Perception, Curriculum, and Subject Matter: Reforming Instruction

Thienhuong Hoang

ABSTRACT: The purpose of this study is to illuminate the reciprocal relation between teacher leaders' perception and practice to subject matter. The researcher conducted interviews and observations of 30 teachers from 8 urban elementary schools. The data and results evidently identify those teachers' views of subject matter both shaped and were shaped by their teaching strategies. Teachers' strategies for improving math instruction focused on external supports such as professional training in mathematics and building skills through sequenced instruction and curriculum. In improving literacy instruction, teachers emphasized the school community as the locus for development of literacy programs and materials that applied to a variety of academic subjects.

Theoretical Framework

The framework I developed integrates concepts across four domains of research, in particular, the influence of teachers' subject-matter views on teachers' work (Grossman & Stodolsky, 1994; Siskin, 1991, 1994), the distribution of instructional leadership within a school (Spillane, Halverson, & Diamond, 2001), the reciprocal relation between social structures and human agency (Giddens, 1979), and the role of sense-making in human cognition (Weick, 1996, 1979). I use this framework to examine the interface between teacher leaders' views of subject matter and their teaching and leadership practice in reform of literacy and mathematics instruction. The framework also illuminates how multiple teacher leaders within a school share in the work of subject-matter reforms.

The Influence of Teachers' Subject-matter views on Teachers' Work

My analysis is based on research on the relation of teachers' practice to subject matter. Subjects and perceptions thereof vary in ways that are likely to result in differences in leadership practice and its consequences. First, the value the school and broader community place on a discipline varies by subject (Siskin, 1991, 1994; Stodolsky, 1988). This variation is reflected in the distribution of resources within a school. For example, time allocations, staffing, and professional development (time and content) all depend on the value attached to each subject. Second, there are epistemological differences among subjects, that is, in the nature of the knowledge of a discipline including its structure, sequence, and desired goals. Grossman and Stodolosky (1994) argued that school subjects vary on at least five dimensions: (1) degree of definition: whether or not there is agreement regarding the content of the subject (i.e., more defined fields are characterized as emphasizing formal training as a measure of expertise); (2) scope: the extent to which a subject is homogeneous or is composed of a number of disciplines or fields of study; (3) degree of sequence: degree to which prior learning is perceived as a prerequisite to later learning; (4) characterization of subject as static or dynamic (i.e., more dynamic fields are characterized by active production of new knowledge, changing theoretical positions, and a continuing need to stay up to date; the content of more static subjects changes less rapidly); and (5) degree to which a subject is viewed as core or basic. Variations in the ways teachers perceive subjects are likely to be important in understanding relations between reform and instruction and to affect teachers' curricular control, standardization of curriculum, and agreement about practice and coverage (Grossman & Stodolsky, 1993, 1994). For example, high school mathematics teachers report significantly less control and autonomy over curriculum than social studies and English teachers, who report high control and autonomy.

The Distribution of Instructional Leadership within a School

Investigations of how views of subject matter affect elementary school teaching and leadership are scarce. However, available work suggests that subject matter is an important context for the work of elementary school teacher leaders and their efforts to improve practice (Nelson, 1999; Spillane, Diamond, & Jita, 2000; Stein & D'Amico, 2000). These studies explored the salience of subject matter by examining subject-specific patterns in their views of student learning (Nelson, 1999; Stein & D'Amico, 2000) and the allocation of resources (Spillane et al., 2000).

Based on interviews and focus groups with 40 teacher leaders in an urban school district, Nelson (1999) argued that

they need regular opportunities to analyze existing views and practices about mathematics in order to construct new understandings of current mathematics reforms. Stein and D'Amico (2000) found that teacher leaders' expertise in literacy and mathematics influenced district reforms within an urban district. Drawing on preliminary evidence across eight elementary schools, Spillane et al. (2001) found differences in the distribution of leadership for literacy and mathematics. There were fewer teacher leaders for mathematics instruction compared to language arts instruction, and fewer still for science instruction compared to the other two subjects.

Norms of teaching and learning emanate from the multiple organizational contexts in which school staff work (McLaughlin & Talbert, 1993). For elementary school, these contexts include districts; professional associations such as collaboratives, networks, and unions; as well as school sectors such as grade-specific or subject-specific decision-making structures. Policy directives and inducements emanating from these contexts, such as standardized test pressures (state and district) and faculty-designed curricula (school sector), carry powerful signals about teaching and learning. Principals, assistant principals, curriculum coordinators, and teachers bear important responsibility for overseeing the subject-matter reforms that are the focus of much current policy. However, research on subject matter gives the practice concerns of these teacher leaders short shrift. A distributed perspective on school leadership (Spillane et al., 2001) considers the ways in which principals, assistant principals, curriculum coordinators, and teacher leaders share responsibility for instructional leadership. It also draws attention to the importance of materials to the practice of leadership. Reforms are shaped in part through teacher leaders' decisions about where reform expertise resides. They seek expertise directly from colleagues but also indirectly in the context of materials such as curriculum guides, policy directives, and unit guides. Thus, I considered these material tools as central to the relation between subject matter and teaching and leadership strategies.

This perspective is particularly important in a reform climate that presses teacher leaders to increase the pace of their reforms while at the same time helping to experiment with new instructional strategies. Hence, leadership requires knowledge about how teachers develop professionally as well as the ability to build momentum for school-wide changes. I considered how teacher leaders work together to address specific instructional issues and shared instructional concerns among teachers. Rather than assuming that subject matter is relevant, I examined what they said about math and literacy, how they enacted their views, and what they learned about subject matter through their teaching and leadership work.

Those who study subject matter as context do not attend to how actors make sense of a social situation and by acting in and on that situation transform it. This view depicts subject-matter norms primarily as acting upon teachers via structures such as professional norms, teacher preparation, departmentalization, and professional organizations. For example, some researchers have found that high school teachers adhere to subject subcultures based on their assignments within departments (Grossman, 1996; Grossman & Stodolsky, 1994; Siskin, 1991, 1994). In this research, subject subcultures powerfully influenced the process of instructional change, mediating teachers' interpretation of reforms, and the effects of reforms on classroom practice (Ball, 1981; Ball & Bowe, 1992; McLaughlin & Talbert, 1993).

The Reciprocal Relation between Social Structures and Human Agency

Following Giddens (1979, 1984), I viewed structure as both the medium and the outcome of human activity. Structure - in my case subject-matter norms - constitutes agency, providing the rules and resources upon which actions are based; however, agents can also create, reproduce, and potentially transform structure. This framework directed my attention to the interface between wider norms and school reform strategies. It reminded me that subject-matter differences, although important, do not represent universal truths but exist as perceptions - ways of seeing the world.

The Role of Sense-making in Human Recognition

As perceptions, these views can be influenced by leaders' own sense-making - their attempt to respond to new challenges and reconcile these challenges with existing assumptions. Weick (1996) emphasized that sense-making focuses on actions in that it takes place in the context of ongoing projects. In their responses to dilemmas, people make sense of their environments and in this way enact their environments. This sense-making takes place in a social context with multiple actors. Drawing on this perspective, I examined how some teacher leaders generated perspectives about improving instruction in reading and mathematics in the course of teaching, analyzing student work, and meeting with colleagues to discuss their concerns.

Method

Research Site and Sample Selection

I used a theoretical sampling strategy (Glaser, 1978; Glaser & Strauss, 1970), selecting schools based on five dimensions as summarized in Table 1. All eight schools are in the Sacramento Public School District, California, U.S. All are high poverty with a minimum of 60% of students receiving free or reduced-price lunches. I selected schools that varied in student demographics, including four schools that were predominantly African-American, two that were predominantly Hispanic, and two that were mixed racially. Six out of eight schools had shown signs of improving mathematics, science, or literacy instruction based on students' scores on standardized tests and other measures of academic productivity. The academic productivity measure uses California Standardized Test (CST) scores to determine the academic gain for students spending the entire year at individual schools. This measure is used to determine the productivity of schools over time. Two of the eight schools had managed no improvement in academic performance.

I also selected schools that varied in the duration of their change efforts as determined by interviews with teacher leaders. Two of eight schools had been involved in instructional change for 1-3 years, two for 4-6 years, and four schools had been involved in reforms for 7-9 years. Finally, schools varied in terms of the general focus of their reforms. At the outset of study, three schools in our sample emphasized a transmission approach to student learning. Five schools emphasized a social construction view of student learning. In this article I focus my analysis on two types of data - structured and semi-structured interviews with teacher leaders. I randomly selected two individuals at each school who were identified as having responsibility for curriculum.

Table 1. Description of the Sample Schools

School	Enrollment	% Low Income (a)	Ethnicity (%)					% Limited English	Academic Productivity (b)	Years of Reform
			Black	White	Hispanic	Asian	Native American			
A	86	93	100	0	0	0	0	0	Low	7-9
B	1,048	63	7	47	22	24	1	38	High	7-9
C	1,498	73	8	40	19	34	0	48	High	1-3
D	287	90	100	0	0	0	0	0	Low	4-6
E	928	97	3	0	97	0	0	46	High	4-6
F	363	97	100	0	0	0	0	0	Low	1-3
G	1,054	97	100	0	0	0	0	0	Low	7-9
H	1,331	96	4	3	8	5	0	29	High	7-9

(a) Percentage of students receiving free or reduced-price lunch.
(b) Academic productivity was defined as improvement in students' scores on the CST in math, science, and reading and by other measures of productivity.

Data Collection

This article derives from data from the pilot phase and the first year of the Leadership-Within Project, a 2-year longitudinal study of elementary school leadership. Data included observations, structured and semi-structured interviews, and videotapes of teaching and leadership practice. I spent the equivalent of 3-4 days per week per school over a 10-week period for each project year and the pilot phase. Teaching and leadership events observed as part of this data collection included grade-level meetings, faculty meetings, school improvement planning meetings, professional development workshops, and teaching. In addition, I observed other events where teacher leaders discussed subject matter including homeroom conversations between teachers, lunchroom conversations, and subject-specific workshops and meetings.

Interview questions addressed five issues about teaching and leadership: (1) the key goals teacher leaders work on (e.g., building a school vision, promoting teacher professional development, improving test scores, etc.); (2) daily

tasks they perform to attain these goals (e.g., teaching, forming breakfast clubs, facilitating grade-level meetings, etc.) and the subject-matter focus of the tasks, if any; (3) their practice as leaders (and how and whether they perform these daily tasks with others); and (4) tools and material resources (including curricula, teachers' guides, memos, protocols, and organizational structures) the respondents identified as important to goals and tasks. I also observed them on multiple occasions, following them into classrooms and meeting rooms, and took field notes. I then conducted post-observation interviews with them about what I had observed. Observation protocols focused on the nature and substance of teaching and leadership tasks and their perceptions of tasks' importance.

Data Analysis

Data collection and data analysis were connected closely, allowing me to examine patterns and working hypotheses as they emerged and to refine data collection as the study progressed (Miles & Huberman, 1994). I developed coding categories based on the theoretical framework described previously and on initial analyses of observation and interview data. In this article, I focus on three indices within the larger coding system. The first focused on teacher leaders' statements of belief. Four codes (goals and challenges of teacher and student learning) were created to categorize these data. The second index focused on subject matter. I used three codes (mathematics, literacy, and other subjects) to label these data. The third index described their practice or observations of that practice. I coded for observations, self-reports, or other reports of (a) regular meetings to talk about classroom practice and/or student work, and (b) meetings with small groups of teachers over time to discuss subject-specific issues.

Coding for this study was used to index the multiple data sets collected for each of 30 teacher leaders and to identify common patterns in their views regarding subject matter and their roles in subject-specific reforms. I used constant comparison to identify, test, and refine assertions. In each instance, I triangulated the data, checking their self reports with evidence from repeated interviews, observation field notes, as well as interviews with other teacher leaders within the same school.

Results and Discussion

Enacting Subject-Matter Views

Table 2 summarizes school teacher leaders' views of subject matter and where expertise for instructional reform resides. The beliefs summarized emerged through interview responses and in my observations of their teaching and leadership practice. They expressed these views in statements about their beliefs about subject matter and about effective teaching and leadership strategies. They identified reading and mathematics as instructional priorities, reflecting their views that these are core subjects in the curriculum. In addition, whether they thought schools should use expertise from inside or outside the school to help with reforms differed between literacy (inside) and mathematics (outside). These differences reflected in part widely held views of mathematics as a highly defined discipline in which expertise develops through formal training and of literacy as having less defined areas of expertise. I explore these patterns below.

Table 2. Percentage of Teachers Expressing Five Views about Literacy and Mathematics

View	Literacy	Mathematics
Subject is core to curriculum	80	83
Skills support learning in other subjects	83	17
Skills should be taught in a particular sequence	16	53
School has primary expertise for reform	80	13
External community has primary expertise for reform	2	63

NOTE. N = 30. Percentages are based on teachers' self-reports and confirmed by triangulation of data through repeated interviews and observation field notes.

Reform Focus

Eighty percent of the 30 teacher leaders I interviewed identified both reading and mathematics as the primary focus of their instructional improvements. Only 13% mentioned improvements in science as focal. They explained how district pressures to improve test scores in reading and math had lent new urgency to their mathematics and literacy reforms. For example, when asked if particular issues were consuming the time and energy of the school staff during the 2004-2005 academic year, a teacher responded, "Nothing but reading and math programs that consumed - that's energy consumed because that's where our focus is. I have pressure to meet certain guidelines. I have pressure to get the children who are below grade level on grade level." A teacher at another school commented:

> We are still aiming for the national average being at 50% in both reading and math, and we feel that we can get there even with our mobility rate. It's not difficult to remain motivated because we still have a challenge ahead of us, and we are working vigorously on it.

The schools in my study are located in Sacramento, a school district that has made standardized test scores in reading and mathematics the primary measure of school performance. Schools that fail to meet national norms on standardized tests in reading and mathematics at the benchmark grades of 3, 6, and 8 face probationary status and possible closure. Based on field observations and document collection, district leadership used directives and memorandums to communicate these subject-area priorities both to schools that faced probation (schools A and F) and to schools that had met or neared national norms (the other six schools). The fact that teacher leaders across all eight schools identified reading and math as instructional priorities reflects in part the importance of these subjects to the district's reform agenda as well as their own views of instruction.

Regardless of role or school, 83% of all teacher leaders articulated a similar view of effective literacy instruction: Because students read and write in every content area, teachers should work on reading and writing throughout the day rather than treating literacy as an isolated subject. The comments of a teacher reflected personal beliefs on this topic:

> I'm not a proponent of spelling books. You teach spelling across the curriculum - that will help to increase the vocabulary, and also encouraging having books for students to read - that also builds their vocabulary. ... So in the classroom we teach the spelling vocabulary across the curriculum. You get vocabulary from every subject: math, science, of course the language arts.

Well over half of teacher leaders also depicted literacy as a broad measure of student progress that involves essential learning skills. For example, a teacher reported:

> [I think] of writing as really important because it integrates so many things. It integrates thinking. It integrates being able to organize. It integrates spelling and language and many different things. So I thought it [reading samples of student writing] was a good way for me to get a kind of snapshot of what's happening and what people are doing in this school.

Teachers' views of literacy and mathematics differed widely in four of five areas (see Table 2). In mathematics, 53% of teachers emphasized adherence closely to the sequence of curriculum.

Reform Strategies

Although they viewed mathematics and literacy as important subjects, teacher leaders outlined different reform strategies in the two areas (see Table 2). Eighty percent viewed their own school community as the primary source of

expertise for improving literacy instruction and test scores. In contrast, they referred to curriculum and/or to training associated with an external program in describing their school's efforts to improve mathematics teaching. They were less likely to mention the importance of colleague input in mathematics reforms than in literacy. These patterns reflect widely held norms regarding the importance of formal training and expertise in mathematics relative to literacy. I explore these patterns below.

A majority of teachers identified school-developed literacy activities - parent programs, reading competitions, and curriculum development groups - as critical to improving instruction, as evidenced in the comments of one teacher: "We've also developed a language arts committee. Because as we began to look at our [students'] writing skills, we felt that if we were able to effectively evaluate writing, we would become better teachers of the writing process."

Similarly, teachers emphasized the importance of teacher input via the literacy subcommittee and the school's efforts to reward and acknowledge that input: "There were some things [proposals to pilot new literacy strategies] that came out of the literacy committee that did not have full school-wide support. However, since there is an awful lot of work that had gone into that, we wanted to make sure that there were provisions that would let those interested in following up on these ideas have an opportunity to work together." These teachers' remarks emphasize the value of teachers' practical insight in efforts to reform literacy. In the school that developed a language arts committee, a group of teachers acted as peer coaches to fellow faculty and evaluated other teachers' practice by analyzing student work. They emphasized the need for school-wide discussion and also a democratic process in implementing and refining that vision.

Teacher leaders spoke of different strategies for instructional improvement in mathematics. As with literacy, they wanted to improve students' performance on standardized tests. However, in mathematics, they placed much less emphasis on participation in decision making and instead frequently attributed improvements at their schools to the of use an established mathematics curriculum associated with a textbook. For example, a teacher described mathematics improvements as the result of a mathematics series that the school had recently adopted: "I like it [the new mathematics series] a lot as a curriculum. It's proven, to us-I mean, data doesn't lie."

When asked where she obtained help for improving mathematics instruction, she responded:

> [I think] of writing as really important because it integrates so many things. It integrates thinking. It integrates being able to organize. It integrates spelling and language and many different things. So I thought it [reading samples of student writing] was a good way for me to get a kind of snapshot of what's happening and what people are doing in this school.

Statements such as these reveal teacher leaders' tendency to view expertise beyond the school as a critical dimension of mathematics reforms. The statement also reveals how they encounter and enact norms of subject matter through their participation in professional communities. The reform initiative she referred to incorporated a highly sequenced mathematics curriculum and intensive professional development support. In the second year of data collection, two additional schools purchased and began using the curriculum. In these schools, the presence and character of the curriculum both reflected and likely reinforced views about the nature and placement of mathematics expertise.

To summarize, teacher leaders in all schools responded to district pressures by accelerating literacy and mathematics reforms already under way. Their priorities reflected their views of mathematics and literacy as core subjects. The reform strategies that they pursued also reflected subject-matter norms. They identified outside expertise as important for improving mathematics instruction and said little about the need for teacher participation in curriculum development. They also emphasized the need to provide teachers with additional professional training in mathematics. In improving literacy instruction, teachers emphasized the school community as the locus for development of literacy programs and materials. Their views also reflected pressures related to local policy and to standardized tests in literacy and mathematics, as well as the character of university-developed mathematics curricula.

My findings illustrate that instructional leadership in elementary schools is mediated by subject matter. Contrary to popular portrayals, norms of subject matter pervade not only high schools but also elementary school teaching and leadership. Teacher leaders in elementary schools approach instructional change not only in terms of grade levels but also in relation to concerns specific to subject matter. Rather than unidirectional, the relation between norms of subject matter and their work can be reciprocal. Norms of subject matter not only structure their work, but they report

that norms can be shaped by this work.

How Views of Subject Matter Shift through Teaching and Leadership Practice

Leadership itself helped some teacher leaders acquire information about their subject-specific needs. Those who interacted about classroom teaching and learning articulated a role for external supports in improving literacy instruction and a role for more school-based expertise in mathematics reform. Daily involvement in the teaching and learning process helped them see the complexities involved in instructional reform and use these insights to modify school-wide reform practices. By daily involvement, I mean they teach in classrooms, analyze student work, and meet with small groups to talk about their practice.

Literacy. These teacher leaders reported and were observed offering substantive feedback on what they saw in before- and after-school meetings or in memos to individual teachers. They also reported and were observed offering more informal assistance with material needs. For example, they suggested age-appropriate novels for interdisciplinary units, shared samples of student-authored journals, and obtained workbooks or novels.

Some reported that these activities helped them see the value of integrating school-developed strategies with more external assistance. For example, a school on Sacramento's West Side conducted an intense campaign to infuse reading and writing throughout the curriculum. Similar to other schools, the school's literacy reform strategies focused on teachers' input and discussion. Teachers assumed an active role in this effort, regularly attending grade-level meetings and visiting colleagues' classrooms. In the course of these meetings, they realized what they could learn from research beyond discussing their practice. One teacher reported:

> One week, some of the teachers volunteered to come in and show how they had used some of the [research] literature ... how they had enacted some of the things or changed their way of doing things based on the literature. And it just - just hit me, I said, 'Wow, this is a tremendous resource.'

Based on this experience, they decided to work more closely with a university partner to connect themselves with research on best practices. Teachers identified an area in which they wanted information, and then "the [university partner] came in and provided some additional articles so that they could read more about it."

This school, like the others in this sample, had developed a participatory approach to improving literacy instruction. Through involvement in the daily work of reform, the teachers learned something from each other about the value of external expertise.

In other instances, teacher leaders described what they had learned as a result of observing literacy instruction with teachers and talking about literacy. Across all eight schools, teacher leaders with daily involvement characterized themselves as supportive of literacy reforms but also described as confused about how to translate reforms into classroom practice. They viewed external supports-teachers' guides, activity sheets, commercially prepared videos-as necessary supplements to school-based expertise. They talked about the need for tools that could help to use literature circles, word walls, and student journals for the first time. For example, a teacher referred to the push to "bring in someone from the outside to do a [literacy workshop]" due to her own and others' growing concern over inadequate in-house expertise. She recalled:

> These conversations of conversations of conversations about-and we're all inexperienced. And, you know, somebody can say, 'Yes, I'm the most experienced teacher in the world,' but you don't have this, this-none of us have this focus about us that says that-or this validation from anywhere that says what we're doing is really grounded in research or best practice.

In short, literacy reforms across the eight schools reflected norms of subject matter in locating expertise for reform at the school level.

Mathematics. Involvement in mathematics reforms also created opportunities for teacher leaders to build new perspectives on school expertise but with a different effect. As with literacy, work on mathematics reforms involved a

variety of activities that brought close contact. Work in mathematics involved, among other things, regular meetings to discuss mathematics issues, helping teachers locate materials for math experiments, coaching teachers in curriculum topics about which they felt unsure, and suggesting how to scaffold student learning. Teacher leaders involved in implementing mathematics reforms identified external expertise and training as crucial strategies. However, in contrast to colleagues with more limited involvement, they also emphasized the need to supplement externally developed materials with more school-based and informal supports. In schools, teachers met to discuss mathematics instruction, review student achievement test scores in mathematics, and discuss the implications of these data for improving instruction at particular grade levels.

Involved mathematics teacher leaders articulated the value of mathematics textbooks and teachers' guides. However, they also acknowledged the presence and importance of more internal forms of expertise. For example, a teacher identified himself as an enthusiastic supporter of a math/science curriculum the school had adopted. In 2005, he formed a workgroup of classroom teachers to "look at performance assessment in math because math is something we have talked a lot about, we have had a lot of training in, we have had a lot of support." Through these meetings and follow-ups, he became convinced of the importance of school staff discussion of mathematics beyond formal workshops and training. He explained:

> Talking about a problem that your kids did, just on the fly, with another teacher, gets that teacher thinking about that problem more than she would in a formal meeting [workshop].... If it's [discussion] informal, I think I've seen more teachers do it, you know, make changes in their classroom because of it.

This teacher met with colleagues to talk about instructional issues. As a result of these conversations, he saw teachers become more receptive to ideas that a staff developer from outside the school had introduced. He did not reject the value of a standard mathematics curriculum. In his view, the common training and materials gave the school a base on which to develop standard performance assessments. However, through his work, he also saw the need to supplement external tools and expertise with teacher discussion.

I found many other examples of this pattern. For example, a teacher at another school met informally with fifth- and sixth-grade teachers to discuss their use of a new mathematics series. In the course of these conversations, she discovered that some teachers were hesitant to use the curriculum because they thought the students were not ready for group work. She decided to address this issue by having some teachers collect and share portfolios of students' math work. In her view, teachers who were involved in the project embraced the curriculum in ways that they had not before.

Another teacher at the same school gained a similar perspective on the need for in-school supports through classroom visits. He found that although teachers were excited about the new math curriculum, they often lacked materials to implement it. After talking with colleagues, he decided to make sure they had access to these materials. He transformed his classroom into a curriculum resource center. In this way, teachers could get what they needed when they needed it. Referring to the value he assigned to this work, he explained, "They [colleagues] come to me because they know I am the type of person used to having a little bit of everything." Close interactions helped build these and other teacher leaders' interest in supplementing external expertise with in-school supports, transforming their thinking about the work of leading change in mathematics instruction. Without these interactions, their perspectives seemed to reflect traditional views of mathematics expertise.

These examples reflect the larger pattern I observed across schools. Involvement in instructional reform activities seemed to help teacher leaders learn new things about the role of school supports in mathematics. Well over half of all school teacher leaders spoke enthusiastically about the mathematics textbook series and the training associated with it. However, involved teacher leaders also emphasized providing teachers with day-to-day school supports. In sum, teacher leaders not only enacted their views of subject matter through their work, but the work itself helped them see their needs differently. Those who interacted with others articulated roles for external supports in literacy and for using more school-based expertise in mathematics. In many instances, they reported that they had acquired these perspectives as a result of their decision to support reform efforts more directly. Teacher leaders who embraced perspectives that departed from traditional subject-matter views sought opportunities to work more closely with teachers around instructional reforms. They formed work groups, volunteered to read students' writing, and visited colleagues' classrooms and asked questions. In other words, they attempted to understand progress at implementing reforms. This suggests that moving beyond general assumptions about subject matter already was part of their teaching and leadership philosophy.

Conclusion

Subject matter provides an important context for the work of teacher leaders engaged in mathematics and literacy reforms. I found that leadership activity in mathematics was different from leadership in literacy. Subject-matter norms influenced how they led instructional reform and their placement of expertise for these reforms. Viewing mathematics as a highly defined body of knowledge, they worked to develop more sequenced programs of study and relied on external sources of expertise in this work. The situation was different with respect to literacy. Viewing literacy as a subject that is involved in all disciplines, teacher leaders encouraged a participatory approach in which they had opportunities to develop and discuss curriculum. The practice of elementary school teacher leaders reflects specific ideas about the nature of teaching and learning, rather than solely styles and preferences. They enact views of subject matter through their reform strategies and their choices about where expertise for these reforms resides.

My account further illustrates the importance of material artifacts in the transmission of subject-specific norms. Teacher leaders encounter norms of subject matter through their interactions with both people and policy tools across organizational contexts. For example, they confront subject-matter views regarding what constitutes the core elementary school curriculum via standardized test pressures that hold schools accountable for improvements in some subjects but not others. They also encounter norms of subject matter through the curricular packages they adopt or that are readily available to them. As in the case of the highly sequenced mathematics curriculum, these curricula signal conditions for building teacher expertise in particular subjects. Thus, their working to improve instruction can benefit from paying attention to the ways policy tools carry norms of subject matter and interact with existing views at the school level.

Although many view practical challenges as impeding instructional reforms, the dilemmas of school change also create opportunities for teachers to learn new things and to acquire norms of practice that depart from traditional subject-matter views. Through interactions, they reported arriving at new perspectives about what they both offered and needed to make improvements in mathematics and literacy. These perspectives articulated the importance of providing teachers with internal and external supports in both mathematics and literacy. The perspectives were distinct from traditional views that depict mathematics expertise as largely outside the domain of teacher expertise and literacy expertise as less defined and therefore more practice based.

These findings have implications for the knowledge and expertise that teacher leaders need in order to implement reforms. Reforms in academic subjects emphasize teachers' needs for content knowledge, and they need content knowledge too. They may be able to gain some of this knowledge by working with colleagues and listening carefully to what they say about the expertise and support they need. The work of multiple school teacher leaders can mediate the progress of instructional reforms, and efforts to improve school teaching and leadership for instructional reform must include a wider array of school leaders (e.g., principal, assistant principals, curriculum coordinators, and teacher leaders).

Subject matter is an important variable in the reform choices of elementary school teacher leaders. The challenges that faculties encounter in improving instruction can differ among subjects. In supporting teachers in changing their practices, they view the challenges and opportunities of instructional reform through subject-specific lenses. Examining these views (how they are enacted and how they shift) is central to improving school teaching and leadership and especially leadership for instruction.

References

Ball, S. J. (1981). *Beachside comprehensive*. Cambridge: Cambridge University Press.

Ball, S. J., & Bowe, R. (1992). Subject departments and the "implementation" of national curriculum policy: An overview of the issues. *Journal of Curriculum Studies*, 24(2), 97-115.

Ball, S. J., & Lacy, C. (1984). Subject disciplines as the opportunity for group action: A measured critique of subject subcultures. In A. Hargreaves & P. Woods (Eds.), *Classrooms and staffrooms: The sociology of teachers and teaching* (pp. 232-244). Milton Keynes: Open University Press.

Drake, C., Spillane, J. P., & Hufferd-Ackles, K. (2001). Storied identities: Teacher learning and subject-matter context. *Journal of Curriculum Studies*, 33(1), 1-23.

Giddens, A. (1979). Central problems in social theory: Action, structure and contradiction in social analysis. Berkeley: University of California Press.

Giddens, A. (1984). *The constitution of society.* Berkeley: University of California Press.

Glaser, B. G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory.* Mill Valley, CA: Sociology Press.

Glaser, B. G., & Strauss, A. L. (1970). Discovery of substantive theory. In W. Filstead (Ed.), *Qualitative methodology* (pp. 288-297). Chicago: Rand McNally.

Grossman, P. (1996). Of regularities and reform: Navigating the subject-specific territory of high schools. In M. McLaughlin & I. Oberman (Eds.), Teacher learning: New policies, new practices (pp. 39-47). New York: Teachers College Press.

Grossman, P., & Stodolsky, S. (1993, April). Adapting to diverse learners: Teachers' beliefs in context. Paper presented at the annual meeting of the Americal Educational Research Association, Atlanta.

Grossman, P., & Stodolsky, S. (1994). Considerations of content and the circumstances of secondary school teaching. *Review of Research in Education*, 20, 179-221.

Lieberman, A., Falk, B., & Alexander, I. (1994). *A culture in the making: Leadership in learner-centered schools.* New York: National Center for Restructuring Education, Schools, and Teaching.

Little, J. W. (1993). Professional community in comprehensive high schools: The two worlds of academic and vocational teachers. In J. W. Little & M. W. McLaughlin (Eds.), *Teachers' work: Individuals, colleagues, and contexts* (pp. 137-163). New York: Teachers College Press.

McLaughlin, M. W., & Talbert, J. E. (1993*). Contexts that matter for teaching and learning.* San Francisco: Jossey-Bass.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis.* Thousand Oaks, CA: Sage.

Nelson, B. S. (1999). *Building new knowledge by thinking: How administrators can learn what they need to know about mathematics education reform* (Center for the Development of Teaching paper series). Newton, MA: Education Development Center.

Rosenholtz, S. J. (1989). *Teachers' workplace: The social organization of schools.* New York: Longman.

Sheppard, B. (1996). Exploring the transformational nature of instructional leadership. *Alberta Journal of Educational Research*, 42(4), 325-344.

Siskin, L. S. (1991). Departments as different worlds: Subject subcultures in secondary schools. *Educational Administration Quarterly*, 27(2), 134-160.

Siskin, L. S. (1994). *Realms of knowledge: Academic departments in secondary schools.* Washington, DC: Falmer.

Spillane, J. P. (2000). Cognition and policy implementation: District policymakers and the reform of mathematics education. *Cognition and Instruction*, 18(2), 141-179.

Spillane, J. P., Diamond, J. B., & Jita, L. (2000, April). Leadership and classroom instruction: Exploring the social distribution of leadership practice. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Spillane, J. P., Halverson, R., & Diamond, J. B. (2001). Towards a theory of leadership practice: A distributed perspective (Institute for Policy Research working paper WP-99-3). Evanston, IL: Northwestern University.

Stein, M. K., & D'Amico, L. (2000, April). How subjects matter in school leadership. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Stodolsky, S. (1988). *The subject matters.* Chicago: University of Chicago Press.

Stodolsky, S. S. (1993). A framework for subject matter comparisons in high schools. *Teaching and Teacher Education*, 9, 333-346.

Stodolsky, S., & Grossman, P. L. (1995). The impact of subject matter on curricular activity: An analysis of five

academic subjects. *American Educational Research Journal*, 32(2), 227-249.

Weick, K. E. (1979). *The social psychology of organizing*. New York: McGraw-Hill.

Weick, K. E. (1996). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

Author's Biography:

Thienhuong Hoang is a professor of education and coordinator of special education at California State Polytechnic University, Pomona. Her research interests include teacher leadership, special education, curriculum, and instruction. She is the editor of the International Journal of Teacher Leadership.

Correspondence:

Thienhuong Hoang
tnhoang@csupomona.edu
College of Education and Integrative Studies
Department of Teacher Education
California State Polytechnic University, Pomona
3801 West Temple Avenue
Pomona, CA 91768
USA