

Teacher Professionalism and the Emergence of
Constructivist-Compatible Pedagogies

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ABSTRACT

This paper examines the relationships among teachers' role orientation, the school culture they experience, and their personal teaching practices using information from a national sample of 4,000 teachers across 1,100 schools, including schools involved in major reform programs. We found that where teachers had a collaborative role orientation rather than solely a classroom focus and where a professional culture emerged schoolwide, teachers were more likely to report engaging in teaching practices consistent with current constructivist reform ideas. In addition, collaboratively oriented teachers were more likely to report recent changes in their teaching towards constructivist practice. Teachers with an orientation limited to their own classroom and teachers in schools with a more traditional school culture of individual teachers engaging in private practice were more likely to have classrooms in which teachers emphasized curriculum coverage, knowledge transmission, and skills practice through direct instruction.

The findings suggest that teachers who are engaged in collaborative professional activities extending beyond their classroom are more likely to have their students work in collaborative ways as well. Teacher who are engaged in constructing new understandings among their colleagues are more likely to encourage their students to take an active role in knowledge construction.

INTRODUCTION

Research on professional development argues that instructional reform is most successfully accomplished when a practitioner culture emerges that recognizes the need for change and takes responsibility for that change (Darling-Hammond, 1997; McLaughlin, 1990, Little, 1993). Such a culture may be fostered by outside agents such as school reform design teams (Stringfield, Ross & Smith, 1996), through strong leadership by a principal (Meier, 1996), through university partnerships in action research (University of California Office of the President, 1997), or through efforts to develop networked "learning communities" (Riel, 1998a; Schlager, Fusco, & Schank, 1998). But the *professional* culture that emerges is claimed to be quite distinct from what usually prevails when a district-directed, knowledge-transmission "staff development" approach is used to "train" teachers. Moreover, changes in teachers' pedagogy that might be superficial when they are externally mandated or where the sense of "being trained" is conveyed, may be more successfully accomplished when teachers play a central role in developing the rationale for the change, constructing the strategies for implementation, and choosing the resources to be used.

The notion that instructional reforms will follow from organizational reforms is not totally self-evident (e.g., Weiss, 1993). Individual teachers may not have the breadth of knowledge or organizational skills needed to implement extensive reform. It would be valuable, then, to have systematic evidence that relates the extent to which a professional culture has emerged among teachers in a school with the nature of teaching practices that occur there.

In this paper we use teacher responses in a large national survey to examine teachers' individual orientation to the work of teaching from private practice to collaborative practice as well as the school work culture that prevails in their environment. We characterize work orientations that focus on a teacher's own classroom responsibilities as "private practice" and

those that include large elements of professional interaction and leadership as “collaborative practice.” We characterize school cultures as being on a continuum from a “bureaucratic culture” to a “professional culture.” We relate both work orientation and school culture to teachers' personal beliefs (philosophy) and to their instructional practices (pedagogy). Table 1 summarizes the parallels that we examine among these four dimensions of teaching.

Insert Table 1 about here

Our interest in studying teachers' orientation towards teaching and the collective orientation of a school's teaching staff–school culture–is because such variables may be levers for changing teachers' philosophies and pedagogies: We want to know if teachers who engage in collaborative exchanges with their peers within schools that support and reward this behavior teach differently than teachers who work in isolation. If this is so, it might help in understanding the process of reframing teachers' beliefs about what is good and bad teaching and for reforming the practices they follow as they confront classes on a daily basis. We are particularly interested in the relationship between these orientations and teaching that derives from constructivist theories of learning.

Before we describe how these four dimensions were examined, we discuss existing research and theory related to (1) teachers' orientation towards the teaching role, (2) aspects of school culture affecting teachers in particular, and (3) the relationship of teachers' role orientation and school culture to teaching philosophy and practice.

RATIONALE AND CONTEXT OF THE RESEARCH

Orientation of Teachers to the Teaching Role

Teachers vary in terms of how they conceptualize their role–their duties and responsibilities as teachers. Some teachers view their work as taking place solely within their classrooms in what is essentially an isolated, individual practice. They are content to let

educational decisions about curriculum, policies or standards be made by outside experts and focus their work on implementation issues. Others view their responsibilities as extending beyond classroom teaching to include participation in a larger community of educators and administrators. They see their role as including decision makers around significant issues in teaching and learning. Although few teachers see teaching exclusively in one way or the other, it may be useful to think of this contrast as a continuum from private to collaborative practice. How teachers define their role will determine how they spend their limited time both in and beyond the classroom.

Private Practice

Traditionally, the job of teaching involved accepting sole responsibility for the education of a small group of students over some period of time, often working alone. As schools grew in size, the organization shifted to graded classrooms for younger students and subject-specific courses for older students, and to having more teachers and students in the same school building. But the structure of one teacher to each class of 15 to 35 students has remained remarkably uniform. Some teachers orient almost exclusively to their assigned students using what they have learned in the past to structure their lessons. Some teachers use their autonomy to implement their personal theories about teaching and learning in their subject-area while others use the closed door to hide their difficult struggle with the complexity of teaching. In either case, to ask for or offer help risks assumptions of incompetence or interference with the autonomy of others.

Teachers with a private orientation have little time for meetings, conferences, or other forms of professional engagement. Novice teachers learn through practice without the benefit of the vast knowledge base of more experienced teachers. Experienced teachers are often seen as

resisting change while asserting their right and independence to establish goals, design curriculum and structure their own approach to teaching (Lortie, 1975).

Low student achievement behind closed doors led to a basic mistrust of teachers by curriculum designers in the '60's, by accountability-oriented reformers in the '80s, and more recently by some technology advocates (Winn, 1989). One solution was the design of "teacher proof" learning materials where teachers were directed to follow step-by-step recipes or formulas with little or no need for experimentation or invention by teachers. More recently, highly interactive technology supported learning materials have been promoted as the solution to poorly educated teachers or teacher shortages (Bork, 1996). Implementation of these programs and procedures does not call for extensive collaboration among teachers and in fact encourages a low evaluation of teachers as professionals.

Collaborative Practice

A contrasting orientation to teaching is seeing it as a collective endeavor by professional educators rather than a private practice of individual teachers. Teachers at this end of the "orientation to teaching" continuum see their responsibility simultaneously in terms of their relationship to their students and to a larger educational community¹. What happens in any single classroom is the concern of all teachers as their success is only possible through collective, interdependent effort. Collegiality is the logical inverse of privacy and personal control (Little, 1993).

Teaching is viewed as a process of continual, reflective inquiry and exchange of ideas with other professionals which leads to the development of a shared technical language and a shared knowledge base (Little, 1993).

Teachers today are expected to prepare all students to reach significantly higher academic standards than have ever been attempted in this country (Murnane & Levy, 1996). The student populations that teachers are asked to work with are diverse and have complex learning needs (Mehan, Villanueva, Hubbard & Linz, 1996). The range of methods and approaches and the theories of teaching and learning demand extensive intellectual preparation and continual learning on the part of teachers (Wiske, 1998). Teaching expertise can grow from a process of inquiry through experimentation, reflection, analysis and benefits from an exchange with others engaged in similar processes. In this view, a individual teacher can never know enough to warrant closing the classroom door.

Collaborative practice encourages dialog over research findings, sharing ideas from conferences and collective work to evolve the most effective strategies for reaching consensus about good teaching practices. When teachers with this orientation experience pressure from contradicting recommendations from school, district or national policies they work collectively to formulate a collective synthesis rather than expecting each teacher to resolve the conflict individually. Teachers who adopt a collaborative stance toward teaching are more likely to build a professional identity than those engaged in private practice. This professional identity includes publishing papers, offering workshops and speaking at conferences. They view their relationship to other educators within and beyond the school as an important determinant of the quality of student learning in the classroom (Glazer, 1999).

Teacher Role Orientation as Patterns of Interaction with Other Teachers

These two contrasting orientations will affect the form of interaction teachers have with their colleagues as well as the way teachers benefit from educational opportunities. In this study, we look at the nature of teacher interactions with other teachers at the same school, with teachers

and educators at other locations, and with the larger educational community, particularly interactions that suggest professional leadership in that community. We will use these markers to identify teachers who view teaching as a collaborative practice and contrast such teachers with those whose lack of interactions with other teachers suggest a more private practice. We then examine how the presence or absence of social relationships within and beyond the school affect teachers' own classroom teaching.

School Culture

School culture is one of the most powerful variables affecting teaching and learning (Fullan & Hargreaves, 1996). While many factors contribute to creating the whole school culture, in this paper we will be focused specifically on those that define the context of work for teachers--the collective philosophy of teaching at a particular school--and not those created by the students. Schools, like all social organizations for work, have cultures that reward, foster, discourage, or constrain the actions of teachers. Those cultures are partly determined by policies and practices of school leaders, by the recruitment of individuals into various positions in the organization, and by a pattern of expectations that emerge from the interactions of participants.

Just as teachers' work orientations contain varying mixtures of attention to their own classroom practice and interest in and collaboration with other teachers' practices, so to, school cultures vary between those with a more restricted definition of the teacher role and those that encourage and facilitate teachers' broader involvement with peers in their school or beyond. These two poles of work culture are embodied in contrasting organizational structures that are designed to address two fundamental needs of social organization (Aldrich & Marsden, 1988). Hierarchical, bureaucratic structures are characterized by differentiated roles and responsibilities which enable individuals to take clear and authoritative actions based on the expertise that comes from specialization. However, autonomous decision-making may create a norm of private

practice—of non-interference. In contrast, participatory and fluid organizational structures evolve from the goal of integrating individuals into a cohesive common culture. Such structures produce norms of collaboration, mutual assistance, and collective responsibility and decision-making.

Bureaucratic Culture

The expectation that teachers' efforts will be almost entirely directed towards improving student outcomes in their own classroom is consistent with a hierarchical and bureaucratic organizational structure. The public school system came of age during an era in which most productive enterprises were characterized by highly specialized job responsibilities, centralized decision-making, detailed regulation through universalistically defined procedures and rules, and standardized work routines. In this organizational structure, which remains as the dominant form of schooling, the curriculum—an ordered set of courses, topics, and skills which all students are expected to learn—is defined by state and district education specialists. The teacher's job is to present information and explanations about those topics and skills to their individual classes of students and to establish a routine of clearly defined activities that efficiently enable students to master the prescribed facts and skills. Tests are used, not just to judge whether students have mastered what they were taught, but as part of an effort to sort students homogeneously into grade levels, programs, and classrooms. These efforts to specify uniformity in content and tasks across classrooms and to manage diversity by creating homogeneity within classrooms rest on an implicit assumption that effective schooling depends on having the right content transmitted to the most appropriate students at the best time.

The school culture that prevails is one that gives each teacher relative autonomy over a class of largely procedural decisions but at the same time restricts him or her from involvement

in fundamental curricular and organizational decisions. School principals, district administrators, local school boards, and state and national policy-makers set the course of action for teachers. They set educational standards, develop frameworks, evaluate materials and mandate the use of specific textbooks. A highly specified, systematic curriculum is viewed as crucial to address the high mobility rates of families with children. This common curriculum is the cultural capital that needs to be distributed to all students in order to reduce the strong effects of socio-economic inequalities on educational outcomes (Hirsch, 1996). High performance on standardized tests drives the system of education encouraging a focus on content knowledge that is easily tested. Raising test scores is viewed as evidence of increased quality of teaching and learning.

Such a structure is highly functional for certain aspects of the educational enterprise. In particular, it provides a supportive environment that encourages teachers with limited pedagogical preparation or skill to successfully transmit factual knowledge and procedural skills. To be successful, all teachers must be motivated to follow federal, state, district and state mandates and programs and implement them at the classroom level. They need to motivate their students to do the required work. However, as new conditions emerge that challenge the ability of autonomous teachers following externally developed scripts and procedures to accomplish academic goals, a climate of “school reform” is likely to develop.

The most common approaches to reform—admonishing teachers to teach better, raising the stakes for failure, implementing new standards for student achievement and new tests to measure it, and even raising salaries and improving working conditions—do not challenge the bureaucratic school culture (Hirsch, 1996). Instead, these reforms are implemented in order to increase efficiency and success. However, others argue that a wholly different school work culture is necessary for the goals of reformers to succeed --a professional culture.

Professional Culture

At the other end of the continuum from schools enmeshed in a bureaucratic culture are schools where the work culture supports intense teachers' interaction over the school's mission, goals, curriculum, and even over teachers' instructional practices. It is a model where individual practitioners give up some degree of procedural autonomy in exchange for involvement in negotiating the larger principles and priorities of the educational enterprise. The image is one of professionals planning their enterprise, sharing beliefs that they, as well as students, are learners, in an evolving structure adapting to individual needs and changing circumstances.

From this perspective, teaching requires continual learning and adaptation with improvisational characteristics requiring quick judgements that cannot be scripted ahead of time (Engestrom & Middleton, 1996). Decisions are based on a guiding philosophy about teaching and learning, a deep understanding of current political and social issues, and a thoughtful sensitivity to learning needs of students. Teaching is a complex integrated whole --one that cannot be decomposed into subsystems mastered one at time in workshops and used as formulas in practice. Instead, teachers need to pool evidence, discuss possibilities, and formulate learning experiences tailored to the changing needs of their specific student population. In doing so, they create a shared knowledge base, common beliefs, and values about the institution of schooling making it possible for novice teachers to benefit from the experience of the collectivity (Brown, Greeno, Lambert, Mehan & Resnick, 1999).

Today's large comprehensive schools allow for an economy of scale, but teachers have limited opportunity to develop broader understandings of the educational enterprise. Powerful norms of privacy, coupled with a practice of having teachers teach all day, tend to confine teachers' own intellectual development to procedural and instructional matters. A culture of teacher-professionals drives intellectual engagement with basic issues of curriculum and school

organization. Such cultures may be facilitated by a structural reorganization of schools into small units in which teachers take broader responsibility academically and socially (Darling-Hammond, 1997). Smaller units, less hierarchically structured, and less role differentiated, make it easier for teachers and students to work collaboratively on issues that affect the whole enterprise, not just what happens in any one classroom.

Recent reform and restructuring proposals and programs have involved teachers in these forms of collaborative teams and partnership (Sizer, 1984; Stringfield, Ross, & Smith, 1996). Often explicitly modeled after new forms of participatory management in business, professional school-level teacher organization is formed to articulate a common vision and establish plans for accomplishing it. We are interested in exploring the relationship of this approach to school-wide learning by teachers and type of learning environments they structure for their students. Our hypothesis is that teachers engaged in collaborative learning organizations will be more likely to teach in ways that are compatible with constructivist pedagogy than with traditional knowledge transmission models.

Indicators of Professional Work Culture

Several aspects of school culture seem particularly indicative of the emergence (or lack of emergence) of a professional culture and we use these as markers of its existence: collaborative work among teachers; the development of common goals and priorities among teachers and between teachers and school site administrators; opportunities for teachers to learn from one another; and collective responsibility for teacher performance in all classrooms. After determining the relative tendency toward either a bureaucratic or professional culture, we look at whether teaching practices are related to school culture.

Relationship of Role Orientation and School Culture to Teacher Beliefs and Practices

Although current discussions of teaching reforms touch on a wide assortment of instructional practices, our examination of the conversation suggests that most of them either explicitly or implicitly derive from theories of learning that can be grouped under the rubric of "constructivism" (Brooks & Brooks, 1993). Educational theorists such as Dewey (1916), Piaget (1952), and Vygotsky (1978) provide a rationale for "constructivist-compatible" teaching practices including, for example,

- designing activities around teacher and student interests rather than in response to an externally mandated curriculum,
- having students engage in collaborative group projects where skills are taught and practiced in authentic contexts rather than in a sequence of textbook exercises,
- focusing instruction on students' understanding of complex ideas rather than on definitions and facts,
- teaching students to self-consciously assess their own understanding, in contrast to multiple-choice testing
- modeling learning, rather than presenting oneself as fully knowledgeable.

These constructivist-compatible instructional activities are quite distinct from a "transmission" view of learning that emphasizes teacher-centered whole-class explanation and closely scripted student seatwork, and which suggests that students acquire concepts and skills through listening, copying text, and practicing sets of similar problems (Pea, 1996).

How teachers organize their classes to a large extent reflects their beliefs about good teaching. Nevertheless, their practices, and to a lesser extent even their philosophies themselves, are subject to influence based on their continued experiences in teaching, the values and opinions

expressed by their peers around them, and by the expectations of influential others which are transmitted to them through formal rules and procedures and informal norms (Glazer, 1999).

Our study examines the relationship between differing teacher orientations towards teaching and the influences of school culture and teachers' pedagogical beliefs and practices. In particular, we investigate the following questions:

- To what extent are teachers who are actively engaged in a professional community more likely to employ constructivist-compatible teaching practices than teachers who see their role as primarily one of implementing curriculum in their own classroom?
- To what extent is working in a school culture that is professional and collaborative associated with more constructivist teaching practice?
- To what extent are teachers who have a professional orientation and who work at a school where a professional culture prevails more likely to report recent changes in their pedagogy in a constructivist direction?

DATA AND METHODS

Source of Data, Sampling, and Weighting

This study of teacher professionalism and pedagogy is drawn from data collected in 1998 as part of a national survey of teachers' use of computer technologies and their pedagogies.

"Teaching, Learning, and Computing–1998" surveyed teachers from a national probability sample of schools—898 schools stratified by school level (elementary, middle, high school)—and 718 additional schools selected either because of the presence of substantial computer technology in the school or because of the involvement of at least one teacher, if not the whole school, in instructional reform activities.² In both the probability sample of schools and the specially selected schools, most of the teachers were selected as part of a probability sample from among all teachers of grades 4-12. About one-sixth of the teachers were selected with

certainty because of their participation in reform programs or their principal's designation of them as exemplary users of constructivist/cognitive approaches.³

Seventy-five percent of schools (N=1215) participated to the point of rostering their teachers for sampling. Among the teachers sampled or selected with certainty, 4,083 provided completed useable surveys, 67% of those rostered and sampled. This includes 2,251 teachers from the probability sample, 1,236 from reform-involved schools, and 596 from the high technology-presence schools.

The analysis for this paper combines the probability and the two selected samples in such a way as to take account of the sampling weights of different schools and different teachers in the same school. We also maintain the balance in total numbers between the probability sample (55% of the total sample) and the two selected samples.⁴

The teacher respondents were asked to complete a survey booklet about their teaching practice, teaching beliefs, and their work environment that was 21 pages in length and required approximately 60-75 minutes. Four different versions of the teacher survey booklet were used, with overlapping sets of questions.

Many of the survey questions about instructional practice and teaching philosophy were validated by a prior study (Becker & Anderson, 1998). That research compared teacher questionnaire responses to field-researcher-team judgments based on three in-depth interviews and three hour-long classroom observations. Those items for which teacher responses most closely matched those made by the interviewer-observers were included in (or adapted for) the final versions of the questionnaires.

Operationalization of Constructs

Orientation towards the Teaching Role: Private versus Collaborative Practice

Teachers who define their work as primarily located in the classroom and concerned with the implementation of mandated policies (private practice) will not place a high value on interaction with their peers. The teachers at the other end of our contrast set are those who are actively engaged with their peers with some who take on leadership roles. The contrast between a private practice orientation versus a collaborative practice leading to our attribution of "professional leadership" at the upper end was measured by three multi-part survey questions:

Within-School Teacher Interaction. From one question, an index of "within-school teacher interaction" was calculated. This was the average frequency that the teacher reported having each of six types of interactions with other teachers at the teacher's own school—discussions about teaching methods, project ideas, subject-matter issues, and technology; and informal observations of another teacher's teaching and observations by another teacher of her own teaching. In addition to the average score across those six types of contact, teachers were divided into high, average, and low levels of interaction. This was based on whether their average frequency of having each of these interactions was closer to "never or seldom," "several per month," or "1-3 times per week."

Beyond-School Teacher Contact. A second survey question dealt with similar interactions—but with teachers at other schools. "Beyond-school teacher contact" was defined as how many of the following three criteria the teachers met: attending workshops with teachers from other schools at least 3 times since September; going to 3 or more committee meetings with teachers from other schools; and using electronic mail with teachers at other schools at least a half-dozen times.

Leadership. The third survey question asked about the teacher's involvement over the past three years in six types of leadership activities within the profession, including mentoring other teachers (2 measures), giving workshop presentations (2 measures), teaching college-level courses, and publishing. The number among these six activities reported by the teacher formed the teacher's "leadership" score.

School Work Culture: Professional Culture vs. Bureaucratic Culture

Teachers were asked to respond to eleven statements about different aspects of their work environment by indicating to what extent the statements described their own work situation (six-point agree-disagree scales). These statements dealt with four aspects of work environments for teachers: consensus and salience of schoolwide goals; how teacher learning opportunities were organized; the presence or absence of a collegial learning community among teachers; and teacher recognition and peer-evaluation practices.⁵

Although each teacher can provide information about his or her work environment, the other teachers at the same school are also informants about that environment. Thus, in most of our analyses, the value assigned to each teacher was not his or her own particular report, but the aggregate of such reports from all of the responding teachers at the same school. Teacher reports were averaged, weighted by the weighting value for each individual teacher, and aggregate variables calculated. Teachers from schools for which fewer than four teachers provided data were excluded from the analysis.

When we combine the eleven aggregate work environment variables reported by all sampled teachers, we get what we call School Work Culture. A professional culture is indicated by teachers playing important roles in defining staff development activities, teachers pressing their peers to improve their performance, teachers encouraging one another to try new ideas, and

discussions of school goals being a central and salient activity at meetings. A bureaucratic culture is indicated by the belief among responding teachers that those features of school work life are, in fact, absent. Each feature we consider part of the teacher's work environment; the set of features together constitutes the School Work Culture.

Pedagogy: Information/Skills Transmission vs. Knowledge Construction

To measure instructional practice, teachers were asked a set of questions that were focused on how frequently specific activities occurred in a class that they selected as an example of their best teaching. An index was constructed based on the mean scores of 25 item prompts from four survey questions:

Methods used to introduce the current unit to the class (each item on a 3-point scale): introductory drills (coded in the direction of “skill/knowledge”); and small group discussions, making conjectures, and raising open-ended questions (all coded “knowledge construction”).

Reasons given for asking students questions (5-point frequency scales): verifying if students knew the right answer and verifying if homework was done (“skill/knowledge”); and eliciting student opinion, getting students to justify their reasoning, and relating issues to students’ experiences (“knowledge construction”).

Frequency of types of assignments and class activities (5-point scales): individual seatwork, hands-on activities, weeklong projects, journal-writing, planning classroom activities, problem-solving in small groups, working on problems with no obvious method for solving, and explaining their reasoning by writing (all but the first coded “knowledge construction”).

Amount of time students spent in these types of activities (4-point scales): formal debates, designing their own problems to solve, small group discussions of procedures for solving problems, doing oral or written reflection on their own work, tasks involving multiple

representations of the same idea, making a product to be used by someone else, demonstrating work to an audience (other than their class or parents), and undertaking tasks without clear correct answers (all “knowledge construction” items). The alpha reliability for this index was .86.).

Pedagogical Change. To measure how teachers’ practice has changed over the past three years, we use a retrospective self-assessment that combines 16 items, only 8 of which were asked to any one group of responding teachers. These include both items asking about increases in traditional practices (reverse-scored)⁶ as well as those asking about increased use of practices associated with constructivist teaching.⁷ The two short subsets of items (the 8 items asked to each group of teachers) had lower alpha reliabilities than the index of current pedagogy (.66 and .58). Reliabilities could have been improved by removing some of the items measuring increased use traditional practices (3 in one subset; 2 in the other), but their inclusion lessened the impact of acquiescence response style on the indices thereby providing greater balance.

Educational Philosophy: Traditional Beliefs vs. Constructivist Beliefs

In our model, teacher beliefs about good practice is seen as a control variable in the main analysis—a clearly important determinant of a teacher’s pedagogy that needs to be taken into account when examining the relationship between role orientation and constructivist practice. Our measure of teaching philosophy comes from three survey questions, incorporating 12 individual prompts.⁸ In one question, teachers were asked to compare two teachers’ approaches to classroom discussion, one approach representing traditional teacher-directed questioning based on prior reading, the other representing teacher-led discussion that provoked questions from the students themselves which the teacher then reflected back to them for further research. A second set of questions presented paired comparisons of contrasting teaching philosophies,

each item presented as a hypothetical personal statement of beliefs.⁹ The third question involved a set of six agree vs. disagree statements (6-point scales) including statements about the importance of background knowledge as a rationale for direct instruction, the value of building instruction around problems with “clear, correct answers” and ideas “that most students can grasp quickly,” and the need to postpone “meaningful learning” until basic skills have been acquired.

An index was created by taking the mean of these 12 prompts, after equalizing item standard deviations (effectively creating standard scores for items). The alpha reliability for this index was .84, with item-total correlations of .37 to .62. For this paper, the index was divided roughly into quartiles, with teachers in the lowest quartile classified as “most traditional” and those in the highest quartile as “most constructivist” in terms of philosophy.

RESEARCH FINDINGS

The findings will be reported in three major sections, (1) teachers’ role orientation and its relationship to pedagogy; (2) school culture and teacher pedagogy and (3) the relationships among all three constructs—role orientation, school culture, and teacher pedagogy. The first two sections begin with descriptive statistics that provide a representative portrait of U.S. teachers from the probability sample of schools in our study. The discussion of the co-occurrence of attributes (e.g., the correlation between professional role orientation and constructivist teaching practice) combine data from both the probability sample and the specially selected schools (high technology presence or involvement in reform).

Teachers' Orientation Towards the Teaching Role

Descriptive Statistics

Within-School Teacher Interactions. A slight majority of all teachers have at least weekly discussions with other teachers at their school about professional matters such as teaching

methods, ideas for group projects, using computers, or news in their subject area. About one-fourth report daily interactions with their colleagues on such matters. Discussions about personal matters, unrelated to teaching, overall are only somewhat more frequent than discussions about professional issues. (See Table 2.)

On the other hand, it is also the case that nearly one-half of teachers don't have professional conversations as often as weekly, and for any given topic (e.g., teaching methods, group projects, etc.) at least 20% of teachers rarely discuss these matters with other teachers. One-fifth of the all of the teachers report visiting or being visited by colleagues to observe teaching on a regular basis (several times a month). While this is a small number, it does represent a substantial amount of professional exchange for these teachers and perhaps a change from the past where peer observation was rarely seen.

Insert Table 2 about here

Beyond-School Teacher Contact. The most common form of exchange beyond the classroom is through conferences and workshops. The vast majority of teachers participate in at least one such activity per year, and more than 40% reported attending three or more workshops or conferences during the year (Table 3). A majority of teachers participate in committees involving teachers from other schools, but such contacts, on average, are fewer than contacts through workshops. Only a minority of teachers use e-mail to interact with other teachers, and fewer than 20% do so regularly. Given the widespread access of teachers to the Internet, both at home and in their classroom (Becker, 1999), the limited use of e-mail for communicating with other teachers may reflect the limited personal acquaintanceship that most teachers have with others in their profession.

Insert Table 3 about here

Leadership. The third measured element of orientation towards teaching was involvement over the past three years in certain peer leadership activities: formal and informal mentoring, workshop presentations (using both quantity and size-of-audience criteria), teaching college courses, and publishing. Peer mentoring is the most commonly reported leadership activity (38%) while publishing is the least frequent (5%). The number of activities reported by each teacher was summed to form a 6 point collaborative leadership index. Although only 7% percent of the teachers met the participation criterion for at least four of the six activities, 20% reported participation in three or more leadership activities. These groups of teachers not only have a collaborative orientation to teaching, but they have assumed leadership roles in the education community.

Insert Table 4 about here

The Relationship between Work Orientation and Instructional Practices

In this section, we examine the empirical relationships between teachers' role orientation and our measure of transmission-oriented versus constructivist teacher pedagogy. For this analysis we have grouped the probability sample and the reform and high technology samples together.¹⁰ The purpose for including the specially selected schools in the correlational analyses is to provide comparisons of means and percentages among small sub-samples of teachers that are more reliable than when simply using the probability sample alone.

Within-school informal interaction with other teachers. We first look at the relationship between teachers' informal professional interactions with other teachers at their school and the extent to which they use transmission-oriented or constructivist teaching practices. The Within School Informal Interactions scale includes both discussions of substantive and pedagogical

issues and informal observation of other teachers' (or their own) classes. Teachers are divided into low, medium, or high frequencies of interaction. As shown in Table 5, teachers who interact frequently with their peers at their schools (14% of the teachers) are more than 3 times as likely to be in the category of "most constructivist" teachers (roughly the upper quartile on the pedagogy index) as teachers who are not involved in these informal exchanges around teaching and learning.

Insert Table 5 about here

The correlation for the interval-level analogs of the variables in Table 5 is .30.

Controlling on the teacher's personal philosophy (the constructivist philosophy index discussed earlier) and also on school level (elementary, middle, high school), the partial correlation remains a substantial .27, suggesting that informal interactions with teachers at their own school may help teachers to practice in a more constructivist manner, independently of the effects of their own teaching philosophy. Conversation and classroom observation both appear to play similarly large roles, with partial correlations, respectively, of .15 and .16, controlling on philosophy and school level.

In contrast, the relationship between within-school professional interactions and Pedagogical Change is modest at best ($r=.09$). This low correlation may indicate that this aspect of Role Orientation (i.e., interacting with other teachers at their school professionally) may be a stable characteristic that had already affected pedagogy for most teachers earlier in their career and is not as likely to influence recent changes.¹¹

Contacts with teachers at other schools. Teachers who interact with teachers in other schools through workshop and committee participation and electronic mail communication also tend to have more constructivist-compatible pedagogies than those who do not. For each of the

three aspects of interaction with teachers at distant schools, we set a criterion level to indicate substantial involvement in that activity (3 or more workshops or committee meetings/year and 6 or more email exchanges). Table 6 compares teachers who were scored as meeting three, two, one or none of the criteria. Nearly 40% of teachers who were most active in communication beyond the school (indicated by substantial involvement in all three activities) used a knowledge construction approach in the classroom, compared to fewer than one-fifth of teachers who met none of the criteria. In contrast, teachers who lacked substantial involvement in any of the three areas were three times as likely to approach education with a knowledge or skill transmission strategy.

Insert Table 6 about here

Overall, the amount of teacher contacts beyond the school was correlated .23 with constructivist pedagogy. Controlling on the teacher's own philosophy and school level taught, the partial correlation remained .14, very substantial for a variable based on dichotomous criteria for only three prompts.

In addition, contacts with teachers at other schools was also correlated with recent changes towards constructivist practice, in a way that within-school teacher contacts was not. The correlation coefficient was .17, but Table 7 displays this relationship in a more concrete way. Table 7 shows, for each set of teachers, grouped according to how many of the "beyond-school contact" criteria they met, what percentage of those teachers reported having changed the relative effort they gave to evaluating students through their products versus evaluating students through tests. So, although 83% of teachers meeting all 3 criteria reported increasing how much they evaluated students through products, only 47% of those who met none of the criteria did so. The greatest difference in the proportion increasing their use of product-based evaluation is

between those meeting two criteria and those meeting all three criteria, the latter group being only 5% of all teachers.

Insert Table 7 about here

Leadership activities. The third element of Role Orientation is the teacher's engagement in mentoring, workshop presentations, college teaching, and publishing. Table 8 shows the relationship between the number of types of these leadership activities a teacher participated in and their level of constructivist practice. Teachers with 3 or more types of leadership activities were more than twice as likely to be in the top quartile on constructivist practice as teachers who did not participate in leadership activities during the previous three years. The correlation for this relationship is $r=.25$. Controlling on philosophy and school level, the partial correlation remains a substantial $.20$. In the same way that informal interactions with other teachers at the same school may help teachers to implement constructivist approaches, mentoring, workshop presentations, teaching teachers, and writing articles also appear to support the implementation of constructivist philosophy into practice. Of course, it is also plausible that the cause-and-effect works the other way: that teachers who implement their constructivist philosophies in practice may then take the initiative to mentor, teach, and write about their accomplishments. A similar, though smaller association exists between leadership activities and recent changes in pedagogy in a constructivist direction. The zero-order correlation was $.13$.

Insert Table 8 about here

Combination of All Three Role Orientation Variables

If we combine all three measures of a collaborative orientation towards work—informal professional contacts with teachers at the same school, professional interactions with teachers at

other schools, and participation in leadership activities—the differences in constructivist practice are very substantial between teachers with a classroom orientation and those with a collaborative orientation ($r=.38$ for an integer-level variable combining the three continuous measures). In addition, the relationship between role orientation and pedagogical change towards a constructivist practice is at least modest ($r=.19$).

Tables 9 and 10 present those results using ordinal variables which emphasize, in particular, the upper-end of the work-orientation scale, collaborative leadership. We classified teachers into four groups using successively stricter criteria that combine the three role orientation variables. Only three percent of teachers met the three strict criteria¹² across the three variables and we refer to these teachers as “Collaborative Leaders.” An additional 12% of the [MRI]teachers meet a slightly less strict criteria¹³ across the variables and we refer to them as Collaborative Teachers. In some of the charts we group the top 15% together as Collaborative Teachers and Leaders (Teacher Professionals). For the teachers who met neither criteria, we divided these teachers (85% of the full sample) into two groups based on whether a teacher was above or below the mean on a continuous variable combining the three aspects of role orientation (within-school professional contacts, beyond-school contact, and leadership activities). Teachers above the mean we label as “Interactive Teachers”; those below the mean are listed as “Private Practice” teachers. Table 9 and Figure 1 help us examine the differences in pedagogy between Teacher Professionals and other teachers. They show that more than 50% of the Collaborative Leaders fall into the upper one-fourth of teachers with the most constructivist-compatible pedagogy, and more than 40% of the Collaborative Teachers do as well. However, fewer than 20% of all other teachers do, and in particular, only 13% of teachers whom we classified as Private Practice Teachers. In contrast, very few (5%) of the Collaborative Leaders are in the

bottom quartile on constructivist practice. Even when controlling for philosophy and school level, the partial correlation remains strong (.30, compared to $r=.38$).

These findings suggest a dramatic difference in teaching practice between teachers who focus almost solely on their own classroom responsibilities and those who assume leadership roles and are in frequent professional contact with other teachers.

Insert Table 9 about here

Insert Figure 1 about here

Changes in Pedagogy and Role Orientation.

We found similar results when examining what teachers said about how extensively they had changed their teaching practice during the past three years. Collaborative Leaders and Teachers are much more likely to report having made substantial changes in their own pedagogy towards a more constructivist practice.¹⁴ For example, 41% of the Collaborative Leaders appear to have made substantial changes in many of the areas we asked about (or some change in most areas). In contrast, only 11% of the Private Practice Teachers reported that level of change during the past three years (Table 10).

Insert Table 10 about here

Role Orientation and Individual Dimensions of Pedagogy--Deep Thinking and Project Activity

In addition to examining teacher pedagogy as a unitary dimension, we divided the index of constructivist pedagogy into a number of sub-scales through a series of exploratory factor

analyses. Here we present results concerning the relationship of Teacher Role Orientation to two of those sub-scales, Deep Thinking and Project-Based Activities.¹⁵ These sub-scales represent distinct components of the Constructivist Pedagogy index—one reflecting a concentration on higher-order thinking and writing; the other reflecting a focus on students doing project work, hands-on activities, making products, and demonstrating their work to an audience, as opposed to doing individual seatwork. Table 11 shows that both of these elements of constructivist practice are associated, and to very similar degrees, with Teacher Role Orientation. The Deep Thinking sub-scale is somewhat more associated with informal teacher contacts within the same school ($r=.28$ vs. $.19$) than is Project-Based Activities, while the latter is somewhat more associated with the extent of a teacher's leadership activities ($r=.24$ vs. $r=.18$). The two sub-scales have almost equal correlations ($r=.31$ and $r=.29$) with the combined Role Orientation index. These findings also hold when controlling for teacher philosophy and school level.

Insert Table 11 about here

School Culture

Descriptive Statistics

Teaching is a relationship between students and teachers, but because it takes place in the context of school organization, external forces shape what happens in the classroom. In the questionnaire, the teachers were asked to characterize a number of features about this larger context—for example, the role teachers play in defining staff development activities, how salient schoolwide goals are, how much sharing of student work occurs, and whether the normative climate encourages peer-to-peer mentoring. Each of these features is part of the teacher's perception of their work culture. But by combining features and aggregating across teachers who

teach at the same school, consensus among survey respondents and the factorial commonality of the items raise this variable to the level of "culture," operationally defining the difference between bureaucratic and professional work cultures.

Teacher Descriptions of Their School Culture. Overall, our survey found that teachers report their schools to be environments where there is substantial agreement on goals and priorities, where teachers support one another to become more successful at their work, where staff development is organized in a way that respects and includes teacher concerns, and where at least positive aspects of teacher evaluation are present. Table 12 shows the extent of agreement with eleven survey "agree-disagree" items measuring these aspects of work environment.

An overwhelming majority of teachers report shared schoolwide goals, and the existence of a learning community supporting professional growth and instructional improvement as can be seen in Table 12. For the other two aspects of school culture—the structure of teacher learning opportunities and public evaluation of teachers—the level of agreement was more mixed.

Insert Table 12 about here

Although two-thirds of teachers believe that their peers play important roles in defining staff development activities at their school, only about one-half believe that there is follow-up support for teachers to help them implement ideas promoted at those staff development sessions. Moreover, only one-third of teachers report that the set of staff development activities formed an integrated whole. Instead, most reported that each activity was discrete and disconnected. With respect to teacher evaluation, a majority of teachers did report that teachers who successfully introduce a major innovation in their teaching are given public recognition, but only one-fourth report that their school culture is one which includes challenging a peer who was not performing

well. Teachers have traditionally only been responsible for what happens within the walls of their classroom. Teacher evaluation has been largely an administrative function; however with the move to teacher professionalism comes a group responsibility to monitor quality of ones peers.

The Relationship between School Culture and Teaching Practice

Table 12 presented data from individual teachers reporting on their perception of the work culture that exists at their school. Now, as we relate work culture to teacher pedagogy, we move from individual assessment of that culture to a collective evaluation. As noted earlier, we limit the analysis to teachers at schools with at least four responding teachers, which leaves us with data on 2,893 teachers, 71% of the full responding sample of teachers.

Most of the eleven items measuring aspects of a school work culture were associated to a small degree with a constructivist pedagogy in the expected direction. That is, to some extent, teachers were more constructivist on average in schools where they and their peers reported a stronger presence of common goals, integrated and teacher-respecting staff development, positive and negative peer evaluation (public recognition of success and constructive criticism), and the presence of a learning community among teachers.

The first column in Table 13 shows the associations with constructivist pedagogy for each of the school culture variables reported by the group of teachers, for the four subscales of school culture, and for an overall measure of school culture, and for a scale composed of the five “best” items. The second column of data provides partial correlation coefficients that control on the teacher’s school level (elementary, middle and high).¹⁶ Finally, the third column of data shows a more conservative measure of the relationship between pedagogy and work environment. In this case, the work environment reported by the respondent is controlled for

(thus essentially excluded, leaving the measured work environment to be that reported by other responding teachers at the school). The reason for this more conservative measure is that since only a few other teachers contributed to the measure of work environment, the respondents themselves constitute a heavily over-represented source of data for their own environments. This alternative measure, then, provides an evaluation of the work environment completely independently of the respondent herself. School level is not controlled for in this column.

Insert Table 13 about here

In terms of individual work environment indicators, four items have somewhat stronger correlations with constructivist practice than the others:

- constructive criticism from peers
- staff development being followed up with implementation support,
- teachers sharing samples of student work,
- teachers encouraging each other to try out new ideas.

When school level (elementary, middle, high school) is applied as a control, the strongest individual indicator becomes "constructive criticism from peers." When looking solely at the work environment as defined by teachers at the school other than the respondent herself, the strongest two indicators of constructivist teaching are:

- staff development with follow-up support for implementation
- teachers sharing common beliefs about school goals and priorities.

All four of the sub-scales had positive associations with constructivist practice, although none of the sub-scales had a correlation coefficient above .14. Because the sub-scales were defined by similarity of content, and not by item reliability or factor analysis measurements, the individual item indicators may be more informative than the sub-scales, even though as single

item indicators their correlations may be attenuated greatly by imprecision of measurement.

Overall, the School Work Culture index was correlated $+0.14$ with constructivist pedagogy, although this was reduced to $.06$ when just the views of teachers other than the respondent were taken into account.

School Culture and Pedagogy subscales-Deep Thinking and Project Learning. Both Deep Thinking and Project-based Activities were about equally strongly associated with School Work Culture and its sub-scales. The overall School Work Culture index was not correlated with changes (increases) in constructivist practice, although one item, staff development follow-up support was associated ($r=.10$) with that outcome variable.

The size of these correlation coefficients are lower than those reported in the previous section regarding the teacher's own role orientation. However, it is important to recognize that, in contrast to the previous set of variables, these are based on very limited data—the responses of several other teachers, in addition to the respondent, regarding their work environments. The small sample of teachers per school, even though it is weighted to reflect their relative probabilities of selection into the sample, are only a rough indicator of the judgments of the complete teaching staff of the surveyed schools. In addition, work environments within a school might vary among teachers in different parts of the school, for example, in heavily departmentalized structures such as in large high schools.

Effects of Teacher Role Orientation and School Work Culture on Constructivist Practice

In addition to affecting teachers' pedagogy directly, school culture might affect teaching practice by changing teachers' orientation towards teaching—for example, a strongly professional teacher learning community may encourage teachers to see their role in

collaborative terms. Our final analysis examines the relationship between Role Orientation and School Culture and between pedagogy and those two variables in combination.

Overall, there is a .20 correlation between our index of School Culture and our index of Teacher Role Orientation. In other words, teachers tend to have a more collaborative role orientation when they work in schools where there is consensus, where there is peer-directed teacher learning, and where good-work is recognized and peer-criticism of poor work is accepted.

Table 14 shows how this correlation translates into percentages when both of those variables are divided into four groups. Role Orientation is categorized as before, into Collaborative Leaders, Collaborative Teachers, Interactive Teachers, and Private Practice Teachers. The measure of School Culture combines the mean score for the five ‘strongest’ school culture items (strongest in the sense of remaining correlated with constructivist practice when only the judgments of the teachers besides the respondent are considered). Those items were:

- Teachers ‘continually learning and seeking new ideas’
- Constructive criticism from teacher peers
- Staff development with follow-up support
- Similarity between principal’s and teachers’ philosophies
- Common priorities for school goals among teachers

The resulting continuous variable was transformed into four ordinal categories—representing approximately the bottom one-third of all teachers on the scale, the middle-third, most of the upper-third, and then roughly the upper 5-6 percent. That top category represents

teachers who responded with an average score of at least 4.4 on a 6-point scale, (roughly halfway between slight and moderate agreement) for all items used.

Insert Table 14 about here

Table 14 shows that as one moves from teachers who are in school cultures that lack the five indicators of professionalism (“lowest third”) to teachers where those attributes are clearly present (“top scores”), the proportion of teachers who are strongly oriented towards their teacher colleagues more than doubles, from 10% to 22.5%. Thus, at schools where teachers’ peers report a work climate that provides staff development respectful of teacher needs and expertise, where there is a common sense of mission, and where teacher peer evaluation occurs, teachers are more likely to involve themselves in professional leadership activities, and professional interactions both in- and outside their own school.

How, then, do these two factors, personal Role Orientation and School Culture, combine to influence teacher pedagogy? Our cross-sectional data suggest that each has an independent effect, but that the effects for School Culture are only really clear for the upper-end of the distribution—for schools with a distinctly professional practitioner culture. These results are shown in Figure 2 below.

Insert Figure 2 about here

Figure 2 shows the average pedagogy score (constructivist teaching practice) for teachers in each category of School Culture and each category of Teacher Role Orientation.

(Collaborative Teachers and Leaders were combined for numerical reliability.) As seen in Figure 2, Private Practice Teachers who happen to teach in schools with a strong professional culture (the “top scores” group) are as constructivist in practice as teachers who personally interact with other teachers but who teach in schools with more typical school working

cultures—schools in the “middle” and “lower third” categories where the culture is more traditionally bureaucratic. Moreover, Interactive Teachers in “top score” schools are even more constructivist in their pedagogy than Teacher Professionals (Collaborative Teachers and Leaders) who teach at schools with typical bureaucratic work cultures.

Thus both personal Role Orientation and School Culture play independent roles in affecting teacher pedagogy. The effects of Role Orientation are more obvious, but that is partly because the professional climate required for a strong professional work culture is in place in so few schools.

SUMMARY OF FINDINGS

This paper examined two dimensions of teacher professionalization—teachers’ own personal orientation towards work (professional leadership and collaboration versus strictly private classroom practice) and the extent to which their school culture supports a collaborative, professionally oriented work environment rather than being typically bureaucratic and hierarchical in nature. The role orientation of teachers was determined by responses to questions which described:

- The frequency of teachers’ informal substantive and pedagogical discussions with other teachers at their school including the frequency of informal observations of each others’ teaching.
- The breadth of professional contact for educators beyond the school.
- The breadth of involvement in peer professional leadership activities.

All of these, individually and collectively, were found to be correlated with constructivist pedagogy, even when controlling on a teacher’s own pedagogical philosophy and school level, two other important determinants of pedagogy.

School culture was determined by examining both teacher reports on their own school environment as well as a collective measurement by a group of at least 4 teachers from the same school. The following dimensions were used to characterize school culture:

- Goal consensus among the professional staff.
- Staff development that respects teachers, is integrated over time, provides for teachers' input, and is concerned about implementation.
- Public recognition of teacher accomplishment.
- Constructive criticism among teacher peers.
- A sense of teachers being in a collaborative community of professionals who are continually learning themselves.

Although the measured correlations between teacher pedagogy and various aspects of school culture were fairly low—at least partly due to measurement unreliability—we did find large effects in those relatively few instances where a strong professional culture emerged. Some movement toward a professional culture is not, in itself, a very strong predictor of constructivist practice. It is only when there is a strong commitment to and support for professional participation that we see an independent effort on pedagogy. In these lighthouse schools, teachers had a much more constructivist pedagogy than teachers with equivalent personal role orientations operating in school settings where a modal bureaucratic culture was the norm.¹⁷

DISCUSSION

Traditional staff development relies on experienced curricular and instructional experts, located in district offices, to orchestrate instruction for teachers that fosters instructional reform. A number of school reformers argue, instead, that for teachers to successfully make major changes in their teaching practice requires a different model altogether. This model is school-centered and teacher-led, builds a collaborative culture among teachers, and leads to actual

changes rather than the kind of surface changes often found when reform is mandated or led from bureaucratic superiors.

Role Orientation of Teachers

Teaching is a complex occupation that calls for continuous learning throughout a teacher's career. In a five year study of the implementation of learning communities in secondary schools, McLaughlin and Talbert (1993) pointed to the role of "teacher discourse" –the way teachers discuss their philosophy and practice to one another—as a critical factor in school reform. They found that the most effective teachers participated beyond the school in professional networks addressing similar problems and evaluating strategies for solving them.

Our findings suggest that teachers who play an active role in exchanging ideas about practices with other teachers in their school are more likely to be the teachers who encourage students to be active "deep thinkers" in their classrooms. Teachers who place a high value on knowledge construction in classroom learning are more likely to play an active role in understanding teaching and learning at their school. Conversely, teachers who focus on delivery of information or skill practice are more likely to spend their free time in the classroom rather than in discussions with teaching peers at their school.

We found that contact with teachers from outside of the school was an important influence on the pedagogy. This form of professional exchange, more so than contact within the school seems to be correlated with constructivist approaches to teaching. This result is one of the most important and strongest in this paper. Increasingly researchers are focusing on documenting the teaching wisdom that is embodied in the most talented teachers (Brown, Greeno, Lambert, Mehan & Resnick, 1999). These results clearly indicate that teachers who are taking leadership roles are the same teachers who believe that students should take active leadership roles in creating their own knowledge.

These findings also suggest that teachers who are not drawn into the professional community, those who are left isolated in their classroom, are teaching in ways that contrast sharply with mentor teachers who engage in a continual teaching and learning interactions. Collectively these findings indicate a symmetry between the way in which teachers work and the way in which they structure their classroom for their students. Teachers who are isolated from their peers, engage in teaching in which students work alone. Teachers who work in collaborative settings, create the same settings for their students. Those who suggest changing the relationship of teachers to the larger education community as a way of changing what happens within the classroom will find that these results support their efforts.¹⁸ By one measure, 20% of teachers play a significant leadership role among their peers, including those who have taught a college-level course for credit and published their work. Those teachers who take a leadership role in field of education, sharing their work with others in the field, are much more likely to be teachers who place their students in leadership roles in the classroom. They encourage collaborative, project based learning in which students are required to present their work to their peers.

And the inverse relationship is also true. Those teachers who do not participate in any of the leadership activities in the educational community are more likely to be the teachers who focus on traditional methods of delivery of information, on direct instruction. They do not place a high value on collaborative knowledge building in the classroom or for themselves in the educational community.

A special group of teachers, constituting only 3% of all teachers, scored high on all three measures of professional work orientation, with strong participation at the school level, frequent connections to colleagues in other schools, and impressive participation in leadership activities.

Over one-half of those teachers stand in the top quartile of teachers who most clearly describe their practice in terms of fostering deep thinking, collaborative learning, and authentic project-based activities.

An additional 12% of teachers indicated a very extensive level of professional engagement with the field. These teachers were also much more likely than the remaining teachers to value student input in their lesson plans and to direct their teaching at deep understanding of problems that do not have known easy answers.

But what about the other 85% of the teachers? Here the relationship was again clear. Those teachers who played some part in the larger educational community, struggling with the solutions to the complex set of problems that face educators, were more likely to be teachers who ask their students to do the same thing in the classroom.

The teachers who played a minimal role in the larger educational community are the teachers who do not expect this behavior from their students. The role of the student in their classrooms is to listen, learn, and repeat. They are more likely to be concerned with helping students learn the right answers that can be found in the back of any textbook and less likely to encourage students to ask questions for which there is no "right" answer.

School Culture and Teaching Practice

If teachers are more likely to acquire constructivist viewpoints and to carry out constructivist-compatible teaching practices when they have a collaborative orientation towards their peers and when they take on leadership responsibilities, are there processes at the school level that also facilitate those changes in teaching? We found that in the five percent of school sites where the work environment can be most clearly characterized by widespread teacher collaboration, group autonomy in their own professional development, collective responsibility

for each other's practice, and common views about goals and priorities, teachers are more likely to teach in ways that emphasize student construction of understanding than they are in the vast majority of more typically bureaucratic school cultures. In many respects, these findings validate decades of research on school culture and teaching.

One of the most powerful and enduring lessons from all the research on effective schools is that the better schools are more tightly linked — structurally, symbolically and culturally — than the less effective ones. They operate more as an organic whole and less as a loose collection of sub-systems. An overarching sense of consistency and coordination is a key element that cuts across the effectiveness correlates and permeates our better schools (Murphy, 1992, pp. 94-96).

One of the persistent failures of efforts of school reform has been significant change in the structure of school to allow time for teacher learning (Riel, 1998b; Brown, Greeno, Lambert, Mehan & Resnick, 1999). For the most part, resource allocation for teacher education has been directed towards a "training model" of self-contained workshops that are designed to incrementally build the knowledge base of teachers (Little, 1993). The decisions of what to teach, when to teach it and even how to teach are made by experts located away from the school context. The role of teacher is often to listen, learn and implement. The teaching training efforts of the 50's and 60's have set a course of providing teachers with disconnected ideas and teaching practice fragments that are not easily transported to new settings. In a 1994 study of staff development, Miller and Lord found that most efforts involved one-time workshops, with short-term, passive activities and limited follow-up which teachers assessed as inappropriate, unfocused, boring and irrelevant to their work. The methods used to teach in these workshops

often contradict the message about best teaching practice. And in fact most teachers describe their staff development as a disconnected series of workshops with only modest efforts at sustained long-term programs of change. In contrast, personal and collective engagement in a knowledge base incorporating outside ideas is one of the characteristics that distinguish successful and less successful professional learning communities (Louis & Kruse, 1995).

Restructuring and reform efforts have begun to look at professional development in a way that is very different than these traditional models. The work of integrating instructional strategies into practice is a complex process and teachers represent an important source of knowledge about this process. More recent efforts at teacher education utilize the expert knowledge of talented teachers using cognitive coaching and peer mentoring as a way of increasing teaching knowledge and practice. This alternative approach builds a culture of learning and binds teachers together in a community, sharing what they learn to help design the best match between the needs of students and the resources available. Descriptions of school cultures where teachers are continually learning, along with strong support for the experimentation with new ideas, are correlated with descriptions of classroom learning with similar characteristics for students. Little (1993) lists four categories of professional interaction that build a culture of learning in practice:

- Teachers and administrators engage in focused discussions about teaching and learning
- Teachers observe and evaluate the teaching of their colleagues
- Teachers engage in collaborative planning and design of lessons
- Teachers actively teach each other and take leadership roles offering workshops

One clear indication of professional practice is collective responsibility for setting standards and assuring quality of practice. While peer review is an integral part of university

level evaluation (Shulman, 1995), teachers traditionally have not played a role in evaluating their peers either positively or negatively. In a bureaucratic culture, it is the work of administrators to assure quality of the teaching staff. But in a professional culture, it is the responsibility of the community. The two national teachers associations recently jointly drafted national guidelines that support peer- assistance and peer-review programs, and California is establishing a comprehensive peer-review process for school and district promotion and firing decisions (Bradley, 1998).

Supporters of peer review programs place a high value on the knowledge developed by skilled teachers and want to leverage this knowledge base to help improve the practice of less skilled teachers. In addition to providing an intervention procedure that helps teachers to learn new skills, peer-review provides increased career opportunity, salaries, and professional recognition for teachers who serve as consulting teachers.

Teachers working in isolation do not have institutional power to shape the designs of teaching and learning. Collectively, teachers can confront political pressures that often place more emphasis on measurable outcomes that are meaningless indicators of real learning. Teachers know the difference between teaching students to perform well on tests and teaching students to understand and use knowledge. Teachers who take a professional stance towards teaching and who are part of a large organization that works together to create good education will not be victimized by well-intended parents and politicians who understand very little about education.

Professional Orientation, School Culture and Pedagogy

Teachers face a very complex task each day they enter the classroom. They need to be well prepared to structure learning for their students in ways that met the expectations of multiple stakeholders. These expectations are overwhelming and contradictory, making it necessary for

teachers to select some and reject others. Depending on the teacher's philosophical beliefs and instructional practices, the students will either have a very active or passive role in the process. The more active the role of the student, the more difficult are the demands placed on the teacher who must be able to incorporate the wide-ranging ideas and theories generated by students who are searching for understanding. How does a teacher orient to the forces both in the classroom and beyond the classroom to make these decisions? And what is the best way to structure learning and support for teachers as they search for the best ways to make these decisions?

These survey data show that in schools where this model of professional development is evident instructional practice is significantly different than in schools where it is not. When teachers are active participants in professional learning communities with a strong sense of voice and authority, they create a similar learning context for their students.

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FOOTNOTES

¹ See Glazer, (1999) for an historical discussion of these issues.

² The probability sample was a weighted sample with selection probabilities related to school size and the amount of computer technology present. Selection of the additional "purposive" sample schools was based upon extensive data gathering, including tabulation of schools participating in more than 50 reform programs and development of a "technology presence index" for all public schools in the United States, using data from Quality Education Data, Inc.

³ Again, weights were used that were inversely proportional to selection probabilities of different teachers. [Further information about the sampling design can be found at <http://www.crito.uci.edu/TLC>. Principals and school technology coordinators also supplied information for the study.

⁴ Teachers are weighted inversely to their probability of selection within their school, and for the probability sample, schools themselves are weighted inversely to their probability of selection.

⁵ As part of the effort to limit response burden, each teacher was asked to respond to only seven of 12 statements. Indices were built by inserting sample mean values for the other five statements.

⁶ These items included: direct instruction, close monitoring of student work, giving students rewards for doing well, use of textbooks generally, and having students answer questions from textbooks.

⁷ These included multiple activities occurring simultaneously during class, student interest governing lesson topics, evaluating student products rather than tests, allowing themselves to be “taught” by students, having students teach one another, student self-directed topic exploration, students revising their prior work, having students make and investigate their own predictions, long projects, group work, and writing long essays.

⁸ For more detailed information on teachers’ responses with respect to teacher philosophy and practice see Ravitz & Becker, (1999).

⁹ The first item contrasted the role of the teacher as learning facilitator in inquiry-based learning versus transmitter of information and procedural directions. A second item contrasted the primacy of “sense-making” with importance of transmitting the required curriculum. A third item presented the choice between believing that motivation and student interest were more important than specific subject-matter versus believing that the textbook content in history, science, math, and language skills should “drive what students study.” A fourth item contrasted a teaching style with multiple activities incorporating the integration of diverse skills occurring simultaneously in the classroom with a whole-class model with short time-span tasks that “match students’ attention spans and the daily class schedule.”

¹⁰ The effects of comingling the specialized samples with the national probability sample are quite small. For example, the correlation Within-School Teacher Interaction and Teacher Pedagogy is .26 for the probability sample alone and .30 when combining that sample with the remaining teachers studied.

¹¹ Had all associations with Pedagogical Change been low, an alternative explanation of unreliable measurement would have been plausible. However, other correlations with this variable are higher, as the text below shows.

¹² These three criteria are averaging half-way between “several per month” and “1-3 times per week” on the within-school interaction items; meeting at least two criteria for external contacts with teachers; and participating in at least three of the six types of professional activities.

¹³ These three criteria are interacting with other teachers, on average, “several times per month” across the six within-school interaction items; meeting one of the three criteria for external contacts; and participating in two or more types of leadership activities.

¹⁴ Only 50% of the teachers were asked to complete the questions about changes in pedagogy over the previous three years.

¹⁵ *Deep Thinking* included items about self-assessment of work, explaining reasoning in writing, writing in a journal, debating, working on tasks with no clear answer, multiple representations of issues, introducing a unit by having students make conjectures, and introducing a unit by having students discuss the topic in small groups. *Project-Based Activities* involved student work on weeklong projects, making products used by someone else, doing hands-on activities, demonstrating their work before an audience, and (negatively) doing seatwork.

¹⁶ Note that philosophy is not controlled. In the earlier discussion of a teacher's role orientation, it was plausible that philosophy could affect a teacher's role orientation and therefore render an association between role orientation and pedagogy spurious. However, it is more likely that a teacher's work environment would affect their philosophy than vice versa. So controlling on philosophy would not be appropriate except to explain the mechanism through which work environment affects pedagogy.

¹⁷ Our investigation of the impact of school culture was limited, though, by measurement issues related to the limited sampling of individual representative teachers at each school and the use of different subsamples of survey questions for different respondents.

¹⁸ On the other hand, frequency of within-school collaborative practice did not appear to be linked to recent changes towards a more constructivist approach. One way to understand this is that teachers who engage in this form of interaction have done so for many years and therefore have developed beliefs and educational practices that are consistent with this level of exchange.

In fact, the data suggests that for those teachers who have recently shifted towards a knowledge-building or inquiry approach to teaching in their classroom, the motivation for this change may frequently come from beyond the school community. The substantial correlation between interaction with teachers from other schools and recent shifts toward more constructivist teaching confirms this possibility^[0].

Table 2

Frequency of Teacher Informal Interactions with Other Teachers at their Own School

<i>How often do you have the following types of interactions with other teachers at your school?</i>	Seldom/ Never	Several /month	1-3/ week	Almost Daily
Discussions about how to teacher a particular concept to the a class	21%	44%	22%	13%
Discussions about ideas for student or group projects	20%	45%	23%	12%
Discussions of different views about an issue within our common subject area (e.g. science)	23%	44%	21%	12%
Discussions about computer software or the Internet	26%	41%	23%	10%
Discussions on any of the above topics	6%	37%	32%	23%
Informal discussions of personal matters, unrelated to teaching	15%	23%	27%	35%
Visits to another teacher's classroom to observe teaching	78%	16%	4%	1%
Informal observations of MY classroom by another teacher	79%	17%	2%	2%

Table 3

Frequency of Professional Contact with Teachers at Other Schools

	Not so far this year ^a	1-2 times	3-5 times	More Often
A workshop or conference with teacher from different schools	14%	44%	29%	13%
A committee meeting with teachers from other schools	45%	27%	20%	8%
Electronic mail with teachers from other places	61%	14%	9%	16%

^a The time period represented is most of a school year. Teachers completed surveys between March and June of 1998.

Table 4

Percent of Teachers Involved in Professional Leadership Activities

<i>In the past three years, which of these experiences have you had?</i>	Yes
I have informally mentored another teacher	38%
I have been formally assigned to mentor another teacher	23%
I have given a workshop or talk for at least 25 teachers	35%
I have given workshops for teachers on at least 5 occasions	15%
I have taught a college-level course for credit	10%
I have published an article for professional educators	5%
Four or more of the above	7%
Three or more of the above	20%
None of the above	40%

Table 5

Within-School Informal Professional Interaction by Pedagogy

Within-School Teacher Interactions	TEACHER PEDAGOGY				
	Information/Skills Transmission	2nd Quartile	3rd Quartile	Knowledge Construction	Total (N)
Collaborative Practice (14%)	10%	22%	24%	45%	100% (645)
Medium contact practice (58%)	24%	25%	28%	23%	100% (2,359)
Private Practice (28%)	37%	29%	21%	13%	100% (978)
All teachers (100%)	26%	26%	25%	23%	100% (3,982)

Note. Where N's appear in tables, they are raw, unweighted counts of the number of respondents. Percentages will not match N's because they are based on weighted N's.

Table 6

Professional Contacts with Teachers at Other Schools by Pedagogy

Teacher Contacts Beyond the School (# of criteria met)	TEACHER PEDAGOGY				
	Information/Skills Transmission	2nd Quartile	3rd Quartile	Knowledge Construction	Total
Most contact (3) (7% of all teachers)	10%	23%	29%	38%	100%
Medium contact (2) (20%)	17%	25%	28%	30%	100%
Low contact (1) (28%)	25%	26%	26%	24%	100%
Private Practice (none) (45%)	34%	27%	23%	17%	100%
Total	26%	26%	25%	23%	100%

Table 7

Change in Primary Method of Evaluating Students by Breadth of Beyond-School Teacher Contact

Contact Beyond School (# of criteria)	<i>How often you evaluate students through their products instead of tests?</i>				Total (N)
	Less than 3 years ago	Same as before or never did	More now	Much more now	
High contact (3)	0%	17%	49%	34%	100% (80)
Medium contact (2)	1%	40%	40%	19%	100% (213)
Low contact (1)	1%	40%	41%	18%	100% (286)
Private Practice (none)	2%	51%	35%	11%	100% (409)
Total	2%	44%	39%	16%	100% (988)

Note. The number of cases in this table is smaller than others because each item concerning changes in pedagogy was asked to a random 25% of all respondents.

Table 8

Number of Leadership Activities by Pedagogy

Number of Leadership Activities	Information/Skills Transmission	2nd Quartile	3rd Quartile	Knowledge Construction	Total
Three or more (Leaders) (19%)	17%	20%	28%	35%	100% (1144)
Two (18%)	24%	25%	24%	27%	100% (761)
One (23%)	28%	25%	26%	21%	100% (828)
None (Private) (40%)	32%	29%	24%	15%	100% (1248)
Total (100%)	26%	25%	25%	23%	100% (3981)

Table 9

Teacher Role Orientation (Collaborative Practice + Leadership) by Pedagogy

Teacher Professional Role Orientation	Information/ Skills Transmission	2nd Quartile	3rd Quartile	Knowledge Construction	Total (N)
Teacher Professionals					
Collaborative Leaders (Top 3%)	5%	16%	26%	54%	100% (172)
Collaborative Teachers (12%)	13%	20%	25%	43%	100% (621)
Other Teachers					
Interactive Teachers (30%)	17%	23%	30%	29%	100% (1306)
Private Practice Teachers (55%)	35%	28%	23%	13%	100% (1848)
Total	26%	26%	25%	23%	100% (3947)

Table 10

Teacher Professional Role Orientation by Extent of Recent Change Towards Constructivist Pedagogy

Extent of Teacher Professional Orientation	RECENT CHANGES TOWARDS CONSTRUCTIVIST PEDAGOGY				Total (N)
	Little or no change; (or change to traditional practice)	Change in a few areas	Change in many areas	Substantial change in many or some change in most areas	
Teacher Professionals					
Collaborative Leaders	19%	11%	30%	41%	100% (67)
Collaborative Teachers	23%	18%	26%	33%	100% (291)
Other Teachers					
Interactive Teachers	17%	24%	35%	24%	100% (636)
Private Practice Teachers	37%	24%	28%	11%	100% (945)
Total	31%	23%	30%	16%	100% (1939)

Table 11

Correlations between Pedagogy Sub-scales and Teacher Role Orientation Variables [Partial correlations control for Teacher Philosophy and School Level]

Teacher Pedagogy	Within-School Interactions with Teachers		Beyond-School Teacher Contacts		Leadership Activities		Combined Role Orientation Index	
	Corr.	Partial	Corr.	Partial	Corr.	Partial	Corr.	Partial
Full Pedagogy Scale	.30	.27	.23	.17	.25	.21	.38	.33
Deep Thinking	.28	.24	.18	.12	.18	.14	.31	.26
Project-Based Activities	.19	.17	.16	.12	.24	.19	.29	.25

Table 12 Teachers' School Work Environment

	% Agree	Mean (range: 1 to 6)	Standard Deviation
Shared School Goals			
Most teachers here share my beliefs about central school goals	84%	4.5	1.2
Discussion of school goals is a regular part of our faculty meetings	79%	4.3	1.5
My principal's values and philosophy of education are similar to my own	77%	4.3	1.4
Learning Community			
Teachers in this school are continually learning and seeking new ideas	86%	4.7	1.2
New ideas presented at in-services are discussed by teachers afterwards	76%	4.0	1.3
Other teachers encourage me to try new ideas	75%	4.2	1.4
It is common for us to share samples of student work	75%	4.1	1.4
Learning Opportunities			
Teachers play an important role in defining staff development activities	66%	4.0	1.5
Staff development is followed by support to help teachers implement ideas	53%	3.5	1.5
Staff development is integrated instead of having a separate topic each time (reverse of item as stated to respondents)	35%	3.1	1.4
Teacher Evaluation			
Teachers who successfully innovate are given public recognition	60%	3.6	1.5
Most teachers will press another if they feel that person is not teaching well	27%	2.6	1.4

Table 13

Correlations between Teacher's (Constructivist) Pedagogy and School-Level Indicators of Work Environment

Indicators of Teachers' Work Environment	CORRELATIONS WITH CONSTRUCTIVIST PEDAGOGY		
	No Controls	Controlled for school level (Elem, Middle and High)	Controlled for teachers own belief about work environment
Shared School Goals			
* Most teachers here share my beliefs about the central goals of the school	.05	.02	.07
Discussion of school goals is a regular part of our faculty meetings	.06	.03	.03
* My principal's values and philosophy of education are similar to my own	.08	.07	.06
Goal Consensus sub-scale	.10	.06	.06
Learning Community			
* Teachers in this school are continually learning and seeking new ideas	.06	.04	.05
New ideas presented at in-services are discussed by teachers afterwards	.08	.06	.04
Other teachers encourage me to try out new ideas	.11	.10	.04
It is common for us to share samples of student work	.10	.09	.03
Learning Community sub-scale	.14	.11	.04
Staff Development			
Teachers play an important role in defining staff development activities	.03	.01	.00
Staff development is integrated instead of having a separate topic each time (reverse of item as stated to respondents)	-.03	-.02	-.02
* Staff development is followed by support to help teachers implement ideas	.10	.07	.07
Staff Development sub-scale	.06	.04	.04
Evaluation			
Teachers who successfully innovate are given public recognition	.06	.05	.04
* Most teachers will press another if they feel that person is not teaching well	.10	.10	.05
Evaluation sub-scale	.09	.08	.05
School Work Culture Index (overall)	.14	.11	.06
5 "strong" items (indicated with *)	.14	.11	.09

Note. Partial correlations at or above .04 are statistically significant at this sample size.

Table 14

Teachers' Role Orientation by School Work Culture

School Culture: (Presence of Professional Work Culture)	TEACHERS' ROLE ORIENTATION					Percent of all teachers
	Collaborative Leaders	Collaborative Teachers	Collaborative Teachers and Leaders	Interactive Teachers	Private Practice Teachers	
Top scores	5.6%	16.9%	(22.5%)	32.5%	45.0%	100% (5.5%)
(Most of) Upper Third	3.7%	15.3%	(19.0%)	32.4%	48.7%	100% (22.6%)
Middle Third	3.5%	11.7%	(15.2%)	31.6%	53.2%	100% (37.8%)
Lowest Third	2.0%	8.2%	(10.2%)	27.0%	62.8%	100% (34.1%)
All teachers	3.1%	11.6%	(14.7%)	30.3%	55.0%	100% (100%)

Figure 1. Teacher Professional Role Orientation by Teacher Pedagogy

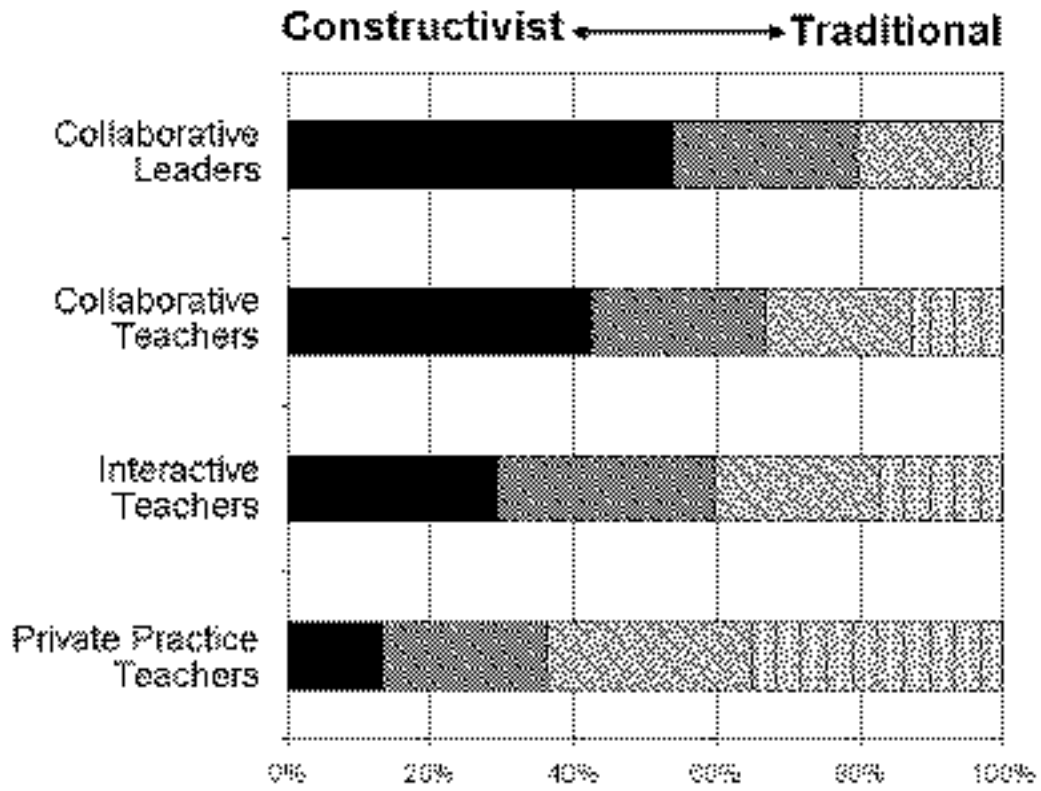


Figure 2. Teacher Pedagogy by Personal Role Orientation by School Work Culture

