Distributed Instructional Leadership in High Schools

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This paper explores the idea of distributed instructional leadership as a way to understand instructional leadership practice in comprehensive high schools. Our argument is that distributed leadership analyses allow researchers to uncover and explain how instructional improvement in high schools occurs through the efforts of multiple individuals working to simultaneously influence the contexts of leadership and the contexts of instruction. The distributed instructional leadership model draws on the full potential of distributed leadership to describe not only who is involved with high school reforms, but also to describe the situated tools, tasks and routines required to change and maintain improved teaching. The first part of the paper develops an account of distributed instructional leadership as an approach to studying how leaders create high school learning environments by drawing upon research in distributed cognition. The second part of the paper provides an illustration of how the ideas of distributed instructional leadership were applied to the analysis of a curriculum-based reform in a comprehensive high school.

Distributed instructional leadership applies the concepts and techniques of distributed leadership to study how school leaders create learning environments for teachers and students. The original distributed leadership framework (Spillane, Halverson & Diamond, 2001; 2004; Spillane, 2006) was developed to study how school leadership practice is situated in local contexts, how it might be documented, and how it might be communicated to interested audiences. It draws on central concepts of distributed cognition to understand how leaders manage and change the complex cognitive systems of schools. The underlying distributed cognition concepts of tasks, tools, routines and cognitive systems play a central role in distributed leadership analysis. Distributed

leadership investigates the two dimensions of practice: the *social distribution* of leadership describes how tasks are shared, co-created or obstructed across multiple actors; the *situational distribution* describes how tools create (or thwart) opportunities to exercise effective leadership.

In recent years, the attention of much distributed leadership research has focused on the social distribution of leadership practice. One goal of a social distribution of leadership practice study is to determine how many people share in leadership practices. Camburn, Rowan & Taylor (2003), for example, found that responsibility for school leadership functions was distributed among three to seven people, including teachers and formal leaders. How the work is enacted across actors within the organization is a central concern for the social distribution of leadership. Spillane & Diamond (2007) developed three paths for describing the social aspect of leadership task distribution: distribution can be *collaborated*, in which multiple actors simultaneously engage in tasks (through, for example, collaborative design sessions or faculty study groups); *collective* distribution occurs when actors divide tasks across roles and; *coordinated* distribution unfolds when leaders sequence complex organizational routines in which multiple actors can then engage. Clifford (2009) also suggests an *oppositional* relationship among actors can provide a check on reform agendas that may actually strengthen reform efforts. The social distribution of leadership identifies optimal arrangements of people in organizations, and then develops models to explore how leadership practice ought to be distributed for school improvement. This crucial step from description to prescription allows distributed leadership researchers to move toward implementing distributed leadership models (Smylie, Mayrowetz, Murphy & Louis, 2007) and ultimately to test the

impact of distributed leadership models on student learning (Leithwood, Mascall & Strauss, 2009).

Knowing who acts as a leader is the first step of a distributed leadership analysis; knowing what leaders do, and more importantly, how they shape (and are shaped by) the context of practice completes the picture. Analysis of the *situational* distribution holds potential for understanding how leadership practice is shaped by the school context, and how leaders seek to reshape the situation of teaching and learning. A situational distribution of leadership practice is built on the concepts of task, artifact, routine and cognitive system from the field of distributed cognition (Salomon & Perkins, 1999; Hutchins, 1995a). Distributed cognition emphasizes the situated nature of human action, and uses the concept of mediated action to describe how tools and environments constitute thinking and doing. Thinking, according to distributed cognition theory, is not something that can be analyzed exclusively as what takes place in our heads, rather, studying cognition requires that we understand how tools, contexts, language and social interaction constitute cognitive (and affective) life. This network of actor-tools-environment becomes the unit of analysis. In the education world, this network of actors, tools and environments is called the learning environment.

The traditional approach to situational analysis of distributed leadership is to investigate how leadership practice is influenced by the policies, programs and routines that constitute the school context. But the work of school leaders is not just limited to navigating within a context; it is also to reform contexts in order to improve teaching and learning. This reshaping activity happens in two distinctly different situations. At the first level, the situation refers to the features of the *leadership environment* of practice.

Instead of treating the context as a static backdrop against which leadership unfolds, a situational analysis of leadership considers the context as the tool-set from which leaders draw to engage their work. Analyses of the leadership environment portray how school contexts enable, constrain and afford leadership action. On the second level, the situation indicates the *learning environment* of the school – the *object* of leadership practice. The work of school leaders is to establish learning environments for improved teaching and learning in schools. In this sense, leaders establish learning environments in which other people (teachers and students) work. Leaders draw on resources and expertise from the leadership environment to construct the situations of practice that enable, constrain and afford environments for teaching and learning.

Successful school leaders must master both the leading and the learning environments. They must navigate and shape the school-level context in order to reform the teaching and learning context. We will refer to this dual interplay of leadership and learning environments as the components of *distributed instructional leadership*. The term *instructional* is used to indicate that reforming the learning environments is the object of leadership practice. Distributed instructional leadership uses the tools of distributed cognition to investigate which leaders are involved, and how leaders create and connect assessments, instructional resources, people, schedules, professional learning and technologies to create safe and effective learning environments.

Our argument consists of three main parts. In Part 1, we provide an account of why leadership is difficult to study in contemporary American high schools. In Part 2, we describe the conceptual and analytic tools of our version of distributed instructional leadership. In part 3, we provide a detailed case of how the tools of distributed

instructional leadership illustrate the ways in which high school teachers and leaders changed the conditions for teaching and learning in an urban comprehensive high school. Our argument shows how distributed instructional leadership analysis uses the tools of the situational distribution of leadership practice to understand how leaders challenge and reframe learning environments for teachers and students.

1. Leading High Schools

There is no area of public education in more need of new approaches to leadership than the U.S. public high school. For years, leadership initiatives in high schools designed to promote school-wide changes (e.g., small learning communities, schools-within-schools, site-based management) have not made significant headway in improving student learning or reducing drop-out rates. While multiple restructuring and improvement programs have been applied to high schools, instructional practices can remain largely unchanged. In part, the inability of these initiatives to spark improvements at scale is a consequence of the school-level nature of the reforms. Changing the roles of teachers and staff by creating instructional teams, group collaboration and planning times, or student advisory meetings change the ways that adults in the school work, but often leave classroom teaching practices untouched. In other words, high school leadership reforms have too often missed the object of efforts, changing the learning environment.

High schools present a special challenge for instructional leadership. Many high schools suffer from acute student achievement and graduation gaps. Comprehensive high schools typically offer a number of successful, high quality instructional programs, but can just as typically fail to engage a large portion of students in meaningful learning

experiences. School size, instructional diversity, and other factors raise the possibility that students can become disengaged from coursework and schooling. The loosely-coupled organization of public school administrative and instructional practices adds to the difficulty of reform-based leadership (Elmore, 2004).

Leaders in loosely-coupled education organizations must negotiate weak connections between administrative and instructional practices (Weick, 1976). A common result of the loose coupling in high schools is the diversion of reform efforts into domains controlled by formal leaders (e.g. principals, assistant principals and deans). These domains included controlling the conditions for entry (admission & hiring), safety (building and grounds and student discipline), professional development, record keeping (grading, attendance and scheduling), buffering (community relations and parent interactions) and exit (graduation and expulsion). Reforms such as small learning communities, student advisories neighborhoods and schools within schools get translated into staff and student reorganization on the school-wide, administrative level that have had surprisingly little influence on classroom teaching practices (Murphy, Beck, Crawford, Hodges & McGaughy, 2001; McLaughlin & Talbert, 2002). These reforms show that leaders are doing *something*, but often do not directly address the classroom contexts, the interactions between teachers, content and students.

Contemporary reform efforts have challenged high school leaders to reshape the traditions that have emerged around loose-coupling. Instructional leaders are increasingly pressed to improve student learning as documented by student achievement on standardized tests achievement or higher graduation rates. Teachers are increasingly evaluated in terms of improving student learning (as measured by test scores);

administrators are increasingly measured by the degree to which their schools improve learning for all students. Attending to instruction requires leaders to tighten the coupling between administrative and instructional practices (Spillane & Burch, 2006). In part, leaders must reform instruction by setting expectations, such as core standards and student assessment benchmarks, that high schools are expected to meet (Barton & Coley, 2011). Leaders must have access to, and learn to critique and support, the teaching and learning practices at the instructional core. A number of high schools that have embraced accountability-driven reforms have focused the conditions for student success as a model for organizational change (see for example, Ferguson, Hackman, Hanna & Ballantine, 2010; Young, Cline, King, Jackson & Timberlake, 2011). These accountability-driven reforms depend on tightening the connections between organizational resources, disciplinary communities and teacher expertise to reshape classroom teaching and learning.

Contemporary high school reform, then, requires researchers and practitioners to understand how to change the contexts in which instruction actually takes place. High school classroom learning is situated in departmental (McLaughlin & Talbert, 1993; Siskin, 1994) and disciplinary (Grossman & Stodolsky, 1994) spheres of influence. Improving student learning requires leaders to understand how content is organized in classrooms, the reality of teacher-student interaction, and the paths that knowledge and guidance flow through the teacher's professional network. In order to influence teaching practice, high school leaders must recognize and work within disciplinary expectations, have direct access to the daily practices of instruction, and develop working relationships with the departments.

The new generation of high school leaders must understand how to engage in *direct* interventions into the classroom, such as measuring (and being able to recognize) the quality of classroom teaching, rewarding productive practices, providing the kinds of support (e.g. coaching and peer review of student work) that have been shown to improve learning. Clearly, this range of tasks describes the work of multiple actors in the high school context. The social distribution of leadership practice can articulate how these practices are shared within (and across) the school. A distributed instructional leadership perspective can reveal how these leaders and teachers create new kinds of learning environments for students.

2. Distributed Cognition and Leadership

Distributed instructional leadership attempts to describe the how leadership practices actually unfold in schools. It draws on the conceptual tools of distributed cognition research to analyze how cognition takes place in learning environments and provides insight about how to design learning environments. Distributed cognition emerged in the 1980s as a research movement to explain the situated nature of thinking and action (Salomon & Perkins, 1988). Cognition had long been considered as a mental phenomenon that took place inside the head. Distributed cognition theorists followed the lead of Leon'tev (1975; 1981) and Vygotsky (1978) to describe how action depends on context. Distributed cognition pushed researchers to consider how thinking was not only supported, but also constituted by tools and practices in a situation.

Distributed cognition moves beyond the action of individuals to explore how thinking and action should be understood as a form of interaction with the world. The unit of analysis in distributed cognition is the *cognitive system* (Hutchins, 1995b). A

cognitive system provides the context for practices, and is composed of tasks, tools and routines. *Tasks* describe the sequences of action that unfold in the cognitive system. Tasks have personal and situational aspects. Tasks knit actors, tools and goals together into action. Identifying the key tasks in a particular action helps the researcher unpack the supporting tools and goals that contribute to a distributed cognition account of practice. Tasks exist at two levels – macro- and micro-tasks. Macro-tasks refer to the large-scale concepts used to organize activities of a certain type, such as, for school leaders, monitoring teaching and learning, maintaining a safe learning environment, or allocating resources. Micro-tasks describe the day-to-day enactments of these macro-tasks through interpersonal interaction, tool construction or decision-making. Part of the work of the distributed cognition researcher is to trace the how micro-tasks compose macro-tasks, and to investigate how actors make sense of their relation (e.g. Spillane, Reiser & Reimer, 2002).

Tools are the material artifacts of the context that afford action (Norman, 1993). When engaging in tasks, actors use tools to achieve goals. Most of our everyday actions unfold in contexts rich with tools, ranging from cars and keyboards to recipes and schedules, to support our intentions. Typically, tools are given in the context of action, but actors can also build tools to afford actions in new ways, and can ignore tools that other actors find relevant for action. The concept of a tool suggests a ready-to-hand availability of capacity. In the school world, tools can include policies, procedures, curricula, instructional materials, parking lots and computer networks. Roles, such as instructional coaches or crossing guards, are also tools designed to organize practices in certain ways. Taken together, the network of tools constitutes a local *system of practice*

that shapes the routines and the perceived possibilities of a given learning environment (Halverson, 2003).

Tools can be analyzed in terms of *features* and *affordances* (Norman, 1993). Designers build features into tools to signal intended uses. In mechanical tools, buttons, switches and dials are features that give access to intended uses; material tools, such as pencils or steering wheels, are shaped in ways that encourage appropriate use. For written or cognitive tools, features are embedded in the organization of text and images. The assessments included in curriculum packages, for example, are tool features to encourage certain patterns of use. Policy incentives are another type of feature that encourages users to interact with the policy in certain ways. If features are described from the perspective of design, then affordances are described from the perspective of use. Affordances reflect how users perceive artifact features. Often user affordances align with the feature intention; but just as often, the affordances that guide use will differ markedly from the intended features. Teacher compensation policies, for example, are often designed to strengthen school capacity for instruction by rewarding exemplary teaching performance. In practice, pay-for-performance policies can reveal the tension between individual and collective perception of policy features, can erode organizational capacity and contribute to dysfunctional school cultures (Odden & Kelley, 2002). Creative instructional leaders work in this gap between feature and affordance by using tools in ways that reflect and go beyond the intention of tool designers; and by building tools that effectively shape new practices to improve instruction.

Routines. Over time, the patterns with which actors use tasks and tools emerge as *routines*. Routines are paths of task enactment that allow actors to focus attention on the

recurrent issues involved with maintaining the environment (Spillane & Coldren, 2011). Organizational routines emerge as actors habitually interact with certain tools around certain tasks. Over time, routines come to define organizational practices as well as organizational cultures. Routines are the building blocks of organizational culture; and the purposive use of tools and tasks to reshape routines constitutes a powerful resource for leadership practice.

Distributed leadership. Spillane, Halverson & Diamond (2004) suggest that the distributed cognition perspective can be applied to school leadership issues so that smarter tools and interventions result. Leaders use tools and tasks to provide behavioral structures around which new routines can be built. The success of instructional leadership practice is largely determined by the degree to which leaders create and actors take up new organizational routines of teaching and learning. Leaders interested in altering existing routines and cultures must attend to how the current network of tasks, tools and routines establish and to perpetuate patterns of interaction in learning environments. Over time, the patterns of new routines that leaders foster can come to redefine organizational culture.

One problem with analyzing a network is that it is sometimes difficult to tell which tools and tasks will disclose a leader's efforts to improve a system. An approach in a distributed leadership analysis is to begin the investigation with the tools that leaders indicate as central to their work, then to observe how leadership tasks and the social distribution of practice radiate from the tools (Halverson, 2004). The indicated tasks and responsibilities then demonstrate how the situation enables and constrains action. Following this method of investigation, the distributed leadership researcher a)

determines the key *tools* used by leaders to identify the relevant *tasks*, b) describe the *social distribution* of leaders who engage these tasks, in order to c) capture the *routines* that define the situation of practice (Halverson, 2003; Clifford, 2009). Illustrating how leaders negotiate, reshape or ignore routines opens a window onto how leaders seek to reshape the local situation.

A distributed instructional leadership perspective introduces another level to the situation. Leaders need to operate simultaneously on two planes of activity in schools. First, they need to negotiate the *leading environment*, that is, the network of policies, role descriptions, expectations and traditions that define leadership practice in schools. The *leading environment* includes tasks such as budgeting, scheduling and creating a safe learning environment, creating partnerships to leverage resources and talent, and tools such as teacher evaluation forms, grade reports and school web-sites. The resulting routines of the leading environment, especially in high schools, reflect the traditions of loose coupling that separate administrative from instructional practices in schools. On a second level, leaders need to support and shape the *learning environment* for students and teachers. On this level, leaders design opportunities for professional and student learning through tasks such as monitoring instructional practices, building professional learning communities, and building coaching and assessment routines to support teaching practices. Leaders also acquire and allocate resources to support teacher initiatives on instruction change. Shaping the leading environment involves practices that lend indirect support of teaching and learning; shaping the learning environment involves practices that directly intervene in teaching and learning.

We hypothesize that an analysis of the social distribution of leadership practice in high schools will show that actors are engaged on the each of the two planes of practice. High school administrators, such as the principal and deans, will work primarily in and on the leading environment, but will also work in and on the learning environment. While high school instructional staff, such as department chairs, special educators, and learning coaches, and teachers will work primarily in and on the learning environment, but will also work in the leading environment. Further, we hypothesize that the tasks and tools of each plane will be separated into sets of routines, and that these routines may obstruct the flow of information and practice across the planes. For example, the minimal presence of administrators in classroom observation routines, as shaped by union contracts and traditions of practice, may run directly against routines of regular observation demanded as a condition for improving learning environments. Research in distributed instructional leadership can show just where conflicting routines obstruct valuable reform practices, and can provide a guide for leaders to design tools and tasks that bridge routines to support instructional improvement (Spillane & Coldren, 2011).

3. Distributed Instructional Leadership Analysis in High Schools

We illustrate the potential of distributed instructional leadership to describe the multi-level work of high school instructional reform by exploring patterns of science reform in an urban comprehensive high school. Clifford (2009) used curriculum tools, specifically the content and assessments in a biology unit, to identify which tasks were critical to tool design and use, who was involved in task enactment, and how the tools and tasks together created new reform –driven organizational practices. Clifford (2009) studied the efforts of high school leaders and teachers to develop and adopt "reform-

oriented" curricula in science. [1] In doing so, Clifford documented school instructional leadership practices in comprehensive high schools and described how actors wrestled with existing organizational routines, both in leadership and learning environments, to initiate instructional change. Clifford conducted 32 formal interviews with teachers, administrators, and other actors who were involved in the local curriculum design process to identify the tasks, actors, and tools involved in the practice of curriculum development. Clifford then created a series of representations of local practice, which were reviewed, manipulated, and eventually verified by subjects in follow-up interviews. The multi-case study compared the curriculum adoption and design processes in two different districts and high schools, and contrasted processes between reform-oriented curriculum unit adoption and more traditionally oriented adoption processes. As the proposed changes became more radical, the more tasks arose, both in the leadership and learning environments, for the school leaders interested in reform.

Clifford's study described leadership tasks of curriculum development at Woodrow Roosevelt High School (WRHS), a pseudonym. Clifford's embedded case study at WRHS contrasted leadership patterns in the creation of a reform-oriented science unit and a "traditional" science unit, the latter of which represented a change to a unit that was in keeping with the status quo instructional method in the department and school.[2] In

[1] "Reform-oriented" curricula represent a form of constructivist pedagogy that encouraged students to guide learning and teachers to act as facilitators for student learning. The term "reform-oriented" is used because, in these schools, traditional lecture and lab-based pedagogies dominate instructional practices, and the reform-oriented curricula required teachers to reshape learning environments and instructional practices. Focal units were identified through independent review of curriculum unit materials by researchers with extensive content knowledge.

[2] "Traditional" curriculum units represented the status quo instructional approach to biology at WRHS and, according to interviewees, the dominant instructional modality of the school. In this case, traditional units tended to involve lecture and student experiments. Experiments engaged

the case, the distribution of instructional leadership differed between the development of a traditional science curriculum and a reform-oriented unit, which shifted the burden of learning from teacher delivery to student inquiry.

The distributed instructional leadership analysis demonstrates several key features of high school reform. First, teachers (rather than administrators) took the lead in negotiating the situation to enact reform-based practices, thus high school teachers entered the "leadership environment" in order to create space for reform-oriented instructional improvements. The WRHS teachers, for example, negotiated access to financial and material resources by forming a partnership with university staff, and brokered changes to student matriculation patterns, which are commonly formal leadership tasks. School administrators and quasi-administrators (the department chair) actively encouraged teacher involvement in the leadership environment, and the formal leaders continued to work in that environment by brokering and buffering relationships within and beyond the school. Second, formal leaders worked directly in the teaching environment, which was uncommon at WRHS, by reviewing, contributing examples, challenging, and eventually approving curriculum materials. The teachers initially viewed administrative involvement as an incursion on their instructional freedoms, but eventually viewed the principal as strengthening the curriculum design. Administrative involvement curtailed the ambitiousness of the reform, and influenced the final design. Third, while reform-oriented curriculum revision perturbed the routines of the leadership and learning

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students in applying a sequential scientific method to investigate a phenomenon with a known result in order to exemplify concepts introduced through reading or lecture. Focal units were identified through independent review of curriculum materials by researchers with extensive content knowledge.

environments, the wider community and district reinforced standard routines by opposing and checking (respectively) the emerging reform-based practices.

All of these distributed instructional practices were made possible through the creation of a "construction-zone," that is, a third space between the leadership and teaching environments that allowed teachers a degree of freedom to discuss, try, and review new curriculum and learning processes. Though uncoupled from regular instructional practices, work within the construction zone was tightly-coupled to reform efforts through multiple, interlocking accountability and instructional tools. Creating a construction zone required teachers to conduct extra-curricular leadership tasks, such as negotiating for space, time to meet, the right to set a collective professional development agenda, and the need to integrate external (university and professional organization) networks into local instructional decisions. The reform-oriented projects required teachers not only to frame and undertake leadership tasks, but also to run active interference with formal leadership pressures to conform new pedagogies to traditional expectations for teaching and learning; the traditional reforms, on the other hand, unfolded within the constraints already established by formal school leaders, and allowed teachers to focus more on instructional practices. In other words, creating a construction zone created a legitimate space for leaders to reshape both the leadership and the learning environments.

Woodrow Roosevelt High School. Our case focuses on Woodrow Roosevelt High School's (pseudonym) adoption of science curriculum reform in ninth grade biology. Woodrow Roosevelt High School (WRHS) is located in a district that served over 25,000 students, 2106 of whom attend WRHS. Like many high schools, WRHS curriculum

offerings are organized into specializations (e.g., math, science, English), and its physical plant is organized by department as well. The 11-member science department is located in one area of the school, the math department is locating in another, and the student body moves between them. WRHS does not have a ninth grade academy, block scheduling, or other structures to reduce class sizes, nor has it adopted a distinct reform model. Within the district, WRHS is considered to be an elite high school, and a place where parents want to send their kids. The majority of WRHS graduates are accepted into colleges and universities, and student test scores have remained well above the state average. But WRHS did not serve all students well.

The new school principal was concerned that WRHS was actually two schools under one roof: One school trained the motivated and college bound and the second school provided a watered-down curriculum to the non-college bound.

> The context… in reality that this [WRHS] is not one school. This is the school that historically has been the academy of [the district], and the strong academic tradition... It's also the case that it has not fully come to grips with the responsibility that it has to educate all children. There are still those who would rather teach content so that children can be successful when they compete for colleges and not teach children.

Although the principal and teachers expressed concerns to colleagues, few changes in teaching, learning, and student matriculation practices had occurred to resolve the "two school" problem. WRHS had few mixed ability courses, where students with various levels of content knowledge attended classes together.

Tools. The first level of distributed leadership analysis is to determine what local leaders define as the relevant tools that would drive the intended change. Defining the learning environment and tools used will in turn define the kinds of tasks necessary to bring about change. The most important tool defines the central problem and point of change. We call this the *focal artifact,* which in this case is the Biology 1 curriculum. The focal artifact frames the scope of leadership tasks. The purpose of the existing Biology I curriculum was, according to the teachers, to introduce students to basic principles of studying biology and to prepare students for studying science through inquiry. Like many survey courses, the curriculum was broken up into discrete units that connected to a central theme. The teachers characterized the twelve curriculum units comprising Biology 1 as fairly traditional, which meant that the units involved lecture and "cookbook" science experiments that were more about finding the right answer through application of techniques than genuinely about engaging the scientific method to generate questions and theory. "Cookbook" science had been the modus operandi in Biology 1 for over ten years, according to the teachers.

New science standards, intended to guide reform-oriented science teaching, were well-known by teachers but had not taken root in teaching practices of the department. Biology 1 maintained procedures for "tinkering" or redesigning curriculum units on their own and with limited oversight from district or school administration, whereas a full revision of the curriculum would require district curriculum specialists' involvement.

Selecting the redesign of Biology 1 as the focal artifact reveals important features of the WRHS theory of action. Curriculum-level designs tend to focus on planning and design apart from the classroom, as opposed to, for example, peer teaching, assessment

reform, collaborative evaluation of teaching practice or a number of other possible paths for classroom-level change. By situating leadership (i.e. designer) action apart from the classroom, curriculum design efforts fit into, and frequently do not challenge, the existing loosely coupled administrative-teaching structures. (This proved to be the case at WRHS, where teachers (and administrators) dealt with conditions around, but not within, the classroom as significant leadership tasks).

Tasks. A distributed leadership analysis of the WRHS science department design revealed how curriculum redesign was organized, and how leaders fit the process in (and around) the existing constraints for professional interaction within the school. The analysis revealed four cyclic macro-tasks as the core practices of WRHS science reforms:

1. *Problem-setting*: Recognizing that the existing curriculum was problematic, and determining a course of action;
2. *Negotiating control of resources*: Assigning leadership and leveraging time and funding for reviewing, experimenting, and purchasing materials;
3. *Design*: Writing the new curriculum;
4. *Feedback*: Proposing a new curriculum design that addresses the initial problem, getting feedback from peers and others.

These macro-tasks described routine procedures that had been developed, over time, among the science department staff, and formed a context for curricular reform, and produced newly-designed examples of very traditional teaching. "Tinkering" that produced traditional curriculum units followed this four-stage cycle. The case displays how the design of a reform-oriented curriculum unit prompted more work and different

tasks than the standard curriculum design procedure. Each of these extra tasks further taxed leaders' resources (e.g., time, finances, staff) and added to the overall workload.

Task 1: Problem-Setting. The first task, according to the interviewees, was to establish that a problem existed (problem setting) with the current instructional approach that would legitimate a ground-up revision of a curriculum unit. A small section of the science department teachers who taught Biology I routinely met as a group to adjust curriculum units as problems were identified, and these teachers identified the need to develop a reform-oriented curriculum. The traditional approach to problem-setting was to adjust the existing curriculum design by introducing a new unit, eliminating another, or experimenting with a new interactive activity. As they considered the learning equity issues that called for change, they began to move in the direction of whole-scale curricular reform. One Biology teacher noted:

> If it was just a matter of us redoing some curriculum…we could do that. We do that all the time. But we are trying to make a fundamental change, and that meant that we actually had to invite guidance and specials [education instructors] and others into it.

Several teachers were resistant to making major changes in curriculum design or instructional approaches, although they were aware and outwardly supportive of state science standards and national recommendations on instructional practices. A key leadership task of the group came to be persuading the more conservative members of the need to think about a more comprehensive curricular overhaul.

One well-respected and highly-experienced teacher noticed, and convinced others, that lower performing students in his classes—those that were not necessarily on the

"academic track"—did not perform as well, were more disruptive, and more frequently absent than other students. Over the course of three weeks, and through considerable conversation, his colleagues came to understand this problem as an instructional problem, which they owned and could change, and one that required a different instructional solution. The team agreed on a compromise (to general curricular overhaul) in which three team members would redesign a plant genetics unit to reflect "constructivist teaching," as they defined it. Redesigning an individual unit fit within the unit-by-unit approach to curriculum design that was standard in Biology I. If deemed successful, the unit could serve as an example of instruction for the redesign of other units. Proposing a solution to the entire Biology I staff was necessary because all teachers coordinated their curriculum, which meant that each teacher taught the same units on the same day. So, a change in instructional approach had to meet the approval of all teachers. Exploring the constructivist curriculum required teachers to engage in persuasive and design tasks over and beyond traditional design activities.

Task 2: Control of Resources. The second macro-task involved negotiating control of available human, material, and financial resources. Under normal circumstances, Biology I teachers negotiated the leadership of curriculum revision and allocation of resources within the department. Someone took the lead in revising curriculum; other teachers helped write and covered missed class time. People from outside the department did not normally become involved, and outsider involvement was considered impingement on teachers' academic freedoms. In the case of the reform-oriented curriculum, the Biology I teachers took the unusual step of talking to the department chair and principal about their plan. They sought administrative approval

because they anticipated that the instructional changes—which involved dissolving ability grouping and rearranging matriculation patterns—could raise parental and guidance counselor concerns. One teacher commented that the principal "was very supportive. She said something like, 'I was waiting for you to show up.' She was encouraging of it and supportive." Another teacher said:

> Quite honestly, I think right now the administration here, the new administration, looks at our program as a model for other departments to take a look at. So we, they're aware of what's going on. But support beyond that really isn't there and they don't come up and talk to us about what kind of curriculum we should be teaching. They put that in the hands of the people that are familiar with the subject matter and trust that they're going to do the job that they should.

The principal and department chair fully approved of the design, and provided funding to purchase the teachers' time. In addition to administrative approval for curriculum redesign, the Biology teachers consulted with a university professor, who had access to low cost curriculum materials and was known for his innovative teaching. These two tasks (negotiating with administration; establishing external networks) added significant (and non-compensated) work to the teachers' already crowded assignments.

Task 3: Curriculum Design. Curriculum design in traditional reform tasks typically involved an individual teacher or a sub-committee of the Biology I teachers working closely together to review research on science content, adapt existing curriculum materials or invent new materials, and pilot test the unit to ensure that materials functioned predictably and learning targets were met. Although the district central office

and local intermediary agency maintained staff to assist teachers with curriculum design, the Biology 1 teachers opted not to tap these resources for assistance because these "external" consultants were not, in their opinion, sufficiently oriented to Biology 1, WRHS students, or science content. One teacher noted:

> Why would we turn to them [district staff] or support? We have never worked with them on curriculum, and [district curriculum specialist] isn't a biologist. We just haven't used them as a resource, ever.

The routine unit redesign process involved a small group of biology teachers working with new and existing curriculum materials and research downloaded from the Internet.

For the reform-oriented curriculum design, the biology teachers sought additional advice and resources. According to one teacher, "We knew about the standards, what the words were about, but we were looking for some ideas about how to structure units so that they worked for us." The Biology 1 teachers brokered a partnership with a local university professor, who agreed to provide free curriculum materials and consultation for the revision of the reform-oriented unit. One teacher commented:

> You need someone who tells you that this is possible or not possible here, and how to do it. We weren't looking for someone to design the project, but we needed someone to say whether or not we were on the right path because we don't have time to go down the wrong path. We need to know if something will work. [The professor] was nearby and available. He offered materials that we could use, and we knew that he was interested in really getting kids to do inquiry in the classroom.

The professor, a noted biologist and curriculum materials developer, viewed the partnership as an opportunity to assist teachers in making instructional decisions.

The biology teachers also secured additional time and funding by leveraging organizational resources:

> We knew pretty quickly that the [reform-oriented] would take more time. In part, it was because we didn't have much in place as a model, and we had to build the lessons and learn the content and materials. We were starting from scratch with a new approach to teaching.

The routine curriculum redesign procedure within the biology department reduces the teaching burden for curriculum designers by eliminating need for lesson preparation. Other teachers agree to prepare lessons while designers are rewriting curriculum. However, the biology teachers successfully leveraged a "mini-grant" from the district for planning time during the summer.

At the request of the principal, the biology teachers also met with the guidance and special education departments to revise student matriculation procedures in order to provide for mixed ability groupings. According to one biology teacher, "We had never met with the guidance department or special ed to talk about student schedules. We just took the kids that they sent us. Student schedules, those were more administrative [decisions]." The committee work required the biology teachers to work across the organization, with administrators, to redesign student schedules and provide for mixed ability groupings.

The Biology I teachers repeated the design routine three to four times per year, but not all design routines resulted in a ground-up unit build. Most redesign involved

tinkering with existing lessons and tended to replicate traditional, "cookbook" lessons, which, in several teachers' views, did not engage students in constructivist learning.

Task 4: Generating Feedback and Buffering Criticism. The final step in the design routine involved getting feedback from Biology I colleagues. Toward the end of the design cycle, the design team presented and explained the revised unit to the larger Biology I group. This final step served as a quality control, and frequently involved challenges by teachers. In keeping with the routine of "instructional freedom" within the school, teachers were responsible for assuring lesson quality. Because all biology teachers taught the same lessons at the same time (i.e., a "coordinated curriculum"), all biology teachers reviewed new lessons. One teacher commented:

> Well, I guess, mainly at that point they [other biology teachers] were raising questions about the plants and the science. We had [professor] here, which was valuable because he could jump in with an answer to the question. And, of course, there are always questions about the materials, and how well they worked. If they didn't agree to it, we would have to go back to the drawing board.

As a matter of routine, the design team had to make changes to newly designed units and either re-present it to the group or choose to end the redesign process.

The reform-oriented curriculum involved more challenging feedback from a variety of sources, which the teachers initially viewed as unwelcomed but in retrospect they believed strengthened the curriculum design. Parents and the principal raised concerns that the reform-oriented curriculum lacked rigor, and would not expose students the content that they needed for success in college, and engaged in the teaching

environment to influence curriculum design. Teachers were placed in the leadership position of buffering criticism. One teacher noted:

> When parents began to call and question grades, the biology team knew the most serious challenges were yet to be voiced. … After all, the status quo worked very well for some. Status quo voices were loud. [WRHS's] biology team could only answer with what they knew was right as educators. But they needed facts to support their beliefs.

Another teacher commented:

> I had a parent come in for parent-teacher conferences. This was a professor whose kid is in one of my classes. Pretty well respected. And, so, naturally, you know, it came up again about, well, he, you know, had been looking over the homework and the book, and pointed to some problems with the book—which I appreciated—but he didn't see the point in spending so much time on genetics investigations at this level. So, you know, I pointed him to the science standards and said, well, that's what we're supposed to be teaching to, and that's how they say that we're supposed to be teaching. I don't know if he was happy with the answer, but he went away.

During the pilot phase, a small group of vocal parents raised concerns that the new unit, and the instructional approach generally, was not rigorous or challenging for their college-bound students. The parents noted that the new unit exposed students to less content, and that the unit did not adequately prepare students for university-level coursework. The principal required teachers to defend the reform-oriented teaching

approach. To fend off this administrative challenge, the Biology I teachers cited research, conducted an action research project, and noted university involvement. The Biology I teachers also re-designed the constructivist units by adding extended learning opportunities for highly motivated students to deepen knowledge or understanding of content. At the principal's encouragement, the Biology I teachers conceded a "gifted and talented" section of Biology I.

The task analysis leads to an account of the kinds of work involved in instructional reforms. At WRHS (and the other high school in the study) teachers invested time and resources into tasks necessary for new practices to gain a foothold in an otherwise traditional curriculum. Tasks such as negotiating with colleagues, meeting with administrators to allocate time and resources, and establishing external expertise networks put teachers solidly in the roles of designing (rather than working in) learning environments. The pressure to create lessons that all teachers would eventually use constrained the design activity to create a legitimate audience (Jenkins, et. al. 2007) for curricular design, and required teachers to regularly consult with colleagues about the demands and feasibility of the new design. The tasks absent from the design cycle are also notable. There was little discussion, for example, of peer observation of reform-based practices, or collaborative discussion of video-cases or student work. The design team seemed to assume that each teacher would be the best judge of reformed-lesson quality, and that each teacher's self-report would constitute sufficient evidence of the design success.

Social distribution of leadership practice. Task-level analysis discloses how leadership is distributed among actors in the organization. Because a distributed

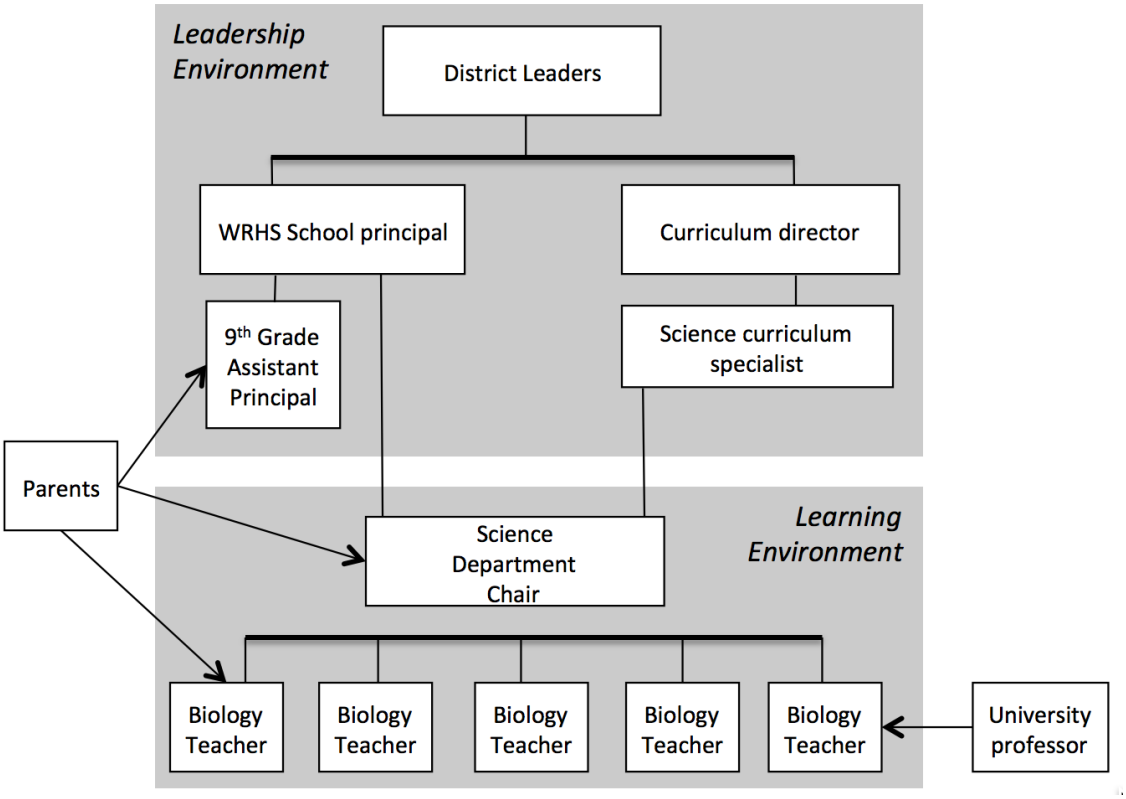
perspective follows the task, rather than the role, it captures patterns of leadership interaction regardless of the actor's position. While many actors at WRHS took part in creating conditions for the curriculum reform, several key actors emerged as leaders who initiated a range of reform tasks.

- *Problem-setting:* The two biology teachers were responsible for noticing and setting instructional problems, and proposing solutions to their colleagues.
- *Negotiating control*: The three senior biology teachers determined who would lead curriculum redesign, and advocated for additional human, financial, and material resources. The department chair and principal regulated the design process by (a) approving its launch, (b) raising questions about design quality and (c) strongly suggesting that teachers provide evidence that the unit motivated and challenged all students.
- *Design:* The two biology teachers, with assistance from the university professor, designed the curriculum through trial and error.
- *Getting feedback:* The two biology teachers and the school principal established when and how feedback on the curriculum design would be given, and what feedback was legitimate to design.

When the actors are displayed on the district's formal structure for curriculum oversight, we see that few of the district's human resources available for curriculum design and oversight were leveraged for the Biology I reform. Figure 1 represents the two levels of environments at play in the WRHS reforms. Members of the district and school administrators worked within the leading environment to support teacher's reform efforts by provide resources and buffering parent concerns. The department chairs and teachers,

working with the University professor, were directly concerned with altering the learning environment.

Figure 1: Social Distribution of Leadership



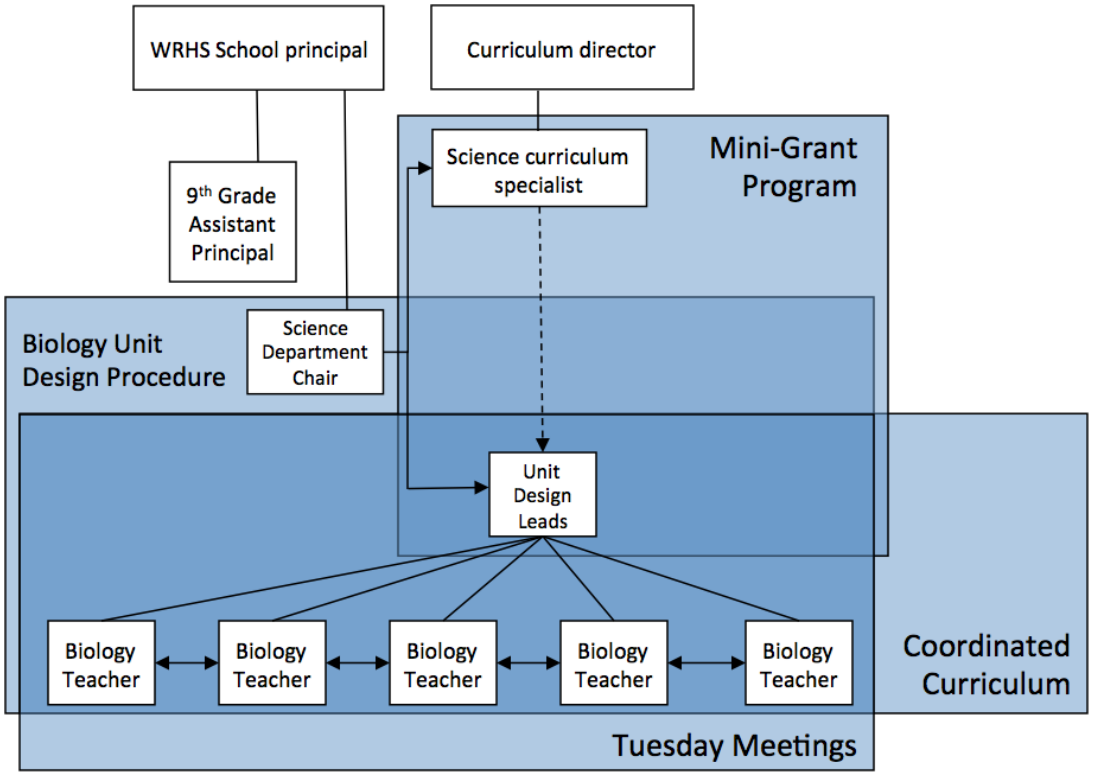
Situational distribution of leadership practice. The situational distribution of leadership practice describes and explains how the local system of practice – the network of tools, routines and traditions – affords and constrains leadership practice.[3] As Halverson (2003) describes, multiple and layered tools can create conditions for instructional improvement by tightly coupling leaders with followers, and allowing for group action and mutual accountability. Teacher leaders at WRHS assembled a series of tools designed to create a legitimate third space between the leader environment and teaching environment, or a "construction zone," that provided the resources for teachers

[3] Table 1 (appendix) lists the tools involved in the Biology I curriculum reforms.

to experiment with new approaches to instruction. Leaders developed and refined four tools central to draw the Biology I group together for work inside the construction zone. The tools, their purposes and the relationships among people created through the use of these tools are listed below and depicted in Figure 2.

- *The Biology I unit design procedure*: The Biology department maintained a procedure for unit review and design. The procedure called for a lead designer to be assigned to a unit by department vote, leader freedom to develop new units, and review/approval by the department of the final product.
- *The coordinated curriculum*: Biology I required all teachers to use the same curriculum simultaneously with students. This is a mechanism for coordination and control of teaching, but it also provides a basis for exchanging information about the quality of curriculum designs, which is essential for gathering feedback and problem-setting processes.
- *Tuesday meetings*: Biology department members agreed to meet and discuss curriculum design issues during non-contract hours on Tuesday morning and after school. Formal meeting agendas required unit leads to report out on progress and designs, and provided social space for problem-setting, deliberation, and gathering feedback.
- *District action research program*: A district-funded program that taught teachers to conduct research on their classroom interventions, and funded research studies. The district action research program was used by Biology I teachers to produce a report that buffered school administration and parental concerns about the curriculum.

Figure 2. Components of the Construction Zone



The first three tools (unit design procedure, coordinated curriculum, Tuesday meetings) tightened the coupling between Biology teachers in the department around instructional design issues. The tight coupling allowed for the launch of the design process, its oversight, and evaluation of the product. The last artifact (action research program) was used to maintain a loose coupling between the teachers' design team, administrators and parents. The action research program and other tools were used to keep "external" influencers, who may derail the design process, from interfering in the design team's process.

These tools were implemented in the context of an existing system of practice that shaped the range of tolerable reform efforts. The tools enabled teachers to establish a construction zone for innovative work that provided the space, the time, the ideas and the

resources for curricular innovation. Teachers were able to use the meeting time, the expectation of action research as a mode of professional development, and the unit design procedure to challenge traditional configurations of professional practice among one another to develop a strong sense of professional community within the department. The loosely-coupled organization model allowed teachers to develop multi-level professional interaction within the context of the existing system of practice. As teachers began to move toward more reform-oriented innovations, however, they began to feel the constraints of the existing system of practice press on their newfound professional community. This pushback revealed the tension points that provoked reaction from administrators and pressed teachers to rein in reform efforts.

In the WRHS case, the construction zone limits were tested in two areas: parental reaction to reform-oriented curricula, and the maintenance of external partnerships. In the WRHS high school context, significant pressure arose as parents began to question the legitimacy of the reform-oriented practices, and teachers were asked engage in the additional tasks of providing evidence for innovation quality in the midst of implementation. Maintaining external partnerships tested the limits of the construction zone in a different way. The professional community of science teachers benefited from having several members with strong ties to local university-based scientists and science educators. The external experts, however, were not familiar with the constraints of the local system of practice, and often advised WRHS teachers to engage in practices beyond what was regarded as acceptable. The pressure to engage in reform-oriented practices beyond the experience of WRHS teachers, paired with parental pressure to justify the

changes, overloaded the Biology teachers with enough expectation and additional work to stall the reform process.

As with prior research on the added burden of teaching for understanding (e.g. Cohen, McLaughlin & Talbert, 1993), the penalty for pushing the limits of the existing system of practice was more work for the teachers involved. A distributed instructional leadership analysis demonstrates just where the pressure emerges in the case of science curriculum reform, why administrators reacted at this pressure point, and how teacher leaders reacted to the pressure. Specifying the actual emergence of conflict and the occasions for additional work can help inform the design of future innovations by allowing practitioners to anticipate reform-based issues before they arise.

5. Discussion

The above analysis demonstrates the role a distributed instructional leadership analysis can shed on a high school curriculum reform process. The case began with the identification of key tools that served as the occasion for analyzing the kind of learning environment that WRHS teachers were trying to design. The artifact analysis disclosed the main tasks that occupied teachers in the traditional reform process, and highlighted the additional tasks that were elicited by the more ambitious, reform-oriented reforms. It also highlighted the different perspectives at work in the teacher-inspired reform practices. Teachers chose to work at the curriculum-design level, that is, at the level of the classroom, in order to alter teaching and learning in the school. Administrative and district leaders served as middle managers (Spillane, Diamond, Burch, Hallett, Jita & Zoltners, 2002) for the teacher-inspired high school reforms – providing support when in

the non-controversial reforms, and applying brakes when the reforms challenged parent expectations for the science curriculum.

We would like to highlight three features of the analysis: 1) how the macro-task of curriculum defined and also constrained the scope of instructional reform at WRHS; 2) how the social distribution of leadership demonstrated the role of teachers as leaders; and 3) how the situational distribution of leadership revealed gaps between the leader and learner environments.

Curriculum design as the macro task. First, curriculum redesign served as the macro-task to for WRHS reform activities. Curricula are common artifacts for focusing science teaching and learning reform (Schmidt, 2003; Halverson, Feinstein & Meshoulam, 2010). Curriculum—lesson plans, textbooks, assessments, teacher guides, and other artifacts—provide a ready-made structure for teacher and student interactions with content, and signal to teachers what should be taught and how it should be taught. (see, for example, Ball & Cohen, 1996; Tyack & Cuban, 1978; Davis & Krajcik, 2005; Barab & Leuhmann, 2003). Choosing curriculum-level design, specifically the redesign of an existing course, afforded a common framework and vocabulary for WRHS staff while also constraining collaborative action to focus on planning and design activities. Curriculum design activities are situated between adapting materials from outside the local context (e.g. buying new textbooks; adopting new programs) and engaging in the active design of new materials. Curriculum design, in the WRHS case, created a legitimate frame for action, and defined the tasks that would organize the subsequent design team activity.

Choosing curriculum reform as the focal task for reform also has limitations. Despite considerable investments in curriculum design and diffusion, curriculum reform has not proven a particular effective mechanism for changing practice in science (c.f. Resnick & Zurawsky, 2005). Curriculum-level designs tend to focus on planning and design apart from the classroom, as opposed to, for example, peer teaching, assessment reform, collaborative evaluation of teaching practice or a number of other possible paths for classroom-level change. By situating leadership (i.e. designer) action apart from the classroom, curriculum design efforts fit into, and frequently do not challenge, the existing loosely coupled administrative-teaching structures.

The WRHS commitment to curriculum reform as the focal task illustrated a fissure in the learning environment plane between teaching, on the one hand, and learning on the other. The WRHS staff showed little interest in integrating the perspectives (or reactions) of students in either the design or the teaching process. Student engagement in the curriculum design was absent from administrative or teacher perspectives. Recent research into high school reform (e.g. Young et. al., 2011) or informal learning environments (Jenkins, Purushotma, Clinton, Weigel & Robison, 2007) emphasizes student involvement in assessing and constructing learning environments. By overlooking the perspectives of students, the curricular focus of the WRHS teachers and leaders can run the risk of becoming just another reform task among the adults in the building – a gear that turns no wheels.

The role of teachers in WRHS reform. The *social distribution* of tasks revealed how the reform-based science work included more actors, and a wider variety of tasks, than the traditional curriculum design work. Under traditional curriculum redesign

conditions, the teachers reshaped the learning environment within the exiting leadership context. In other words, the traditional reform conditions respected the existing loosely coupled system components. The principal's "loose-tight" (Sagie, 1997) configuration of control in the traditional situation led her to delegate control over the instructional process to provide teachers a high degree of freedom from school or central office oversight while controlling the organizational boundaries to buffer teachers from parental inspection of the instructional change process. In the reform-oriented design situation, the tasks brought the routines of the leadership and learning planes into conflict. The more ambitious curriculum reform pressed teachers to alter their day-to-day teaching practices.

Motivated teachers were excited at the possibilities of trying out new practices, but some teachers and parents were skeptical of the value (and the costs) of the reform-based curricula. At first, the negative reaction of parents led teachers and administrators to buffer criticism of the reform-oriented curriculum. Teachers were called upon to address criticisms because they were most familiar with the content area and reforms. Then, as the reform progressed, and as parent concern increased, the principal began to regulate curriculum by constraining the range of the design process. The principal tightened control over reform process as parents pressed teachers to justify lessons that deviated significantly from the college-prep biology curriculum. As the reform-oriented curriculum bumped up against parental expectations for traditional biology course outcomes, the principal pressed teachers to produce credible evidence that reform units were as effective as the traditional units they replaced. Left alone, the teachers did not consider the need to produce evidence of program success as a feature of the curriculum design routine. The relation between teachers and formal leaders thus changed as a

function of the reform task. Our analysis revealed how the competing goals of between leadership (e.g. buffer external criticism) and learning environments (e.g. improve student opportunities to learn) demonstrated the limited value of generic statements such as "leaders must support instructional initiatives" by showing just how the task structure shifts the social distribution of leadership action.

Bridging the gap between leader and learning environments. In the first part of the paper, we introduced a distinction between leader and learner environments. We argued that leaders work *in* the leader environment, and work *on* the learner environment. The WRHS case showed that teachers worked in the liminal space between leader and learner environments by seeking to draw resources, permission and the room to work from the leader environment in order to influence the learning environment. The case documented how teachers worked to create a legitimate space for interaction, what we called a construction zone, which was outside the classroom but not included in the formal administrative work world. The case supports Siskin (1994) and McLaughlin & Talbert's (2001) conclusions that, unlike elementary reform, instructional leadership in high schools are located with teachers in subject areas or sub-specializations. Teachers used the tools of curriculum reform and professional community to create resources and space for a construction zone for innovation. The case also illustrates how the existing leader environment was challenged as teachers pushed the construction zone into reform-based teaching with the help of external experts and in the face of challenges from formal leaders and parents.

Identifying departmental level tasks and teacher-leaders may well be the key to analyzing curriculum-driven instructional high school reforms. If, as we suggested above,

the learning environment should be thought of as a combination of teacher and student planes, then distributed instructional leadership tools could also be used to describe tools that facilitate interaction across this wider range of high school instructional practice. By the time they reach adolescence, students control their own learning, and their peer cultures and affiliations in large part shape their motivation to engage in school learning as well as defining their learning environments. Seen from this perspective, the role of tools and practices such as extra-curricular activities, the scheduling and counseling activities of guidance departments, and the design of distributed technological environments could play a crucial role in understanding effective high school instructional leadership. Each of these domains call for different kinds of leadership support and, depending on the roles their leaders play in the school, can be designed to align with, or be independent of, the instructional system of practice.

Conclusion. Our use of distributed instructional leadership is intended as an analytic, rather than a prescriptive, framework for considering school leadership. We argue that careful accounts of social and situational distributions of practice that articulate leadership tasks as identified through relevant tools provide the kinds of understanding that can better situate reform efforts. Clifford's case provides a powerful example of the possibilities of using distributed instructional leadership to better understand high school reform. Connecting the widely distributed leadership tasks in high schools allows researchers and practitioners to get a handle on how local systems of practice arrange leadership work, and point toward potential opportunities for design leverage. Multiple cases of practice could be developed to contrast the work of high school leaders across different school situations (e.g. urban, rural, suburban) or types of schools (e.g.

elementary). Such studies could provide instructional leaders with strategic cues for reform, and deepen our understanding of high school organizational dynamics. The distributed instructional leadership framework can then be used as a diagnostic system for both practitioners and researchers to reveal the occasions for effective change. Careful analysis could then result in better prescriptive models, and could provide the kinds of knowledge necessary for reformers to design more effective environments for high school teaching and learning.

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