the students enjoyed talking about their neighborhoods, and she thought that by being more focused on students' funds of knowledge missed opportunities would be minimized. After completing Unit, Cara wrote in her thesis:

> To me this was a logical lead in to studying their surroundings. I expected the students to be enthusiastic and they were. All of the students were engaged in drawing maps of their streets and researching products at various grocery stores to compare prices.

Cara talked about what she learned about her students during Unit 3:

> And that really came out in Unit 3 and how I think I talked about this before, really how smart they were. I had misjudged them at the beginning and I had made comments; which I am sorry and I do apologize. I just didn't think that they were going to be capable of it. I was really impressed with them. I think they really enjoyed it.

Cara recognized how she had misjudged students' abilities and imposed her own understanding on them. Her misjudgments had impeded the development of third spaces in her classroom. In his Bristol study, Wells (2011) showed how teachers were "much more concerned to impose their own meaning intentions, often ignoring what the child was trying to communicate" (p.

166). Cara acted similarly, but the study group meetings served to meditate the tension she experienced in wanting to create third space but not recognizing her students' expertise. During the July 24, 2009, FG 4, I asked Cara if she thought her students had taken ownership of their work during the implementation of Unit 3. She said, "Yes. Definitely. Especially when theycreated their own civilizations. In presenting it and creating the things and not even asking me how should we do this. And they just did it on their own." Figure 7.2 Students' Civilizations shows the results of her second-grade students' civilization project. Their projects reflected their understanding of how civilizations developed, as they created representations of animals and objects that were familiar to them. The students went on to share their work with the first grade classes.

Figure 7.2 Students' Civilizations

"You have to be a good listener": Making connections and teachable moments. Both Eva and Susan emphasized the importance of making connections between students' out of school knowledge and academic Discourse to create third spaces; however, they went about making those connections differently. Eva believed she needed to learn about students' funds of knowledge and draw on them as she taught mathematics and science. She thought third space opportunities occurred when she was able to use their everyday language(s) and expertise and create "teachable moments" teaching the content. Susan saw it differently. She explained:

> Well it's kind of their space already and when you do a third space part of the third element of the third space is creating it within their space and what they already know and their funds of knowledge. (June 30, 2009, SG#17, OoS)

Susan allowed time for students to talk and share their expertise, both in whole class and small group discussions. On June 1, 2009, students evaluated the video game project. They worked in their groups and then presented to the class.

01: **Susan:** How about Sonia, (.) how did you find working with the group?
02: **Sonia:** It was hard.
03: **Susan:** It was hard (.) how come? (3sec)
04: **Sonia:** Cause (.) we have different opinions about the (2 sec) how to (.) work the city. (3 sec)

The transcript demonstrates how Susan paused and waited for Sonia's response. In the June 30 meeting she said, "It connects things up at times… they are making connections to other things… what they are interested in too, or what's going to engage them because they start talking about it." Susan saw her role in all this was to be a good listener. She later explained in her thesis how she saw her role as teacher and facilitator to identify issues that reappeared for the students and provide opportunities for students to learn more about those issues. In her thesis, Susan described such an example:

> In unit 3 when the students were talking about budgets and Arthur said that his aunt made $60,000, but the rest of the students said, "that's not possible." His knowledge created a point of tension that led to a very animated class conversation and allowed students to raise new questions about careers and salaries. Hence, because students had more opportunities to talk in small groups, I was able to bridge their community knowledge with academic content; thus third spaces emerged.

In playing *SimCity IV*, students learned about budget issues. Susan used whole class discussions as a way to hear students' progress and concerns with the game and attempted to make real life connections. As the groups expanded their cities, the students learned about supplying government services such as health, education, safety, parks and leisure, and how inadequate funding of these services can lead to strikes.

'Making it alive again': Reconceptualizing missed opportunities. Similarly, the teachers identified different strategies for alleviating missed opportunities. During the March 5, 2009, SG #3 (InS), Eva introduced a new way to think about missed opportunities.

> I need] to figure out something else, it's not necessary so as a teacher you figure out you lost an opportunity to expand on something. I mean it's not necessary to go in that minute, you can do the decision you know what I think this is really important. So what I'm doing in my class, next day I'm come back and say you know what guys, today we need to talk about that (.) because yesterday I saw you had some question and I am pretty much sure you want to. Then so I (.) the discussion I you know make it alive again!

For example, Eva, in her part of the thesis, reflected on a lost opportunity that occurred while students played the "My Sims" game during Unit 3. Students had to collect *essence* from plants in order to build a house. *Essence* was a new concept students learned while playing the game.

Based on the game, Eva developed a lesson about gardening and chose plant essences, such as lycopene from tomatoes and capsicum from jalapeños, to help students to make connections to their home experiences. Eva explained in her thesis:

> When I showed a map of where these plants are grown, the Latino students became very excited and began to share new information about their native countries and Puerto Rico, opening a new space. When I assigned scientific readings about lycopene and capsicum, all the students wanted to read about jalapeños. (Thesis, p. 60)

The transcript for the lesson captures students' desires (lines 1-25):

01:	**Eva:**	You have a choice to pick your vegetable. I don't have a lot. Okay let's see. Radish? Who
02:		would like to plant radish? (hands table the radish reading)
03:	**S:**	What's that?
04:	**Eva:**	(points to the group) As a table. I'm going to tell what kind of vegetables I have
05:	**S:**	No.
06:	**Eva:**	Okay guys I'm going to tell you what I have and you're going to decide as a team what you
07:		want. And raise your hand.
08:	**SS:**	(excited chatter)
09:	**Eva:**	I have radish. I have lettuce.
10:	**S:**	What?
11:	**Eva:**	Lettuce. I have jalapeño.
12:	**S1:**	yeah! yeah!
13:	**S2:**	Yeah we want jalapeño. We called it!
14:	**S1:**	We want jalapeño!
15:	**S4:**	Lettuce?
16:	**SS:**	We said jalapeño!
17:	**S5:**	Can you say it again?
18:	**Eva:**	I have... (2) you are talking and I have lettuce, jalapeño, and I also have squash or zucchini.
19:		(walks around to tables and hands out the readings)
20:	**S6:**	zucchini
21:	**S3:**	We said jalapeño!
22:	**S2:**	My mom can make a guacamole
23:	**S8:**	My mom makes chile relleno
24:	**SS:**	(class erupts into loud talking about the vegetables)

Eva realized the importance of identifying students' funds of knowledge and using their funds of knowledge to introduce new content. Her ability to reflect on creating third spaces and her decision to realize or make happen its potential is a pedagogical move that she decided can and should be made in the classroom. Until this point in our discussions, the teachers and I had viewed third spaces as an interaction between students and teacher, and at times among students,

occurring in the moment-to-moment discourse as if they arose organically. Eva introduced a new way to reconceptualize missed opportunities from individual diachronic events, playing *My Sims*, to synchronic activity systems, drawing on the moment-to-moment discourse analysis to inform the change of events, and thus curriculum and participants over time. She saw new possibility in reorganizing the curriculum to engage her students in productive activities that were personally as well as socially significant. Her effort to redefine curriculum as co-created by the teacher and students, and thus potentially more meaningfully, opened up the possibility for student questions and ideas to shape the curriculum. Eva discussed the challenge of planning this type of teaching (lines 1-10):

01: **Eva:** and then that will be it. And so I so many times I did like that, I never keep a planning
02: because that's the point
03: **Susan:** Yeah
04: **Eva:** when you do a planning lessons plans (.)
05: **Susan:** [You can't do it. How can you go to those third spaces?]
06: **Eva**: [How can you do this with] the lessons plans?
07: **Susan**: [That's right. Exactly.]
08: **Eva**: [and like that, this is crazy.] I never on time because I always do this. Always go back I see
09: what my kids need and go back and do that and so I'm off of the planning all the time. I never
10: can keep up plan

Eva and Susan were always planning together (during lunch and after school, as well as in-between classes and at coffee shops). Because they shared the same students but taught different content areas, they knew their students and shared information with each other. As Susan pointed out in line 5, third spaces often occur unexpectedly and as a teacher you need to make a decision whether to foster the potential of that third space, close it and try to make it alive at another time, or shut it down for good. The planning in this excerpt refers to the official (dominant) script that the teachers are responsible for using even as they try to respond to student needs.

During the Unit 2 meeting on April 9, 2009, (SG#9, OoS) Eva had brought up the challenge of time and planning:

With third spaces, it's a really big issue because there are a lot, **a lot** and if we have to stop all the time, that will never, we can **never** cover what we have. I mean in a class and there are a lot, **a lot of time** when I can see it, I can but and **I stop few times**, really I stop, and I go back and I redo it and I, or I explain, I **did** but see that it's kind of, I'm thinking so **many** opportunities, then what's the point for this planning. Will never be on top with the planning stuff (.) to tell you the truth.

Teachers began to think about third space occurring not just at the discourse level but also the curricular level. They saw an opportunity to shape the discourse by the type of curriculum implemented. Eva's example demonstrated the how she began to think about curriculum as larger events connected to activities in and out of the classroom. Planning for this type of learning needs to be flexible, allowing teachers to have more control over when and how specific content is taught.

Vulnerable Spaces: The Shifting Role of Tension in Developing Third Spaces

In their Unit 1 report (submitted on March 5, 2009), the teachers wrote about how their efforts to code incidents of tension in their video transcripts helped them examine the sources of tension in their classroom practices. Although their English learners (ELs) were proficient in the content, all three teachers identified spelling as a source of tension among students, meaning that the students struggled with spelling and it inhibited their participation in group activities. ELs shied away from writer roles in small groups and were critiqued by other students when they did take on this role. Eva provided an example from an activity that had students documenting the mathematics, science and literacy in that was in a video game. Within the group, Sophia, an English learner, was the most reserved:

Transcript 7: Spelling as a Source of Tension

01: **Sophia:** How do you spell {inaudible}

02: **Junisa:** m-a-
03: **Sophia:** (erases something on paper)
04: **Junisa:** Just leave it.
05: **Sophia:** I'm just drawing.
06: **Genia:** Just leave it.
07: **Junisa:** Stop saying anything. Leave her alone.
08: **Sophia:** (takes paper) I know how to spell. Don't have to look pretty. (writes)
09: **Junisa:** You're trying to be {inaudible}
10: **Sophia:** No I'm not.
11: **Genia:** It could still be more bigger.
12: **Sophia:** It **don't** matter.
13: **Junisa:** It doesn't matter. (1sec) {Let's just finish.}
14: **Sophia:** See I know how to spell.
15: **Junisa:** Oh my god. That's what she had
16: **Sophia:** (gives paper back to Nicolas) She never put feet.
17: **Junisa:** U
18: **Sophia:** I
19: **Junisa:** I
20: **Sophia:** T
21: **Junisa:** T
22: **Sophia:** A
23: **Junisa:** A-R
24: **Nicholas:** I know how to spell it.
25: **Junisa:** **Without** an **E**. **Without** an **E.**
26: **Sophia:** I know.
27: **Junisa:** She put an E last time
28: **Sophia:** Oh yeah at the end of heroes.
29: **Junisa:** Ahah I spelled it right and she spelled it wrong.

The teachers identified these moments of reserve in the student discourse as 'vulnerable spaces,' believing that they created a type of tension that impeded the discourse needed to foster third spaces among students. The students were resistant to intellectual conflicts during these moments because they felt uncomfortable and saw no place for their funds of knowledge within these discussions. Teachers made changes to the focal groups—moving students who regulated spelling and enforced English only.

The role of tension in inhibiting and developing third spaces became more evident to the teachers as they implemented Units 2 and 3 and conducted their teacher research. In analyzing Unit 2, Eva said, "third spaces usually will appear more when you give students the opportunity to struggle to think" (June 18, 2009, SG #15, OoS). Tension arising from opportunity to think beyond previous understandings casts tension as important to developing third spaces, with Eva

suggesting that it is the nature of thinking that is encouraged fosters the developing third spaces. The following week she added, "Any kind of tension can open opportunities for the third space, that's right there for me, tension. I want tension! When it's tension the kids are thinking in different ways" (June 23, 2009, SG #16, OoS). This was a far cry from their analysis of the pilot study, and the belief that tension among students created missed opportunities. In her thesis she wrote: "more student dialogue created tension, this allowed for the appearance of third spaces and represented an important change in how students conducted group work." The reference to "any kind of tension" needs to be understood within the context of Eva's and the other teachers' focus on providing students opportunities to think, to get past inhibitions. Third space is facilitated through students struggling with the content and drawing on their own funds of knowledge to make meaning of it. It is the third space, however, that makes the transformation of the content into something meaningful and relevant possible. The teachers wanted students to struggle with their thinking, believing it fostered third spaces that, in turn, fostered new knowledge development.

By Unit 3, Eva was able to show how students modeled and used instructional conversation in their groups. For example, in the following transcript students read and discussed a reading about lycopene, a plant essence found in tomatoes. The transcript demonstrates how Eva saw dialogue as an important tool in providing peer assistance for opening up third spaces:

Transcript 8: Dialogue as a tool in opening up third spaces

048: **Isabella:** So what do we know about this paragraph?
049: **Sophia:** It's talking [about]
050: **Diego:** [Antioxidants] helps you grow. I think.
051: **Isabella:** Not (inaudible)
052: **Diego:** Na na na (making a face)
053: **Angelo:** Disease fighting
054: **Isabella:** Yeah. So it helps us by
055: **Sophia:** By prevent can::cer

056: **Diego:** (leans over to Sophia) Can:cer
057: **Sophia:** (puts her arm up to push Diego away)
058: **Diego:** And other
059: **Sophia:** And other
060: **Diego:** I don't know why you gotta hate.
061: **Arthur:** And it protects our cells'

In contrast to Unit 1, Eva came to value group work and remarked how Isabella's scaffolding (48, 54) provided assistance for students to make connections from earlier lessons and also draw on their funds of knowledge about antioxidants related to cancer and disease fighting (53-61). In her thesis, she wrote:

> [Isabella] played the role of the teacher as facilitator engaging students in their understanding about antioxidants, which I had not provided. Students imposed their own interpretations of the new concepts covered in the readings and created ideas that made sense to them. Isabella's guided questions in the focal group provided an appropriate amount of struggle, and at times tension (Thesis, 52-53).

Susan, too, began to understand tension differently over time. She created a new code to talk about the tension she observed, "My tension I think, uhm, creates different role shifts and is part of the *role negotiation*. I call it *role negotiation* because there is tension between who is going to be dominant and who isn't going to be dominant" (June 23, 2009, SG#16, OoS).

The web of tension. The evolution of the teachers' understanding of the relationship of tension and third space is presented in Table 7.2, where terms taken from study group meetings and unit reports show how the collective understanding of the teachers evolved from unit to unit.

Table 7.2 Teachers' Understanding of Tension Across Units

UNIT 1	UNIT 2	UNIT 3
Tension is caused by: • Disagreement • Conflict • Frustration • Power dynamics	• Tension is caused by going "off topic" • Tension can be used to make connections between content and funds of knowledge.	• Tension created role shifts/participation shifts among students. • Tension exists and should be used to create third spaces

Throughout the year in study groups, reports and fieldnotes, the teachers had described "tension," especially when it occurred in small group interactions, as "conflict," "disagreement," "frustration," "discomfort," "struggle," "power dynamics," "a different energy and involvement," "disequilibrium," and even as "silence." And because students lacked experience working in groups, the teachers identified several sources of tension, including their implicit or explicit choosing of group roles, their sharing of academic and out-of-school expertise, their using of English and Spanish to control the discourse, and their learning how to compromise. Tension was often identified with other codes such as *rule negotiation, funds of knowledge,* and *shifts in expertise and participation*. And at times, they failed at first to identify tension in the videos.

In the last study group meeting on July 20, 2009, (SG# 19, OoS) the teachers discussed *tension* as a common overarching theme across grade levels and the professional development. After they each described the role of tension in their practice, we decided to break *tension* into categories and describe its role in inhibiting or fostering third spaces. I thought an outline or web

could help them organize the writing of their thesis. Eva said: "I'm thinking now, 'oh my god, I have to be like the student now.' I tell my kids do like this."

Susan and Eva immediately presented perspectives. Eva took out a flow chart she had shared at a previous meeting, describing how she saw tension in her scaffolding of activities and whole class discussions. Susan explained how her tension did not come from scaffolding but rather from group dialogue among students and from having them make decisions. Susan said, "Let's just name all the tension." Together, the three teachers created the web of tension presented in Figure 7.3.

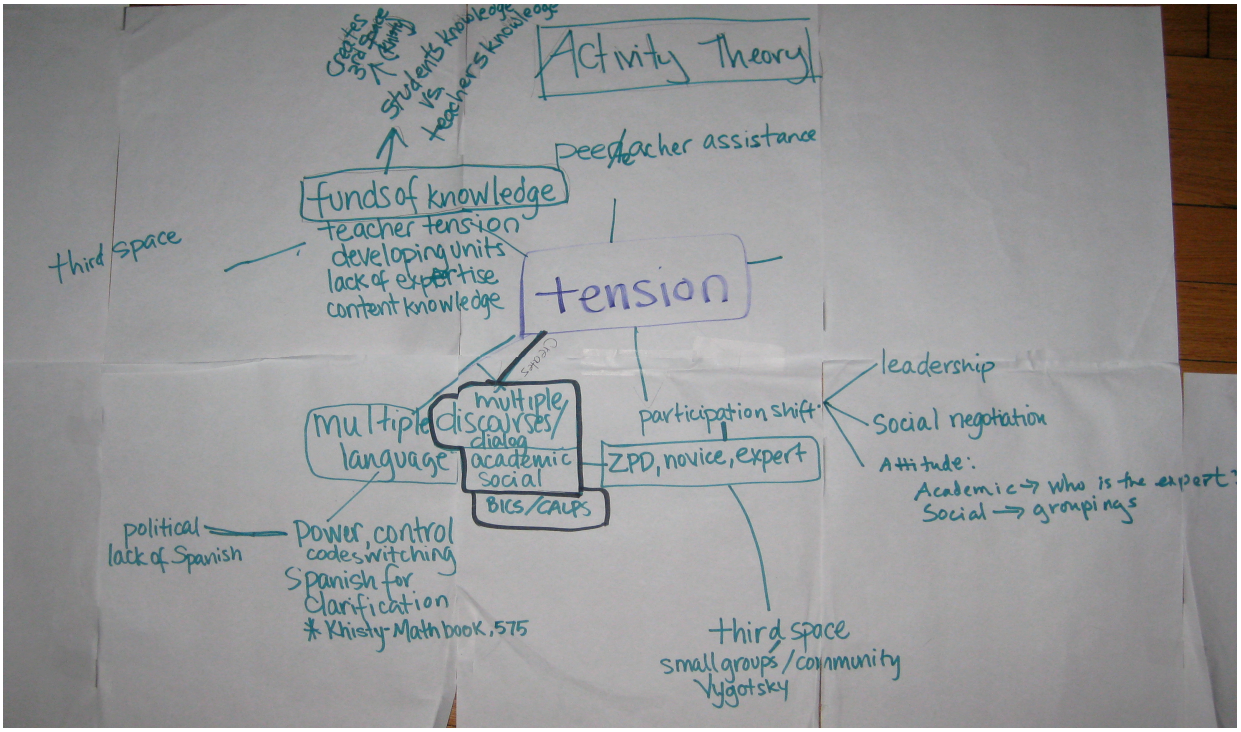


Figure 7.3 Web of Tension

Table 7.3 provides a description of the sources of tension and their outcomes that the teachers captured their web tension.

Table 7.3 Teachers' Description of Tension Sources and Outcomes

Sources of Tension	**Outcomes of Teachers Use of Tension**
Multiple Languages	Used Spanish and English: - to establish power dynamics within the group - as clarification Lack of multiple languages
Multiple Discourses	Academic Discourses (mathematics, science, and literacy) Social Discourses (video games)
Students' funds of knowledge	Created tension planning and developing units - Lack of teacher expertise; not comfortable being novice Used fok to develop third spaces
Dialogue	Whole class and small group interactions as mediational tool
Participation Shifts	The way students talked and acted in groups - Peer assistance - Role shifts (shifts in expertise) - Led teachers to change groups

As they created the web, Cara and Susan pointed out that they only tallied multiple languages and did not consider multiple Discourses, whereas Eva saw how instructional conversation changed how students communicated across the academic Discourses of mathematics and science and across social Discourses, such as video games. In the web, they divided *multiple languages* and *multiple Discourses*, academic and social language, into two categories. Under multiple languages, Susan pointed to how students used Spanish and/or

English to gain status and control in the group. Eva and Susan provided examples of how students used Spanish for clarification. They reflected on articles they read throughout their course work in making connections to the research base. Cara added *lack of multiple languages* to the chart to describe how her bilingual students refused to use Spanish in class. Eva named *participation shift* (the way students talk and act in the group) as another source of tension.

As the teachers charted the tension they had experienced and observed over the year, they began to identify how the categories were related. Eva suggested that they add arrows in both directions "like in chemistry" to show the bi-directionality or ways tension produced participation shifts and vice versa. Making a circular motion with her hand, Susan agreed and added, "We can do just a continuous arrow." However, the final product (Figure 7.3) did not reflect either of these ideas as the teachers became immersed in discussion and set the chart aside.

Eva explained that she had recently reread some articles on third space and said: "[the] first space has to do with what students know from home. So home space…then the second space is from school academic. And the third is when you as the teacher can combine the two of them." She saw third space as a pedagogical move that could be facilitated by different pedagogical strategies. The teachers saw students' *funds of knowledge*, including what they know about video games, as the foundation that created *teacher tension* in planning curriculum and that could serve to open up the curriculum through third space opportunities. Susan said, "We wanted to have that [planning] all done in advance and we wanted to know where we were going and all our resources" (July 20, 2009, SG #19, OoS). All three teachers agreed that this was no longer the case.

As such, they categorized funds of knowledge with developing the units because unit development created tension due to the teachers' lack of video game expertise. Eva, for example, wanted to make more connections between the games and teaching mathematics and science because she was not comfortable being the novice; whereas, Susan did not feel she had to become a video game expert and allowed the students to teach her. Eva talked about using scaffolding and dialogue – in whole class and small group interactions – as a mediational tool to create tension in learning mathematics and science. Invoking Moje et al.'s definition of *third space*, Eva said, "…that struggling has to be done with a lot of scaffolding questions, a lot of open questions, and then with dialogue." Cara and Susan identified this as *(peer and teacher) assistance* and added it to the web.

Fostering third space through tension. With the academic year completed, and the professional development coming to an end, with only their thesis to be written, the teachers had come full circle on their perspectives about the role of tension in their classrooms, coming to see tension as creating opportunities of constructive controversy or potential third space moments that could lead to learning and development. Although they still believed that it could inhibit third spaces, they now realized that tension could, in fact, be used to foster third space, and as Eva noted, might be a prerequisite for third spaces to occur.

The activity that was the professional development had an initial *outcome* that framed tension as an impediment to third spaces. Figure 7.4 provides a diagram of the roles students and teachers played in impeding and facilitating third spaces across the year. As can be seen in the diagram, for students' tension usually impeded third space by silencing students or creating uncomfortable situations. For teachers, a failure to build opportunities into the curriculum for student funds of knowledge and a refusal to give up some authority impeded third space.

Relatedly, when students had opportunities to draw on funds of knowledge and take expert roles, third spaces were often created. All of this was facilitated by the conscious choices of the teachers to draw on students' funds of knowledge in curriculum development and leave space within the curriculum for students to take on expert roles.

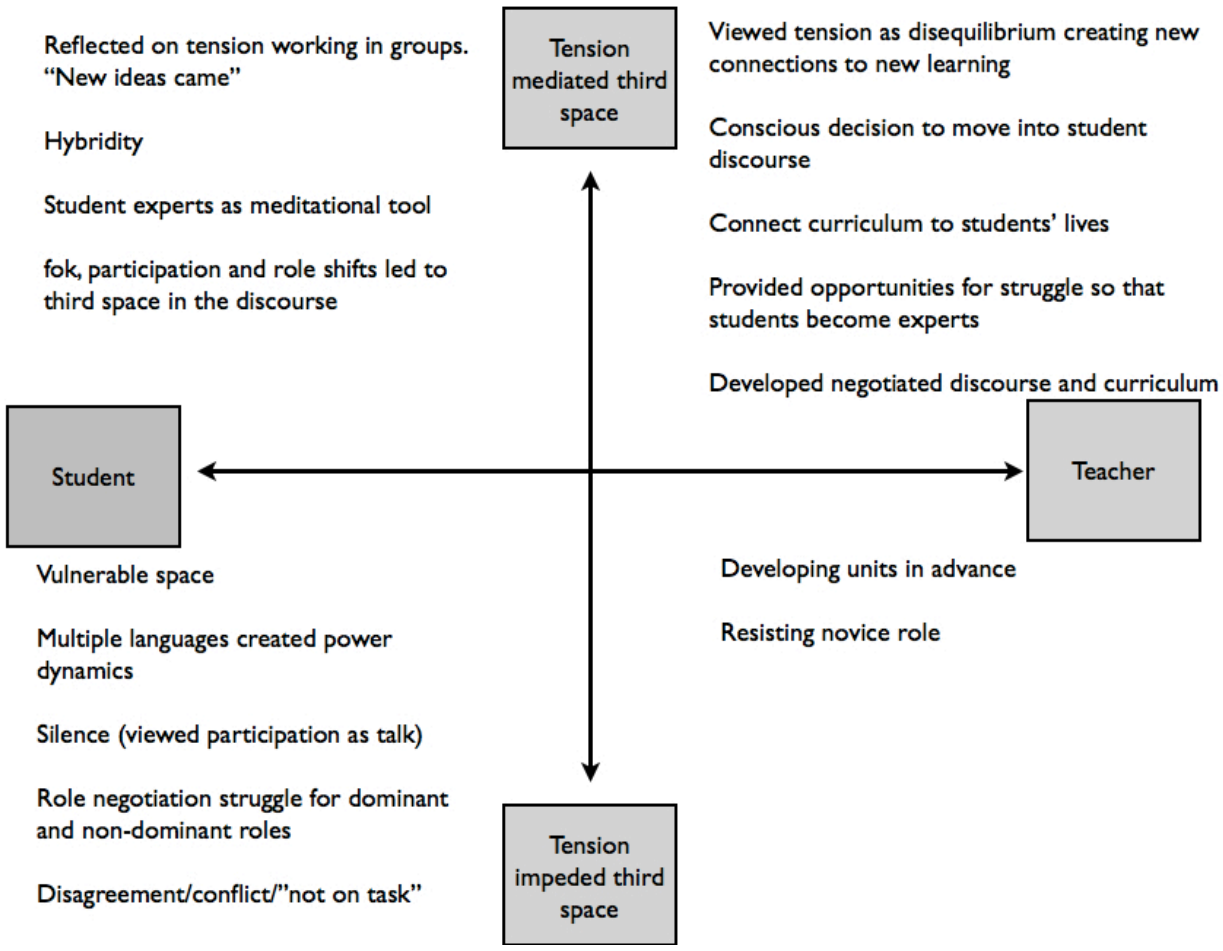


Figure 7.4 Diagram of Tension

For example, during the third unit teacher meeting (May 7, 2009, SG #12, InS), Susan talked about how she used a writing activity to help students reflect on the obstacles or tension they experienced while playing *SimCity* in their groups:

> And what they wrote about, which I found interesting again was that when they were doing groups, they said that when we got to the point of tension, we had to come up with

new ideas. Many of the students talked about that. They said we disagreed and then new ideas came. And they talked about that in their writing.

The students, themselves, demonstrated an understanding of the role tension can play in creating new knowledge. Tension, when allowed to exist and when used as a cue for further interaction, can facilitate new ideas or knowledge creation. For example, Sonia's reflection (Figure 7.5) demonstrated how the game created a learning environment that encouraged failure through real problem solving. The group worked together (mirror), trying out their ideas (light bulb) and learning from their mistakes (wall). Although the activity was filled with tension, as previously demonstrated, Sonia showed an interest in continuing to play and learn with her peers (general).

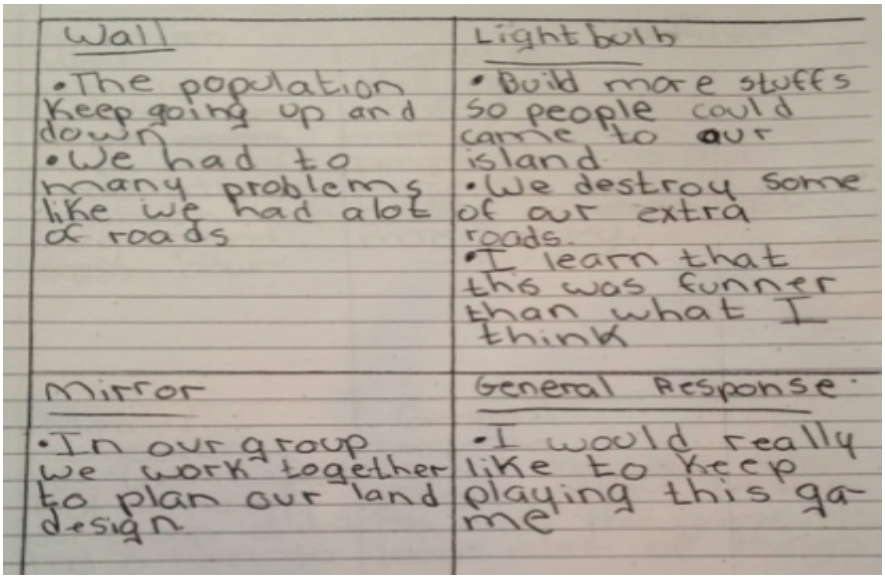


Figure 7.5 Sonia's Written Reflection on *SimCity*

For the teachers, by the end of the professional development, tension was seen as a tool within their classroom practice that could inhibit and promote third space development depending on from where the tension arose and how the participants negotiated it. The key to successful use of tension appeared to be, first, to recognize it, whether it took the form of challenge, a struggle, or conflict, and then allow it to be a source of third space by opening the

space up to the perspectives of all participants as a way to negotiate learning. This required a certain level of nimbleness on the part of the teachers to reflect on their praxis and consider multiple possibilities of action. As Figure 7.5 shows, tension exists between all aspects of classroom interaction.

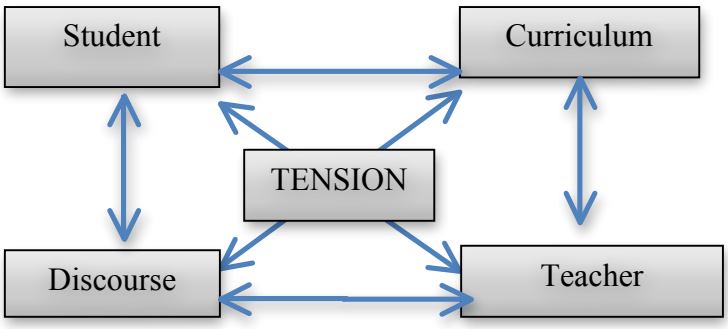


Figure 7.6 Tension as a Mediational Tool

In the Figure 7.6, tension mediated the teachers' development of curriculum and the role teachers carved out for themselves in the curriculum. To develop curriculum that would allow for third spaces, meant the teachers had to rethink what it meant to create curriculum and to rethink who they were to be as teachers within that curriculum. Related to this, the curriculum redefined the role of students, who in turn, experienced tension in being asked to take on these new roles. Similarly, as the curriculum redefined the types of discourses possible in the classrooms, both students and the teacher experienced the tension of having to interact differently in the classroom. Ultimately, the tension that mediated ongoing curriculum development informed the discourse of the classroom made third spaces possible. Learning this, the teachers realized that their role as teachers was not to alleviate tension but to use it productively in the classroom, with one productive use being as a source, or mediational artifact, of third space development.

Discussion: Lessons Learned—After a Year of Professional Development

Part of the tension teachers experienced in negotiating their roles as teachers and roles as researchers was using new research tools. Through developing situated research tools (as described in the previous chapter), the teachers were able to examine tension and its relationship to third space in new and meaningful ways. Their new understanding of tension and its relationship to third space as a context to student learning evolved during Units 1 and 2, and the Unit 3 development reflected this new understanding. The study group discussions mediated the shift from tension as an impediment to a source for creating third spaces. This shift occurred at the discourse and curricular level impacting the entire activity system. In this final section, I discuss the effect of the teachers' new understanding on curriculum development by presenting an extended excerpt from Susan's part of the thesis, where she offers a summary of how the professional development transformed her practice.

In their thesis, Susan explained how the video game curriculum created a space where students were engaged in tasks and topics relevant in their lives. She viewed her role as the facilitator, but in fact her role involved much more. As a teacher researcher, she studied students' interactions in groups and identified mathematical and scientific concepts that caused tension in student discussions. Susan drew upon the concepts in the game that reappeared for students and then provided opportunities for them to learn more about those topics as a whole class. She described the joint collaboration between teacher and students as "the meaning making that takes place in the third space, where the teacher can build upon the students' funds of knowledge and integrate it into the curriculum situated in a safe environment where both the teacher and the students enter the space together." The following extended excerpt is from her

thesis and captures both Susan's evolving understanding of tension and third space development and her thinking at the end of the professional development:

Finally, in the third unit, I learned how to listen to the student's voices, consider their expertise and funds of knowledge, and yet make guiding decisions regarding curriculum and activities. The different kinds of tension I felt in previous units pushed me to approach my third unit by building my curriculum around *SimCity IV*. Additionally, while the students were playing the game, I listened to their discourse about the game and created mini-lessons. This was my [use of] third space; the tension I felt while learning to bring together the expertise and interests of my students and my expertise as the teacher and facilitator.

The previous chapter presented an activity triangle to describe how (initial) outcomes became new mediational tools for the teachers as the year went on. In the early part of the year, tension was the outcome of Susan's experience of changing her practice. Over time, she learned to change her practices, such as learning to facilitate the possibility of having students inform curriculum development and learning to allow students position of expertise. As such, the tension these changes in practice fostered became a new mediational tool that she viewed as fostering a disequilibrium that led to students and teacher learning. Susan's praxis was shaped by the changing tools—her own struggle made her aware of ways to develop third spaces by shifting her talk into the student discourse and providing opportunities for struggle in the curriculum. For example, in the teachers' thesis, she wrote:

An example of listening to the students' discourse came from the embedded issues in *SimCity IV* which also provided third space opportunities. Issues of money, budgeting and taxation continuously reappeared in the game. For example, on May 27, 2009, the focal students were having arguments about taxes and how much the people should be taxed:

015: **Arthur:** See the taxes. I told you guys to leave the taxes alone.

016: **Iris:** (points to screen) **Raise** the taxes. (2sec)
017: **Arthur:** (laughs)
018: **Iris:** It's telling us to raise them.
019: **Grace:** Destroy the city.
020: **Sonia:** No.
021: **Iris:** You know what we should have done [like] fifty percent taxes.
022: **Grace:** [No]
023: **Arthur:** You know what raise taxes as high as they'll go.
024: **Sonia:** No::::::::: (2sec)
025: **Grace:** See how high they'll go. (3sec)

This was an example where one student had already raised the taxes and Arthur had told the group to leave the taxes alone (036), but Grace wanted to raise the taxes as high as they would go (022). In the next part of the transcript she became aware of the consequences of raising the taxes in the game and in real life:

036: **Arthur:** I was telling you guys (.) [to leave the taxes] a:lone
037: **Grace:** [(smiles at camera)]
038: **Arthur**: because they're going to [keep complaining]
039: **Iris:** [They're not complaining] about the taxes.
040: **Arthur:** (pointing finger at Iris) Yes they were.
041: **Grace:** They're complaining they don't have enough money.
042: **Arthur:** When you guys were changing it they were complaining.
043: **Grace:** A::ll (picks up her notebook and papers and taps against desk) Okay okay.
044: **Arthur:** They're complaining they don't have enough money.
045: **Sonia:** They're not complaining.

Grace changed the taxes and realized that people (in the game) were complaining that they didn't have enough money because the taxes were too high (41, 43) and Understanding the concept of taxation, Arthur kept reminding them that he told them to leave the taxes alone for this reason (36, 38, 42).

Susan had documented these shifts in her fieldnotes and coding sheets and selected transcripts that showed shifts in participation and expertise. She had moved Arthur to the focal group in Unit 3 as a *SimCity* game expert to provide the other students technical support to play the game; however, Arthur also had an understanding of creating a budget and understood the consequences of raising and lowering taxes based on his prior experience.

Susan subsequently wrote:

After I noticed their tension in the discourse, we had a whole class discussion about the different kinds of taxation they saw in the game, SimCity IV. In my fieldnotes on May 26, 2009, I recorded:

> "The students became animated when they started explaining how people would leave if the taxes were too high, but how it was hard to balance it in order to keep the people happy; when the taxes are too low, then the people aren't happy because there aren't enough services."

We then applied this to property taxes in our world and how these taxes can keep people in or out of communities. At this point, I introduced a study of basic types of taxation and services these taxes provided.

I noted in an email to Bev that the students, during the end of the year presentations, mentioned numerous times how much they liked learning about taxes and budgets. The initial tension I felt in the first unit with video games was allayed during this unit. The opportunity to extract a meaningful learning experience from the game was embedded in the game. The game provided a scaffold and a real-life situation for instruction of taxes, budgets, and wages. The students developed an interest in these topics since they could understand their importance in the context of the video game, *SimCity IV* (Cohort thesis, 57-58).

SimCity IV sparked students' interest in applied economics. Susan was able to bring the focal group's struggle with concepts of taxation to the whole class for discussion. She identified the tension in student discourse as being different in the third unit from what it was in Unit 1 or even Unit 2. The tension in Unit 3 was around problem solving; whereas, in Units 1 and 2 the tension was often personal, having typically to do with role negotiation and authority within groups.

The students' Unit 3 tension was not that different than the tension the teachers experienced as the professional development year went on—the tension necessary to cause disequilibrium. Divergent interpretations about what they were experiencing and what needed to be done pushed the teachers to think differently about what they had learned in the university classroom and about what they had known about teaching. Over time and through collaboration, their ideas about tension and third space development converged, much as it did in regards to the research tools and theory.

Conclusion

As we wrapped up our study group meeting #18 at my house on July 7, 2012, the teachers talked about the ways they saw students lead small group interactions.

01: **Eva:** Anna. she's doing the same thing assuming the role as a leader. Incredible skills!
02: **Bev:** Iris is also
03: **Susan:** Iris is a leader definitely oh yeah it goes back and forth
04: **Eva:** leader
05: **Bev:** Arthur is like the [game] expert
06: **Susan:** Right, Arthur's the expert. Iris is the leader.
07: **Bev:** Yeah.
08: **Eva:** Really?
09: **Susan:** Uhm.
10: **Eva:** So Arthur is the head and Itzel is the neck
11: **All:** (laugh)
12: **Eva:** I'm sorry. Did I say it wrong? I say it to my husband all the time you're the head but I'm the
13: neck.
14: **All:** (laugh)
15: **Eva:** No you didn't know that. My mom used to tell me make sure let your husband be the head
16: you have to be the neck. So to orientate where the head is looking at. That's a Romanian
17: saying by the way.

Susan referred to how Arthur provided assistance with learning how to play the game and pulled back so that the other students could use his technical support to try out their own theories (6). Iris, however, was the leader. She gave the group direction. Eva drew on her own funds of knowledge to suggest Arthur was the head and Iris was the neck (10, 15-17). It was Iris who oriented the group and kept them going in the right direction.

In many ways, the LSciMAct Program started out as both head and neck, designed to provide the teachers with content and guidance and direction. But in time, the teachers began to take over, first as the head, in that they had to make meaning of the content in ways that could serve their work as teachers and researchers. In using the content to look at praxis to make sense of their classroom practices, the teachers, with the support of the Program team, began to find their own direction and began to provide one another guidance.

The Program encouraged them and gave them the tools to draw on their experiences and expertise. They used those experiences and expertise to identify what needed to happen. But it was then they began to direct the project and define what they were experiencing that they became the leaders of the Project. It was then that they began to question what they had learned in their coursework and what they were asked to do in their classrooms. This questioning led them to challenge the meaning of *third space* and how it is third space contexts were created and connected to student learning. In turn, it made it possible for them to develop curriculum that allowed for the possibility of third spaces.

Discussion

Lessons From My Study

I advocate a paradigm shift in how many in the educational community—university researchers, school leaders, policy makers, and teachers—conceptualize professional development. It is a conceptualization, however, that has strong theoretical and historical roots, from the work of Dewey (1916) and subsequent Deweyan scholars (Connelly, He, & Phillion, 2008; Schubert, 1986) to the work of Vygotsky (1986) and his myriad of followers (Moll et al., 1992; Gutiérrez, 2008; Razfar, 2007). Lessons from my study suggest the following shifts as ways for those advocating a more sociocultural and collaborative PD framework: (1) shifts in authority and changes of place; (2) shifts in teacher decision-making processes; and (3) shifts in the teachers action research as demonstrated in their use of discourse analysis to study and facilitate ELs' learning. The following subsections speak to each finding with respect to re-conceptualizing PD for mainstream teachers who have English learners in their classrooms.

Shifts in authority and changes of place. My first finding poses questions of re-conceptualizing PD in terms of (a) who has authority during PD and (b) how place of PD can transform the nature of authority. The continuum of who has authority in PD runs from the university researcher as having complete authority to the university researcher as feigning no authority in collaborative inquiry with teachers. The challenge for university researchers is to learn how to balance collaboration so that the focus is on collaboration premised on the expertise each participant brings to the work. For university researchers this requires a level of "researcher reflexivity" that reveals their positionality, voice, and participation and strives to complicate researcher roles. It does not minimize the central role of the university researcher, however, particularly as it relates to theoretical expertise, but instead makes evident the importance of an

intense ethnographic relationship among university researchers and teachers. For the teachers, the theoretical expertise that university researchers can offer along with the ability to help teaches begin to appropriate that theory in meaningful ways is what makes transformation possible.

Thus, university researchers need to reflect on issues of authority and whose role is privileged and, most importantly, what that might mean to the teachers' development as researchers and teachers. Ultimately, the question that needs to be answered for the university researcher is what type of researcher he or she wants to be and what does taking that role mean for those with whom he or she works. For example, I shifted from being an instructor to a facilitator of the PD. As an instructor, I valued providing the teachers with research; whereas as a facilitator, I helped the teachers create their own original work. Crossing the boundaries of university and teacher research, I moved into a new realm of research that is relevant to the lives of teachers and classrooms but that can inform the work of university researchers. In this sense, the work is dialectic and provides new possibilities for researchers and teachers. For the teachers, through their university coursework and subsequent action research PD their roles shifted from novices to experts of ELs learning, with them learning how to take constructs prominent in English learning theory and research and using them to make sense of their own practices. Allowing them to be the experts, foregrounds teachers own thinking and encourages them to use their analysis to develop new understanding of theory that is beneficial and relevant for ELs in the context of their own classroom.

The location in which the PD takes place is also important for university researchers to consider. My work with the teachers on their action research showed that within the context of school, the teacher researcher identity conflicted with teachers in school identity. As a result, we

had to create a space where teacher researcher identity could be fostered. However the shift from in school to out of school was not just a geographical shift. It also brought about a change in the activity system. In the out of school context, the activity system foregrounded a common object: building awareness to teacher and researcher practices through discourse analysis. The outcome for teachers became fostering a teacher-researcher identity; whereas, the outcome for researchers was re-defining their own role as a researcher.

Similarly, my first finding suggests that PD that supports the development of a teacher researcher is not enough. PD needs to expand to also provide teachers with opportunities to become curriculum designers. Teachers need to think through the development of activities that consider both the content they will teach and how they will engage students around that content. They need to see curriculum development as a process of positioning students to reveal the content and make sense of it from and beyond their own experiences. In this regard, it is a process of moving students from their day-to-day understandings of content to more academic understandings that is similar to Vygotsky's (1986) notion of moving from everyday knowledge to scientific or academic knowledge.

Shifts in teacher decision-making processes. My second finding showed how teachers modified research tools to develop their own coding systems. The teachers took ownership of constructs within an activity system, such as *third space, tension* and *assistance,* to select transcripts. Using discourse analysis, they shaped the theoretical constructs so that these constructs spoke to what they were experiencing in their practice. Shifting the quality and types of mediation, the teachers learned to use the transcripts to see larger themes across curriculum units, which informed their curriculum development.

Teachers who design their own curriculum face tension on what counts as learning. On the one hand, subtractive language views are perpetuated by curriculum mandates that politicize labeling students as "other" (i.e., English Language Learners), which allows for the manufacturing prepackaged curriculum to meet the prescribed deficiencies since the goal is simply viewed as a linear process of moving the other from an "abnormal" categorization (e.g., below grade level, lower stanines, etc.) to a "normal" categorization. The teachers in this study came to take an additive view of language learning grounded in sociocultural learning theory and an evolving understanding of funds of knowledge and the role of student interaction. They recognized the language abilities that the students' had as an asset. The teachers approached curriculum development as a joint activity between teacher (experts in content) and students (experts in funds of knowledge) based on the belief that the students had something to add to the equation of learning. That something included not only funds of knowledge but language abilities that were intricately related to that knowledge and gave it representation.

As teacher researchers, the teachers drew on cultural historical activity theory and the notion of learning as social, with students' zone of proximal development making prominent student potential and the role of mediation in making that development real. With this in mind, the teachers understood that curriculum development needs to be premised on flexibility because that is the only way to account for the potential of what students had to offer. Flexibility also meant being able to develop topics of studies from students' emerging funds of knowledge and being able to create meaningful problem solving activities in a third space. Thus, this finding suggests that educational policy makers need to provide a range of flexibility in how standards are implemented so that teachers can adjust curriculum for students based on not only student needs but also on student knowledge. In addition, PD also needs to be flexible so that teachers

can modify research tools to inform new curricular decisions based on their and their students' needs.

Shifts in teacher action research. PD needs to foster teachers' learning about their practice by blurring the boundaries between teaching and research. As professionals, teachers need opportunities to study their classrooms and contextualize the learning of ELs. And they need support from more expert others, such as university researchers, so that the process of study is theoretically sound and arises from the knowledge base of field. My third finding shows how teachers were able to use discourse analysis to learn how to group ELs. Student grouping was an on-going theme with which the teachers struggled, and with which the action research process defined and maintained through the support of coursework and collaboration with me as the university researcher.

The teachers tried many different approaches, such as heterogeneous grouping by language, gender, and ability. They found that grouping was most supportive of learning for both native and non-native Spanish speakers when ELs had the flexibility to draw upon their linguistic resources. In Susan's and Eva's classroom, students used both conversational and academic Spanish. Although the teachers were monolingual, they encouraged students verbally and through their activities to use Spanish by making Spanish a tool in the activity. The teachers encouraged students to speak and write using Spanish, including using Spanish to communicate with peers. As a result, student expertise emerged from their sharing of video game knowledge and in their use of Spanish.

The teachers learned in this experience that all students, particularly language learners, need opportunities to talk. Talk is important for ELs because it helps develop students' ideas, which readily transfer to and support the learning of other languages such as English. It also

facilitates the learning of content by making it possible for students both to make the content their own (through their own language) and to explore other students understanding and naming of the content. Students themselves noted that when they were in a group they did things that they could not do on their own, recognizing that shared knowledge through social interaction facilitated individual learning. From this, the teachers recognized similarities between the students' learning and Vygotsky's theory about the social nature of learning and the movement from intrapsychological to psychological development.

Based on the significance of these findings, I suggest that a reorientation of PD is needed in order to develop teacher researchers as rigorous methodologists. Effective professional development must be ongoing, relevant, and meet the needs of classroom teachers and their students. An action research approach to professional development precludes the didactic presentation of decontextualized knowledge and skills. Having teachers use discourse analysis professionalizes teachers as experts in making sense of their own practices and their students' learning. Discourse analysis, as a method for action research, positions teacher to look closely and critically at what their students are learning and how, at the nature of talk that students use, and at the funds of knowledge students bring to a context. It also helps teachers become aware of their own positions in the classroom and how they interact with students and to what effect. In a very real sense, discourse analysis facilitates praxis by facilitating close study of teaching practice, which through ongoing collaborative PD can begin to transform practice.

From Learning to Problematizing Theories and Tools

In speaking about the shift from a traditional thesis to an action research culminating project at one teacher education Master's program in a predominantly Hispanic liberal arts college, Razfar (2011) explained how the action research "emphasized the importance of

problematizing issues rather than 'fixing' them, appreciating *complexity* over simplicity, becoming comfortable with discomfort and *uncertainty,* and [having the teacher researchers become] a more complete member of their respective communities" (p. 26). Drawing on this work, he went on to create the LSciMAct Project of which Susan, Cara, and Eva were a part. In this discussion, I take up how it is these teachers *problematized* the issues they faced and over time came to appreciate the *complexity* and *uncertainty* of not only teaching but also teacher research. I also take up how, in doing these things, they became different teachers who came to understand the profession of teaching differently. However, in the end, while they became different teachers, they found themselves in a school system that sees little value in who they became and how they taught. I will conclude, then, with some ideas about what I think needs to happen in the long-term for teachers to reclaim their profession and for ELs and all children to get the education they deserve.

The LSciMAct Program, as both a Master's degree program and a professional development program, is grounded in cultural historical activity theory of learning and development, with the coursework emphasizing learning as situated, goal directed, and mediated through language. In addition, it stresses specific concepts and frameworks that help teachers better understand how to design and assess robust learning activities for ELs. Amongst these concepts are *funds of knowledge* and *third space theory*. Through coursework, the teachers were prepared to appropriate and use these concepts and theories to help them make sense of their classroom practices, develop curriculum and pedagogy, and conduct teacher research on their practices. Program coursework introduced them to the concepts and theories and allowed them to discuss and even begin to articulate how they could inform their teaching practices.

However, once the teachers began to do their teacher research, questions about the

concepts and theories arose, particularly as the teachers began to use them to inform their teaching and research. These questions arose from praxis, meaning they arose from the process of using the concepts and theories and realizing that their practices were more complex and dynamic than the concepts and theories could account for. The concepts and theories raised questions that were grounded in the specificity of the teachers' experiences, experiences the teachers could only know and questions that could only arise from those experiences. With this, the teachers problematized what they had learned in their coursework and, just as the concepts and theories informed the work they were doing in their classroom, they took on the long-term effort of informing the concepts and theories so that they became more meaningful to them. In its use in the previous sentence, *meaningful* is meant to capture the fact that the concepts and theories were not only meaningful to the teachers but that through praxis they filled the concepts and theory with new meaning.

Similarly, the teachers took the discourse analysis tools they were given—the fieldnotes, coding sheets, and transcripts—and allowed their practices to problematize them even as they used them in their work. In using them, they created new codes that spoke to their practices and allowed them to hone in on aspects of that work that would have gone unnoticed had they only used what was given to them. They also revised the coding sheet so that it became more useful to the work they were doing.

I suggest that this ability to problematize the concepts, theories, and tools with which they were presented was possible, in part, an outcome of the professional development, most particularly its duration (over a year), its combination of coursework and action research, its collaborative structure (among teachers and between university researchers and teachers), and its use of the CHAT framework. The latter fostered a dialogical and recursive process of praxis that

allowed what the teachers were experiencing in their classrooms and teacher research to inform their work as it moved forward. For this, time was required; a strong theory and research foundation was instrumental; the support of others who were experiencing the same professional development and who were able to mentor and guide was necessary; and a framework that made it possible for what the teachers were learning to become tools for continued work. In the findings chapters, I tried to capture how these three aspects of the professional development came together to contribute to the teachers' learning and ultimately their shifts in understanding and practices. These aspects of the professional development positioned the teachers to problematize what they had learned and what they were experiencing.

An essential aspect I have yet to mention, however, was the relationships that the professional development fostered among the teachers and between the teachers and me, which I suggest contributed to creating an environment in which the teachers could problematize what they had learned in their courses and classrooms. In Chapter 5, I called this the ethnographic challenge, or the challenge of becoming comfortable revealing and drawing on the diversity of our understandings and experiences. Time was a contributing factor to this relationship building in that over time we all came to know one another better. Place was also a contributing factor, I believe, in that by moving outside the school space to take up our work in more personal settings, such as our homes, freed the teachers and me from the accoutrements of our work and allowed us to focus on praxis. It also allowed us to reveal other aspects of who we are that could not be revealed in the school setting because of the overwhelming need to be teachers in those settings. All of this, in time, led to a willingness on all our parts to reflect on the work we were doing.

Finding Purpose in Complexity and Uncertainty

The summer prior to conducting their year-long action research project, the teachers developed classroom activities designed to help them learn about students' funds of knowledge. They wanted to get a head start on planning the curriculum units that would be part of the project, but they had learned in their coursework that a CHAT approach to learning required student input, or being able to draw on students' funds of knowledge. However, the teachers did not know exactly what it meant to allow students to inform curriculum development until they developed an understanding of how to facilitate third space opportunities in their classrooms. For the teachers, the conceptualizing of the importance of students' funds of knowledge to teaching and learning was relatively easy; knowing what that meant for curriculum development and pedagogy was another matter. It required more than only a willingness to make a space in the curriculum to accommodate student knowledge.

The teachers had to delve into levels of uncertainty and complexity about curriculum and pedagogy with which they were unaccustomed because everything in their teacher preparation and in-service professional development prior to this had emphasized the importance of certainty and the need to tame the complexity. What the teachers came to realize about students' funds of knowledge and the facilitating of third space opportunities was that uncertainty was essential and complexity had to be allowed for if student knowledge was to be used to its greatest advantage in learning content and if third spaces were to develop. Thus, although the teachers prided themselves on their ability to organize curriculum and pedagogy around clearly articulated learning standards, disciplinary content, instructional activities, and learning outcomes, they came to realize, particularly with the implementation of Unit 2, that their desire to create specific curriculum left them with complete authority in the classroom and closed down opportunities for

third space. They, in fact, were eliminating the potential of students' funds of knowledge to shape the curriculum.

The teachers' use of activity theory as a framework for designing curriculum required them in time to change their approach to curriculum planning and how they conducted classroom activities. This is not to suggest that the curriculum had no structure or that there were no learning outcome identified. Quite the contrary, the teachers continued to develop standards-based curriculum and have clear learning outcomes that were measurable. However, the process of meeting those standards and getting to those outcomes became less directive, more open to what the students could make of the curriculum, and therefore, more complex. As described in Chapters 6 and 7, by the end of the professional development, the teachers had stepped back from their authoritative roles to allow students to grapple with content and make sense of it in ways that tied to their experiences and often raised larger content questions that augmented or enhanced the learning outcomes.

The uncertainty the teachers described as giving up authority or allowing students to be the experts should never disappear, even with a teacher's growing experience with fostering third spaces and increasing confidence with drawing on students' funds of knowledge. The uncertainty is an essential part of the endeavor of designing curriculum that fosters third spaces in that these spaces by definition can only evolve from opportunities for students to demonstrate authority over their learning and make of the content what they can together and with the teacher. As a complex endeavor, curriculum development and implementation must be transformed from a design for how to transmit content to students to a design for engaging students around meaningful problems and questions that require disciplinary content to answer.

Redefining Teacher and Teaching

It became evident early on in the action research, as the teachers were implementing their units, that becoming a teacher researcher was more than only taking up the mantra of teacher research and doing it. As described in the previous sections, becoming a teacher researcher required particular dispositional shifts. These shifts not only facilitated the teachers' development as teacher researchers but it also changed who they were as teachers. Razfar (2011) described it as "becoming a more complete member of their respective communities." For the teachers in this study, it meant redefining what it meant to be a teacher so that they could be teacher researchers.

Early on in their work, the teachers' understanding of themselves as teachers appeared to inhibit their work as teacher researchers and the development of a teacher researcher identity. They approached their teacher research work as an "add-on" to their already full workload as teachers, just so much more to do, in this case, to get a Master's degree. Thus, even as the teachers did their Master's coursework and prepared their action research with enthusiasm and aplomb, and even as they were quite successful in their efforts, they were at the beginning of their action research the same teachers as they had been at the outset of the Master's program but now having tried out a few new things in their classes (e.g., identified students' funds of knowledge and introduced video games). Again, *meaningful* connotes the taking from and contributing of meaning to an endeavor as noted in the first section above.

To become a "more complete members" of their community, the teachers had to redefine their roles within a community that appeared to be moving in one direction as they were moving in another. They had to move from being one type of teacher to being another one. This was difficult to do when what they were trying to do was not valued or respected by their community

writ large. They recognized that in comparison to the other LSciMAct Program school cohorts, their group benefited from having a supportive administration that, at the time of the research, gave them autonomy in their classrooms and encouraged them to conduct action research. But, even within this supportive environment, the teachers recognized that what they were being asked to do by the Program, and what they would begin to champion and see as their work as teachers, had been misinterpreted and misrepresented by education reform advocates as less than rigorous and inappropriate for nonmainstream students. For example, when the assistant principal, principal, and an administrator from the central office walked into her classroom unannounced as the students played *MySims*, Eva immediately panicked:

> The principal said I didn't have any idea what you were doing there. I was so afraid [the central office administrator] would say something, but when she went out, she said I am so impressed that I could see finally student discourse instead of [just] teacher discourse. I said okay. There is one person that's thinking (laughs). She could understand what I'm doing. (Focus group, July 24, 2009)

Eva's fears were alleviated and she found support and validation in the administrator's comments, but the fear was real. With increased pressure on teachers to raise test scores and teach prescribed curriculum and now with new teacher evaluation measures tied to student performance, the fears are even greater today than they were three years ago.

At the end of the action research project, when I asked her how the project had informed her teaching, Susan became philosophical and contextualized her changed practices within the landscape of education.

> This kind of teaching is not perceived in a positive way. It is much more because it is so much more flexible and open and it has to flow; it's very threatening to people. They

> [teachers and administrators] don't understand it. I think they've always been puzzled at how I get the scores but I do. And I'm puzzled too, to tell you the truth. (laughs) Because it's not as structured as most people would think it should be or would expect it to be. (FG#4, July 24, 2009)

In redefining themselves as teachers and in redefining what it meant to teach, the teachers had, in fact, created tension within their professional community as it appeared to them. It was a tension that they felt, believing that what they were doing in the classroom could be misinterpreted and used against them and knowing that stronger trends within education perceived what they were doing as inappropriate even as it met with success. It failed the litmus test of accountability and objectivity even as it proved successful.

The teachers completed their action research and their Master's degree program. They got their diplomas in May 2010. Cara lost her position due to low enrollment and left teaching to have a baby, and now is looking to return to the classroom, but wants to teach in the suburbs. Eva and Susan continue to teach at the same school but see limitations on what they can do because the perceived changes they feared had three years ago have become not only a reality but have proven even more onerous, as now they are given the curriculum that they must teach. Susan has become active in union organizing and teacher professional development. Their communities continue to shift below their feet so that they are no longer the members they once were for reasons both within and beyond their control. They are left wondering exactly what their roles can be if those roles they want to take up are not welcomed.

Remaking the Community and Reclaiming the Profession

> Carr and Kemmis, as far back as 1986, wrote that the 'teacher-as-researcher' movement can be seen as a response to the political climate. Teachers had been reduced to

> conformers, implementing the curriculum. Teaching had been made instrumental, reduced to mere technicians attempting to attain goals decided from above, outside the realm of their management. Teachers as researchers should again take control over their own teaching situation, thus making judgments based on their knowledge and experience and the demands of practical situations" (cited in Postholm, 2009, p. 553.)

The LSciMAct Program was premised on what is said in the last sentence, knowing that Carr and Kemmis's concerns about education have not changed, and have probably gotten worse, since 1986 and even since 2008 when the Program began. Teachers live in dire times. In this era of high-stakes accountability and teacher evaluations tied to standardized test scores, the teacher is seen as both the cause and solution to perceived school failures. As cause, they are blamed for not teaching and the unions they belong to are blamed with condoning their failures. As solution, they are expected to toe the line and teach as prescribed by those who imagine teaching as similar to the enterprise of building cogs—hammer away until it sticks and move it along to the next part of the assembly line.

There is some exaggeration here. In reality, however, the blame placed on teachers is real even as schools that are well-funded and populated by the middle class and in districts that are unionized do well on nearly all indicators of success. How are these teachers different than those in struggling schools with large populations of poor and minority students? And the solution is even more real, if that is possible, in that every day appears to bring new mandates on teachers and new ways to denigrate and deprofessionalize the profession, whether that is with new ways of evaluating them, publically scrutinizing them, or suggesting they are not even a profession since anyone with any type of preparation can teach. In her critique of Obama's *Race to the Top,* Diane Ravitch (2012) points to how "The curriculum will be narrowed even more

than under George W. Bush's *No Child Left Behind*, because of the link between wages and scores." Again, how are these teachers any different than those in better funded and more middle class districts, or for that matter, than the teachers in the nationally top ranked schools that are located in urban areas?

I want to end by suggesting that it is, in fact, not teachers that are the problem. The problem is how we train and support them to do the work required in the places and with the students who need them the most, that is, in schools such as the one in which Susan, Eva, and Cara taught.

The work of Susan, Eva, and Cara is a testament to what is possible when teachers are positioned through collaboration, time, and support to draw on and create research and theory to inform practice. This, in fact, is to treat them as professionals. I suggest that treating teachers as professionals is the first step in improving education in those places in which it needs to be improved. And as professionals, teachers must be seen as and make claims to being teacher researchers, or inquirers of their own practice. This is how other professions function. For example, it is doctors who conduct medical research and define best practices. It is lawyers who study and write law. It should not be any different for teachers. It is teachers who should conduct educational research and determine best practices.

Such a professionalization of teachers does not preclude the role of university researchers in education research. It simply makes evident and prioritizes the role of teachers in these endeavors. As far back as 1975, Stenhouse recognized as much in claiming that it is not sufficient to just study teachers' work, as teachers also need to study their own work. Teachers, he wrote, are the best researchers of their own classrooms because they are the ones who really know the history and background of their pupils and the classroom activities taking place there.

University researchers can serve as collaborators and mentors, apprenticing teacher researchers into rigorous research methods and theory that will support their professionalization must as we did in the LSciMAct Program.

Indeed, teacher research is essential to the professionalization of the teaching profession. As O'Connell-Rust (2009) has noted, university researchers and teacher researchers should work collaboratively to document the life in classrooms and reveal the complexity of classroom activities and how it is teachers think and make decisions. Such research must speak to policy makers who, as Wesley and Buysse (2006) noted, make decisions in many ways—"sometimes with scientific evidence at the forefront of decision-making; sometimes with consumer preferences, cost effectiveness, ideology, and other influences at play; and often through a process that considers all of these types of information and more" (p. 119). Teachers through their research should become an essential consideration in this decision-making.

Shonkoff (2000) wrote that "policy-makers are persuaded by compelling stories and the selective use of evidence. Policymakers mobilize information to support an agenda" (p. 181). Thus, for policy makers at local, state, and national levels, the rich contextual narrative of teacher research can help to clarify the impact of policy as it enters the school and classroom. Research that can cross the boundaries of each of these domains, that can be considered valuable in each, is essential to enable substantive educational reform.

At the end of my work with Susan, Eva, and Cara, Susan said:

> There aren't people watching us saying, "hey, you know what, you do these things really well and here's some areas that I can help you improve on. Let's work on this together." We don't get that. We never get that from anyone. We don't know and observe classrooms, we don't observe good teachers you know, and who defines that good

> teacher? I've been critiqued a lot on things that other teachers, traditional teachers, look at me and say, "you know she's not very good at this." Where as on the other hand, I value that part of my teaching… I think it's pretty typical of the teaching profession to struggle in this way and not have the community that we would like to have. (FG #4, July 24, 2009)

Susan captured the dilemma teachers face, the dilemma Eva, Cara, and she faced as they finished up their action research and got their degrees. Where is the community that will sustain their work and the work of future teachers? Where is the collaboration and professional networks that supports the work they do? They exist in pockets, no doubt, typically within teacher unions and often in individual schools among groups of teachers and supportive networks sustained by universities. But where is the sustained efforts to engage, first, every teacher so that she knows she is being watched over with an eye on supporting her and, second, so that she knows that she is part of a collective that defines what good teaching is? Until that professional community is born *writ large* and allowed to define itself through its own research, the research of teachers like Susan, Cara, and Eva, as important and valuable as it is, will not define the profession, as it exists only as a small exception to a growing deskilling of the profession. Hopefully, however, it can serve as a glimpse of what is possible.

Appendix A: Teacher Researcher Materials

A1: Inventory Table
A2: Activity Triangle
A3: Coding Sheet
A4: Fieldnote Template
A5: Transcription Conventions
A6: LSciMAct Guide to Unit 2/3 Planning, Implementing, and Analysis

A1: Inventory Table

State Standards (and Benchmarks)	Content Objectives	Community Knowledge (Funds of knowledge)	Values and Principles of Math, Science, and Literacy (language arts)

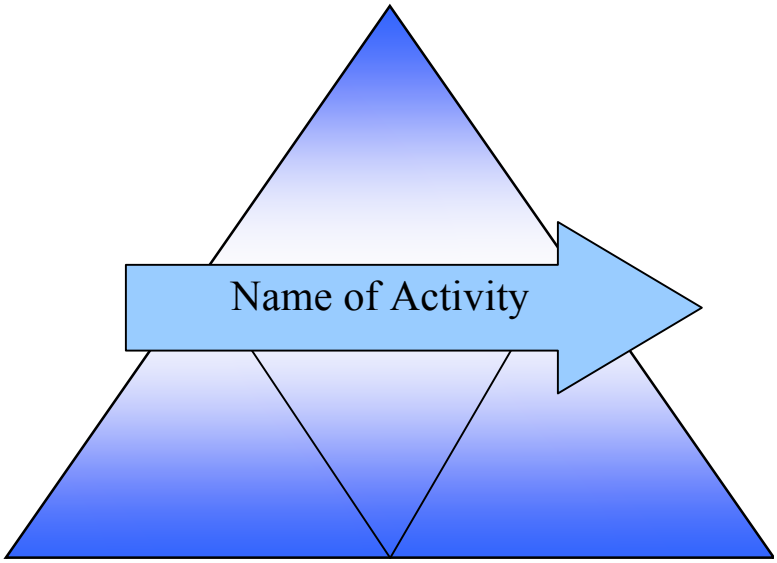
A2: Activity Triangle

Tools and Artifacts
-
-
-
-

Subjects
-
-
-
-

Objects
-
-
-
-

Outcomes
-
-
-
-



Community
-
-
-
-

Rules
-
-
-
-

Division of Effort
-
-
-
-

A3: Coding Sheet

Time	a. Peer Assistance	b. Funds of Knowledge	c. Multiple Languages/ Discourses	d. Questions	e. Tension	f. Third Space	g. Participation Shifts	h. Role Shift	i. Rule Nego-tation
0:00:00									
0:02:00									
0:04:00									
0:06:00									
0:08:00									
0:10:00									
0:12:00									
0:14:00									
0:16:00									
0:18:00									
0:20:00									
0:22:00									
0:24:00									
0:26:00									
0:28:00									
0:30:00									
0:32:00									

A4: Fieldnote Template

Date:

Site:

Activity:

Participants:

Length of Observation:

Summary
Write a one paragraph summary or abstract of the day's events. Include analytic description, such as today was a good example of code-switching.

Narrative
Write a detailed narrative of what you observed. Use (OC: _____.) for observer comments.

Questions/Things to follow up with

A5: Transcription Conventions

Numbered Lines	Each line is numbered beginning with 001.
Speakers	Name of speaker:
[ ]	Overlap talk
All CAPS	Reading text a loud.
Bold	Louder voice
:	Vowel elongation (stress comes after vowel)
↑↓	Raising/Falling Intonation
?	Questioning intonation
Italics	Recitation of any kind (reading out loud)
(.)	Micropause less than 0.2 seconds
(2 sec)	Longer pause - Write the number of seconds in parenthesis
Uhm/ uhuh	Backchanneling – Use colon to show length
Describe in ( )	Non-verbal cues (gestures)
/	Self-repair
//	Other repair
‘ ‘	Mock voice – speaker assumes voice of another speaker.

A6: LSciMAct Guide to Unit 2/3 Planning, Implementing, and Analyzing

To make the paperwork a little easier, we will be collecting materials in phases for units 2 and 3. During the weekly meetings we will discuss your questions and ideas and try to support you in the current phase. Please let us know when you need help. Otherwise, we expect everyone to turn in the materials in a timely manner.

Here is a description of the three phases and the materials due during that time:

Planning Phase
During this phase bring your planning ideas and get feedback from colleagues.
You will turn in the following materials before beginning the unit 2 or 3:

12. Inventory Table
13. Activity Triangle

Implementing Phase
During implementation you will be teaching the unit. At our weekly meetings, we will provide you with a copy of the video from the previous week. For the following week, you should bring a hard copy and email electronic copies of the following:

14. Lesson plans
15. Fieldnotes
16. Completed excel coding sheet

Analyzing Phase
We want to provide you with help through the analysis phase. At the weekly meeting we will progress through the steps listed below (in order). You should turn in the following work during the analysis phase:

17. Choosing clips
18. Transcribing episodes
19. Individual report
20. Group report
21. Student work
22. Unit binder

A7: Observation Protocol

PROTOCOL: Social Organization of Learning (Adapted from Razfar)

Date: _____ Observer:_____
Site:_____
Began observation at: _____
Concluded observation at:_____

PART I: THE SOCIAL ORGANIZATION OF LEARNING:
1) Describe the activity:

2) Number of participants: _____ #male: _____ #female:_____
Describe any other salient identity markers that describe these students:

3) Spatial Arrangement (Diagram)

4) Instructional Arrangement
a) small group b) whole class c) individualized work
d) other:_____

Notes:

5) Nature of activity
a) teacher defined b) student defined c) negotiated

Notes:

6) Nature of participation:

1	2	3	4	5
Teacher centered		student centered		community centered

7) Management/Rule Negotiation
a) Explicit teacher established/enforced rewards/sanctions
b) Implicit teacher established/enforced rewards/sanctions
c) Community established/enforced rewards/sanctions
d) Other:

Description:
PART II: LANGUAGE PRACTICES

1) Language(s) used for this activity: (a) English (b) Spanish (c) Other:_____

2) If more than one language was used, describe the language mixing:
   (a) code switching
   (b) native language used to clarify/extend
   (c) preview/review
   (d) speakers divided by language
   (e) topics divided by language
   (f) other: _____

3) Speaker Designation:
   (a) Teacher designates
   (b) Student leader designates
   (c) Self-nomination
   (d) mixed

   Notes:

4) Extent of participation:
   (a) A few students dominate talk
   (b) Small core participates in talk
   (c) Most students participate in talk
   (d) No students participate in talk

Salient identity markers of most vocal participants:

5) Discourse Pattern:
   (a) IRE
   (b) Instructional Conversation
   (c) Other: _____

Notes:

6) Assistance/Expansion:
   (a) Teacher expands on student thinking
   (b) Students expand
   (c) Missed opportunities for expansion.

Examples:

7) Discourse(s) used
   (a) Math
   (b) Science
   (c) Students' funds of knowledge
   (d) Other: _____

Examples:

8) Potential third spaces
   (a) Tension
   (b) Shifts in participation
   (c) Expert/novice role shifts
   (d) Other: _____

Examples:

Appendix B: Focus Group Questions

1. Language questions:
    i. How is your thinking of language changing?
    ii. How do you see students using language in your classroom?
    iii. How have your activities promoted multiple language use?

2. Teaching questions:
    i. Tell me about the planning process for unit 1?
    ii. Tell me about how you learned about your students' funds of knowledge?
    iii. How did you draw on students' funds of knowledge while teaching unit 1?
    iv. Have your views on teaching math and science changed?

3. Analysis questions:
    1. Talk about the analytic process for unit 1:
        i. What did you learn by using the tally sheets (excel spreadsheet)?
        ii. What did you learn doing the transcription?
        iii. How did you use the transcripts in your analysis?
        iv. What modifications to the analysis process would you make?
        v. How does discourse analysis impact how you see yourself?

4. Since you have done unit 1, what do you think about
    i. developing curriculum?
    ii. integrating science, math, and literacy?
    iii. working with English language learners?

5. Action research questions:
    i. What do you see as key issues or challenges in conducting action research?
    ii. What are some of the challenges of implementing the units?
    iii. Do you feel these units are bringing about change in the students?
    iv. Have you noticed any changes in students (are they excited about the project?)
    v. Do you feel empowered by this type of teaching?
    vi. Are students taking ownership?
    vii. What have been some of the challenges of trying to bring about change?

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Warren, B., Ballenger, C., Ogonowski, M., Rosebery, A. S., & Hudicourt-Barnes, J. (2001). Rethinking diversity in learning science: The logic of everyday sense-making. *Journal of Research in Science Teaching*, *38*(5), 529-552.

Wells, G. (2000). Dialogic inquiry in education. In C. Lee & P. Smagorinsky (Eds.), *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry* (pp. 51-85) New York, NY: Cambridge University Press.

Wells, G. (Ed.). (2001). *Action, talk, and text: Learning and teaching through inquiry.* New York: Teacher College Press.

Wells, G. (2007). The mediating role of discoursing in activity. *Mind, Culture, and Activity, 13*(3), 1-18.

Wells, G. (2009). Dialogic inquiry as collaborative action research. In S. Noffke & B. Somekh (Eds.), *The SAGE handbook of educational action research* (pp. 62-73). Thousand Oaks, CA: SAGE Publications Inc.

Wells, G. (2011). Integrating CHAT and action research. *Mind, Culture, and Activity, 18*(2), 161-180.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action.* Cambridge, MA: Routledge.

Wesley, P. W., & Buysse, V. (2006). Making the case for evidence-based policy. In V. Buysse & P. W. Wesley (Eds.), *Evidence-based practice in the early childhood field* (pp. 117–159). Washington, DC: Zero to Three.

Yoon, B., (2008). Uninvited guests: The influence of teachers' roles and pedagogies on the positioning of English language learners in the regular classroom. *American Educational Research Journal*, *45*(2), 495-522.

Yin, R. K. (2006). Case study methods. In J. Green, G. Camilli & P. Elmore (Eds.), *Handbook of complementary methods in education research* (pp. 279-295). Mahwah, NJ: Lawrence Erlbaum Associates.

Yin, R. K. (2009). *Case study research design and methods* (4th ed.). Thousand Oaks, CA: SAGE Publications Inc.

Zeichner, K. M. (2003): Teacher research as professional development P–12 educators in the USA, *Educational Action Research*, *11*(2), 301-326.

VITA

BEVERLY TROIANO

EDUCATION

Ph.D. Curriculum and Instruction—Curriculum Studies, Summer 2012.
University of Illinois at Chicago

Dissertation title: Developing professional teacher researchers: Transforming language learning through discourse analysis

Committee: Aria Razfar (chair), Josh Radinsky, Christine Pappas, William Schubert, Gordon Wells

M.Ed. Secondary Teaching and Learning with Certification in German and Middle School ESL and German endorsements, 2002.
DePaul University

Student Teaching, March 2000 – June 2000. **Elizabeth Oberschule**, Berlin, Germany

B.A., Major: German Literature. Certificate in Western European Studies, 1997.
University of Pittsburgh

Study abroad. November 1996 to July 1997, **University of Augsburg**, Germany
Study abroad. August 1995 to July 1996, **Ludwig Maximilian Universität**, Munich, Germany, Junior Year in Munich sponsored by Wayne State University, Detroit, MI.

CERTIFICATES

Illinois Secondary Education Certification in German and Anthropology (#1665416)
Illinois State Endorsements: English as a Second Language and Middle School ESL and German
ACCESS certified coordinator
SIOP certified coordinator

TEACHING EXPERIENCE

University Instructor. College of Education, DePaul University
TCH 320: *Exploring teaching in the urban high school*, (Spring 2012)
SEC 364: *Secondary curriculum and instruction methods*, (Spring 2012)
SEC 363: *Introduction to secondary teaching as a profession*, (Fall 2011, Spring 2011)
SEC 325/ TL 525: *Reading, writing, and communicating across the curriculum*, (Fall 2009)

University Instructor. College of Education, University of Illinois at Chicago
CI 472: *Language proficiency assessment and ESL instruction*, (Summer 2009, Fall 2009)
CIE 575: *Action research and English language learners*, (Co-taught, Spring 2008)

Bilingual Program Coordinator/Classroom ESL Teacher. Chicago Discovery Academy, Chicago Public Schools. (2005-2006).

- Created a new Transitional Bilingual Education (TBE) program
- Taught and developed curriculum for ESL I and II.
- Evaluated, placed, and programmed all incoming and current ELLs.
- Provided professional development to content area teachers on addressing the needs of ELLs.
- Coordinated parent Bilingual Advisory Committee.
- Presented lessons integrating best practices at quarterly Bilingual Lead Teacher meetings.
- Coordinated and administered ACCESS test at Bowen Campus.

ESL Resource Teacher. Roger C. Sullivan High School, Chicago Public Schools. (2004-2005).

- Designed and taught course for pre-literate refugee students.
- Collaborated with content area teachers to adapt curriculum for pre-literacy students.
- Organized collaboration with DePaul University for teacher candidates to implement self-designed unit plans and tutor refugee students.
- Coordinated grant writing team from Sullivan, DePaul University, and Heartland Alliance Refugee Resettlement Office.
- Designed and implemented a summer enrichment program for refugees.

Classroom ESL Teacher. Roberto Clemente Community Academy, Chicago Public Schools. (2001-2004).

- Designed and implemented project-based curriculum and assessments for new courses: ESL Reading I and II and ESL Communications I, II and III.
- Selected main textbooks, software, and all ancillaries for four levels of ESL.
- Mentored student teacher and teacher candidates from DePaul University.
- Initiated collaboration with *FreeStreet's* Arts Literacy Program.
- Integrated drama and creative writing into communications classes, including a published anthology of the students' writing (2003-2004 academic year).
- Shared best practices with Clemente teachers in weekly learning communities.

Newcomer Center Teacher. Roberto Clemente Community Academy – The Newcomer Center was established in February 2003 as part of a Federal Dropout Prevention Grant.

- Developed curriculum for and taught low literacy and regular newcomer English language learners.
- Taught and designed a summer enrichment program for newcomers.
- Developed after-school creative expression program for newcomer students with end of the year performance and two books of student writing (Winter and Spring, 2003).
- Participated in professional development in the areas of parent involvement and mental health with grant team from the University of Illinois at Chicago.
- Created a newcomer advisory curriculum.

Student Teacher. Elizabeth Oberschule, Berlin, Germany (March 2000 – June 2000).
- Taught seventh- and tenth-grade German, English, and environmental science.
- Worked with second language learners from different countries, including Turkey, Poland, Senegal, Nigeria, Tunisia, and Germany.

German instructor. DePaul University, Modern Language Department (January 2000 – March 2000).
- Taught two sections of college level elementary German II.

Bilingual Kindergarten Teacher. Lerchennest German/English Kindergarten, Munich, Germany (1997-1998).
- Taught subjects in English and German.
- Developed and implemented project-based units.

German Language Day Care Assistant. Four U Munich Montessori, Munich, Germany (1996 – 1997).
- Prepared non-native German speaking pre-school children for entrance to kindergarten.
- Worked on grants for single parent refugees' tuition.

German and EFL instructor. Berlitz, Chicago, IL (1999-2000)

SCHOLARSHIP

Research Assistantships

Project Coordinator/Research Assistant. University of Illinois at Chicago (September 2007 – Present), as part of DoE's Office of English Language Acquisition grant for Teacher Training ($1,500,000)
- LSciMAct (Transforming Literacy, Science, & Math through Participatory Action Research) team member
  - Collected and analyzed data on program implementation for scholarly manuscripts and grant evaluation
  - Organized recruitment of thirty K-8 general program teachers in school cohorts
  - Led cohort 2 mentoring program
  - Advised graduate students and supervised thesis research
  - Helped design and teach new course for the program: CIE 575: Action research and English language learners
  - Co-wrote IRB proposal
  - Organized LSciMAct team meetings
  - Led weekly school cohort meetings
  - Conducted, transcribed and coded focus groups
  - Mentored research assistants

Research Assistant. University of Illinois at Chicago. (August 2006 – September 2007), as part of National Science Foundation grants ($1,784,000).

- ALSP (Adolescent Literacy Support Project) team member August 2006 – June 2007
  - Collected data on program implementation
  - Conducted classroom observations
  - Participated in monthly professional development
  - Assisted in the redesign of classroom observation tool
  - Coded student interviews and focus groups

- Meaningful Science Consortium team member June 2007 – September 2007
  - Facilitated literacy component of August 2007 professional development
  - Designed Reading-to-Learn literacy tools

Research Assistant for Spencer Grant. DePaul University, Chicago, IL (October 2004 – April 2005), as part of Adult Education grant ($40,000).

- Created database of adult education programs in the U.S. and the United Kingdom.
- Coordinated collection of survey data, including follow-up phone calls.
- Categorized inputted survey data.

Teacher Researcher Team Member. University of Illinois at Chicago, IL (February 2004 – March 2005).

- Helped design interview protocol for teachers of newcomer students.
- Interviewed teachers of newcomer students about the acculturation and education needs of Newcomer Center students.

Graduate Assistant. DePaul University – School of Education (September 2000 – May 2001).

- Created a database of research and higher educational programs in the field of bilingual education.
- Worked with a team of professors in the creation of a new Master's program in Bilingual-Bicultural Education.

PUBLICATIONS

Manuscripts in Preparation

Razfar, A., Troiano, B., Nasir, A., Yang, E. (In Preparation). *Teacher researchers and the negotiated curriculum: Developing math and science literacy(s) with English learners.* To be submitted to *American Research Journal.*

Troiano, B., Razfar, A. (In Preparation). *Teacher researcher's beliefs and practices. Using discourse analysis as a tool to improve practice:* Paper presented at the annual meeting of the American Education Research Association. San Diego, CA.

Curriculum Materials

Rhodes, M., & Troiano, B. (2009). *Health care literacy in high school ESL.*

PRESENTATIONS

Conference Proceedings (Peer-reviewed)

Refereed Selection

Troiano, B., Rumenapp, J., Allebach, B., & Degand, L. *There are a lot of dynamics and it's frustrating: An ethnographic approach to professional development*. (2012). Panel member at National Conference of Teachers of English in November, Las Vegas, NV.

Troiano, B. *Discourse analysis as action research: A cultural historical approach to in-service teacher development with English learners.* (2011). Paper presented at the Literacy Research Association in November, Jacksonville, FL.

Troiano, B. & Allebach, B. (2011). *Using discourse analysis as a tool for teacher education.* Panel member at National Conference of Teachers of English in November, Chicago, IL.

Weinstein, T., Troiano, B., Tricket, E., Sakash, K., Birman, D., & Forsline, T. (2011). *The researcher/teacher partnership: Current topics in the field of ESL from a community psychology perspective*. Roundtable presentation at the 13th Biennial Conference of the Society for Community Research and Action (Division 27 of the American Psychological Association), Chicago, IL.

Troiano, B. (2009). *Middle school teacher researchers' language and literacy beliefs and practices: Using discourse analysis as a tool to mediate praxis*. Paper presented at National Reading Conference, Albuquerque, NM.

Troiano, B. & Razfar, A. (2009). *Teacher researchers' beliefs and practices: Using discourse analysis as a tool to mediate practice*. Paper presented at American Educational Research Association, San Diego, CA.

Madda, K., Troiano, B., & Wantroba-Ferrer, M. (2008). *(De)constructing ideologies: A critical look at discourse practices*. Paper presented at American Educational Research Association, New York, NY.

Troiano, B. (2007). *Health care, English, and critical awareness: Developing the multiple literacies of English language learners*. Paper presented at National Reading Conference, Austin, TX.

Rhodes, M. & Troiano, B. (2007). *Fostering consumer cultural competence in health care settings: Beyond health literacy for immigrants and refugees*. Roundtable presented at Illinois Public Health Association Annual Meeting, Springfield, IL.

Rhodes, M. & Troiano, B. (2007). *Developing health care literacy in secondary ESL*. Paper presented at Illinois Teachers of ESOL and Bilingual Education Annual Convention, Naperville, IL.

Rhodes, M., & Troiano, B. (2006). *Consumer cultural competence in health care settings*. Paper presented at American Public Health Association 133rd Annual Meeting and Public Exposition, Philadelphia.

Worthman, C., & Troiano, B. (2003). *Integrating international world languages and career competencies in the Chicago Public Schools*. Paper presented at the American Council on the Teaching of Foreign Languages Conference, Philadelphia.

Discussant

Troiano, B. (2008). *The schools: Acculturative challenge for all*. Midwestern Psychological Association 80th Annual Meeting, Chicago, IL.

Reviewer

Journal of Literacy Research
American Research Educational Association
National Reading Conference/Literacy Research Association

SERVICE

Professional Development

Invited Presentation

Troiano, B., Nasir, A., Razfar, A., Yang, E., & Rumenapp, J. (2010). *Teacher Action Research: Using video and coding to study your teaching.* Haines Elementary, Chicago Public Schools, November 12, 2010.

Troiano, B., Nasir, A., Allebach, B. & Caraba, C. (2010). *Start the year off right: Get to know your students while learning academic content.* University of Illinois at Chicago Bilingual/ESL Summer Institute, June 23, 2010.

Pagan, M. & Troiano, B. (2007). *Professional Development Workshop: Making High School Environmental Science ELL Friendly*. Teachers' Academy for Math and Science, June 18 -22, 2007.

Pagan, M. & Troiano, B. (2007). *Professional Development Workshop: Making High School Language Arts and Social Studies ELL Friendly*. Teachers' Academy for Math and Science, June 25 -29, 2007.

Troiano, B., & Rhodes, M. (2007). *Refugee health care issues: Navigating the U.S. health care system*. Series of parent workshops presented as part of the K-12 Refugee Children's Education Grant. Roosevelt Multicultural Center, New Field Elementary, Heartland Alliance, and Volta Elementary, Chicago. January 2007 - May 2007.

Troiano, B., Pagan, M., & Forsline, T. (2006). *Strategies for teaching content to English language learners*. Paper presented as part of the CPS Dropout Prevention Grant. Roosevelt Multicultural Center, Chicago.

Troiano, B., & Rhodes, M. (2006). *Developing a health care curriculum for English language learners*. Paper presented as part of the CPS Dropout Prevention Grant. Roosevelt Multicultural Center, Chicago.

Commencement Speaker. Chopin Elementary School, Chicago, IL, June 14, 2011.

CONSULTING

Curriculum Consultant. Illinois Health Education Consortium, Chicago (April 2004 – June 2009).

- Developed health education curriculum for high school English language learners that include learner centered activity-based lessons and assessments for multiple language proficiency levels.
- Aligned Illinois State Health and ESL Goals and Standards.
- Wrote teacher guidelines for implementing curriculum in single and multi-level classrooms.
- Developed proposal to collaborate with Chicago Public Schools.
- Developed and conducted professional development for teachers using the curriculum.
- Supervised multiple implementation cycles of curriculum at sites, including Clemente Community Academy, Little Village High School, Kennedy High School, Hancock High School, Senn High School, Bowen High School and Tilden High School.
- Collaborated with teachers to revise the curriculum.
- Incorporated a service-learning component to the curriculum.
- Designed evaluation measures to assess English language learners' progress.
- Developed and piloted a series of five health workshops for parents.

Curriculum Consultant. Hampton-Brown Publishing, Carmel, CA (April 2004 – April 2006).

- Reviewed literature and nonfiction selections, evaluated themes, and provided ideas for instructional activities for six textbook units.
- Participated in High School Reading Roundtable on March 21, in Carmel, CA. The purpose of the roundtable was to critically examine what works to accelerate achievement for high school English language learners.
- Evaluated readability level for 50 reading selections.

Curriculum Consultant. Nieman Inc., Wilmette, IL (April 2005 – April 2006).

- Helped create educational materials for reading and language arts.
- Provided feedback for a product concept's overview, table of contents, and prototype.
- Wrote quizzes for Scholastic's Reading Counts program.

Curriculum Developer. Chicago Public Schools (2001 – 2006).

- Participated in the *High School English as a Second Language Curriculum Project*.
- Aligned ESL I Frameworks with WIDA standards and provided sample activities for each language domain.
- Contributed newcomer unit for CPS High School ELL Seminar (March 2005).
- Developed and wrote 4-year ILCA (Integrated Language and Career Academies) high school curriculum units as part of a Federal Title VII grant with the Office of Language and Cultural Education (Chicago Public Schools) and DePaul University.

Professional Memberships

American Council on the Teaching of Foreign Language
American Educational Research Association
National Council of Teachers of English
National Reading Conference/Literacy Research Association
Illinois Teachers of ESOL and Bilingual Education

AWARDS

University of Illinois at Chicago Graduate Student Council Travel Award, $300; 2008-2010
University of Illinois at Chicago Graduate College Presenter Award, $200; 2008-2010