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Collective Leadership Effects on Student Achievement

Kenneth Leithwood
Blair Mascall

Purpose: *This study aimed to estimate the impact of collective, or shared, leadership on key teacher variables and on student achievement. As well, it inquired about the relative contribution of different sources of such leadership and whether differences among patterns of collective leadership were related to differences in student achievement.*

Methods: *Evidence included 2,570 teacher responses from 90 elementary and secondary schools in which four or more teachers completed usable surveys. Student achievement data in language and math averaged over 3 years were acquired through school Web sites. Data were analyzed using path-analytic techniques.*

Findings: *Collective leadership explained a significant proportion of variation in student achievement across schools. Higher-achieving schools awarded leadership influence to all school members and other stakeholders to a greater degree than that of lower-achieving schools. These differences were most significant in relation to the leadership exercised by school teams, parents, and students. Principals were awarded the highest levels of influence in schools at all levels of achievement.*

Implications: *Influence seems to be an infinite resource in schools. The more those in formal leadership roles give it away, the more they acquire.*

Keywords: *shared leadership; distributed leadership; student achievement; influence*

The growing edge of the current conversation about educational leadership has shifted decidedly toward a focus on its sources.¹ This shift reflects, for example, disillusionment with “great man” conceptions of leadership and bureaucratic organizational structures (Pearce & Conger,

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2003); it also reflects our growing appreciation for the contributions to productivity of the informal dimensions of organizations (Tschannen-Moran, 2004), the untapped and often-unrecognized leadership capacities found among those not in positions of formal authority (Gronn, 2003), and the extent to which the capacities of those at the organizational apex alone have been overtaken by the complexities of the challenges they now face (Wheatley, 2005). Leadership is increasingly conceptualized as an organization-wide phenomenon (Ogawa & Bossert, 1995) in which flatter organizational structures and leadership, distributed over multiple people and roles, are being advocated as solutions to these dilemmas (Manz & Sims, 1993).

We use the term *collective leadership* in this study to signify our relatively narrow preoccupation with the combined effects of all sources of leadership and the possible differences in the contribution to such effects by each source (e.g., administrators, teachers, students, parents). This focus is only one of a wider set of interests pursued by others doing research on distributed (e.g., Gronn, 2002), shared (Pearce & Conger, 2003), or dispersed (e.g., Ray, Clegg, & Gordon, 2004) leadership about the functions and practices that are distributed (e.g., Spillane, Camburn, & Stitzel Pareja, 2007), who performs which function or practice (e.g., Firestone & Martinez, 2007), and whether some practices are better carried out by certain people or roles rather than others (e.g., Leithwood et al., 2004; Locke, 2003).

The overwhelming disposition of the contemporary literature on distributed leadership (the category we use for all the terms mentioned above) is that of enthusiastic optimism about its anticipated benefits. As compared with exclusively hierarchical, or focused, forms of leadership, distributed leadership is thought to (a) more accurately reflect the division of labor that is experienced in organizations from day to day and (b) reduce the chances of error arising from decisions based on the limited information available to a single leader. Distributed leadership also enhances opportunities for the organization to benefit from the capacities of more of its members; it permits members to capitalize on the range of their individual strengths; and it develops among organizational members a fuller appreciation of interdependence and how one's behavior affects the organization as a whole. Through increased participation in decision making, greater commitment to organizational goals and strategies may develop. Distributed leadership has the potential to increase on-the-job leadership development experiences and reduce the workload for those in

formal administrative roles. The increased self-determination arising from distributed leadership may improve members' experience of work. Such leadership allows members to better anticipate and respond to the demands of the organization's environment. Solutions to organizational challenges may develop through distributed leadership that would unlikely emerge from individual sources. Finally, overlapping actions that occur in some distributed leadership contexts provide further reinforcement of leadership influence (e.g., Burke, Fiore, & Salas, 2003; Cox, Pearce, & Perry, 2003; Gronn, 2002; Grubb & Flessa, 2006).

This is an impressive list of potential positive consequences of distributed leadership for the nature of organizational processes and outcomes. One might reasonably expect that if even just a few materialized, the effects on the organization's bottom line would be significant. However, there is little empirical evidence to justify any of these consequences. Furthermore, some of the evidence that does exist suggests quite different consequences. One of our own large-scale empirical studies, for example, found nonsignificant negative effects of collective leadership (conceived and measured exactly as it is in this study) on student engagement in school. We speculated that this might signify a nonlinear relationship between number of leadership sources and organizational outcomes. Beyond some optimal amount, perhaps "more leadership actually detracts from clarity of purpose, sense of mission, sufficient certainty about what needs to be done to allow for productive action in the school and the like" (Leithwood & Jantzi, 2000, p. 61). Others have expressed similar speculations (e.g., Bryk, 1998; Timperley, 2005).

Evidence from our earlier study, and the speculations to which it gave rise, flies in the face of the enthusiasm much more frequently expressed for the outcomes of more fully distributing leadership in schools. Clearly, this issue warrants greater empirical attention—our general purpose for this study. Specifically, the study aimed to estimate

- the impact of collective leadership on key teacher variables and on student learning,
- the relative influence on school decision making of each individual or group included in our measure of collective leadership (administrators, individual teachers, groups of teachers, parents, students), and
- whether differences in the patterns of collective leadership are related to differences in student achievement levels.

FRAMEWORK

Collective Leadership

We conceptualized and measured collective leadership in this study as a form of distributed influence and control. Such a view overlaps with Rowan's conceptions of organic management (Miller & Rowan, 2006; Rowan, 1990), which he defined as

a shift away from conventional, hierarchical patterns of bureaucratic, control toward what has been referred to as a network pattern of control, that is, a pattern of control in which line employees are actively involved in organizational decision making [and] staff cooperation and collegiality supplant the hierarchy as a means of coordinating work flows and resolving technical difficulties. (Miller & Rowan, 2006, pp. 219-220)

Conceptualizing collective leadership as distributed influence and control also locates our study in association with some quite venerable research about organizational control structures. A seminal paper by Tannenbaum (1961),² for example, introduced the control graph as a means of displaying the pattern of control in formal organizations. The horizontal axis of a control graph designates each level in the organization, whereas the vertical axis represents the degree of perceived influence or control exercised by each level or role. Tannenbaum used the control graph to illustrate four prototypical control modes, or approaches to leadership: autocratic (control or influence rises with the hierarchical level of the role), democratic (higher levels of influence are ascribed to those in hierarchically lower levels or roles), anarchic (relatively little control or influence by any level or role) and polyarchic (high levels of control or influence by all levels or roles). Reflecting Rowan's expectations (1990) for organic management under conditions of uncertainty, Tannenbaum (1961) also hypothesized that organizational effectiveness will be related to more democratic and more polyarchic forms of control. The first of these hypotheses arises from two sets of expectations. First, more democratic forms of control will be inherently more consistent with employees' beliefs and values in a democratic society and so contribute to higher levels of job satisfaction and morale, whereas autocratic forms of control in these societies are expected "to reduce initiative, inhibit identification with the organization and to create conflict and hostility among members" (p. 35). Second, more control by those lower in the hierarchy will lead to greater acceptance of jointly made decisions, along with an increased sense of responsibility and motivation to accomplish organizational goals. Such decision participation may also contribute

to more effective coordination through mutual influence mechanisms. The second of Tannebaum's hypotheses, sometimes called the power equalization hypothesis, is justified with reference to its impact on organizational efficiency, as well as contributions to members' motivation and their identification with and loyalty to the organization. Reasons offered in the current literature about distributed leadership, as we note above, are quite similar to the justification Tannenbaum offered for his two hypotheses.

The effectiveness of democratic, supportive, and shared forms of leadership (control and influence) in organizations receives support from many related empirical sources, including, for example, research on teacher participation with peers in planning and decision making (Talbert & McLaughlin, 1993) and transformational leadership (Leithwood & Jantzi, 2005). Several lines of related theory also give rise to expectations of a positive association between organizational effectiveness and the distribution of influence and control, including theories of organizational learning (Hutchins, 1996), distributed cognition (Perkins, 1993; Tsoukas, 2005), and communities of practice (Wenger, McDermott, & Snyder, 2002).

Nonetheless, there is substantial contrary evidence—especially from research in which organizational effectiveness is defined as the organization's bottom line (some version of productivity) and assessed using objective indicators, such as student test data (in the case of schools). For example, Tannenbaum (1961) was able to provide only limited support for his hypotheses about organizational control structures. After about 15 years of programmatic research about organic management, Miller and Rowan (2006) reported "the main effects are weak and positive effects appear to be contingent on many other conditions" (p. 220). A recent comprehensive review of teacher leadership—one approach to the distribution of influence and control in school organizations—found only a handful of studies that had inquired about effects on students, and these data were generally not supportive (York-Barr & Duke, 2004).

Finally, although there is the potential in schools to involve a variety of people in leadership functions, most research so far has focused on the work of teachers and school administrators. Many other people and roles have the potential to exercise influence in schools, however, including parents, students, and other members of the wider community. The work of Pounder, Ogawa, and Adams (1995) is one of the only examples that we have found of research that examined leadership provided by school administrators, teachers, secretaries, and parents. Their work in testing a model regarding the influence of principals, teachers, parents, and secretaries on a number of mediating variables, as well as on a range of school outcomes, provides a useful model of our approach from a decade earlier. In our

current study, we are able to extend the list of those providing influence beyond the school setting to include the district as well. Those in district roles have an obligation to influence what schools do, although most studies of distributed leadership have not examined the contribution of district personnel (but see Firestone, 1989; Firestone & Martinez, 2007). Our study concerned itself with all these potential sources of influence.

The Antecedents of Teacher Performance

Among the central limitations of Miller and Rowan's efforts (2006) to assess the effects of organic management is their acknowledged inattention to variables potentially mediating the effects of leaders on student achievement. That the effects of leadership on students is largely indirect has been evident since at least the publication of Hallinger and Heck's widely cited review (1996). Results of that review indicate quite clearly that direct-effects leadership studies rarely detect significant effects on students whereas many indirect effects studies do. Most published leadership-effects research since 1996 has aimed to explain leadership effects on students, guided by complex causal models that include an array of promising mediators (e.g., Leithwood & Levin, 2005; Leithwood, Louis, Anderson & Wahlstrom, 2004).

The framework for this study presumed indirect leadership effects and conceptualized a set of teacher performance antecedents as mediators. Motivation, capacity, and the situations in which people work are variables in a general model of employee performance and how it improves. This model has been developed most fully in the literature on organizational and industrial psychology—ironically, in light of our review to this point, by Rowan (1996) and others (the model is presented diagrammatically in the results section). According to this model, the relationship among these variables is captured in a simple equation:

$$P_j = f(M_j, A_j, S_j),$$

where P (employee performance) is expressed as a function of M (employee motivation), A (employee ability or capacity), and S (the situation in which the employee performs his or her work; i.e., working conditions). Subscript j indicates that only performance, motivation, abilities, and situations relevant to carrying out a particular job are considered. Relationships among variables in the model are assumed to be multiplicative. This means, for example, that neither high ability and low motivation, nor high motivation and low ability, produce high levels of employee

performance—neither does high ability and high motivation in a dysfunctional job situation. Furthermore, a dysfunctional situation will likely depress initially high levels of ability and motivation.

Our own modification and extension of this framework is based on contemporary theoretical and empirical accounts of the conditions required for development of motivation and capacity on the part of those in schools to productively engage in improvement efforts with which leaders have some attachment. It also incorporates accounts of organizational conditions and characteristics of the infrastructure that facilitate the successful implementation of large-scale reform, or what van den Berg, Vandenberghe, and Slegers (1999) refer to as the organization's innovative capacity.

Motivation. Comprehensive theories of motivation—in particular, those of Ford (1992) and Bandura (1986)—predict most of the causes and consequences of teacher motivation and commitment identified in recent empirical research. According to Ford, motivational processes are qualities of a person that are oriented toward the future and aimed at helping the person evaluate the need for change or action. These processes are a function of one's emotions, personal goals, beliefs about one's capacities, and beliefs about one's context or situation. Our study included measures of three of these variables (not emotions).

Goal setting, as Mohrman and Lawler (1996) point out, "is a linchpin of organizational motivation" (p. 121). Goals direct one's attention and effort toward specific targets for performance; they provide a gauge by which to judge one's success; and they encourage persistence in the tasks required for goal achievement (Rowan, 1996). Personal goals represent desired future states (aspirations, needs, wants) that have been internalized by an individual (e.g., a teacher's desire for a manageable class). The term *personal* is thus significant. Goals energize action when (a) a person's evaluation of present circumstances indicates that it is different from the desired state (Berman & McLaughlin, 1977), (b) goals are perceived to be challenging but achievable (Louis & Miles, 1990), (c) when there are opportunities to learn more about how the goal can be accomplished (Kushman, 1992; Reyes, 1990; Rosenholtz, 1989), and (d) when goals are perceived to be clear and concrete (Shedd & Bacharach, 1991).

Two sets of personal agency beliefs interact with teachers' personal goals to help determine the strength of motivation to achieve such goals. The first set, capacity beliefs, includes such psychological states as self-efficacy, self-confidence, academic self-concept, and aspects of self-esteem. It is not enough that people have energizing goals in mind. They must also believe themselves to be capable of accomplishing these goals.

As Bandura (1986) argues, people who see themselves as being efficacious are willing to assume challenges that they find interesting and involving. When their initial attempts fall short, they intensify their efforts without significant stress because they believe that effort is the key to success. Eventually, this self-assured effort produces success. Increased perceptions of self-efficacy may result from teachers' perceptions of success, perhaps formed through supportive feedback from administrators, peers, and students (Smylie, 1990). Bandura also associates increased efficacy with the vicarious experience that can be provided by role models, as well as with verbal persuasion—the expressed opinions of credible others about one's abilities.

A second set of personal agency beliefs, context beliefs, are beliefs about how congenial one's situation is for carrying out one's work. These are beliefs about whether, for example, the working conditions in the school will support teachers' efforts to instruct in the manner suggested by the school's improvement initiatives. Many experienced teachers have developed negative context beliefs over their careers as a consequence of being associated with mismanaged or ill-conceived innovations (Huberman, 1988). Such negative context beliefs may easily graft themselves onto these teachers' perceptions of current change initiatives in their schools, thereby reducing their motivation to implement those initiatives ("This, too, shall pass"). Such beliefs do not change quickly.

Capacity. Initially conceived of as the property of individual professionals, capacity or ability in this framework includes the knowledge and skills required to accomplish work-related tasks. It has been recognized more recently as a collective organizational property. Because there is an immense body of literature about this matter, we are admittedly quite selective in this brief review. As such, we have chosen treatments of learning that seem most useful in the context of school improvement and the challenges faced by teachers and administrators under such conditions. This context makes the least difference (but still some) with respect to our treatment of individual learning. Most significant, however, the school improvement context requires us to consider collective, or organizational, learning in addition to individual learning. This is the learning that is required on the part of small groups and whole schools as they attempt to understand the meaning of an improvement effort, what might be entailed in its implementation in their setting, and how to acquire new skills that may be needed to alter their existing practices. As Louis, Toole, and Hargreaves (1999) argue in relation to successful school improvement processes,

organizational transformation must aim at increasing the organization's problem solving capability, by building organizational resilience, and expanding its capacity to create, thereby widening the range of possible situations the organization will be able to cope with. (p. 263)

Our approach to identifying the conditions for capacity building in schools therefore assumes that it is necessary to understand how learning occurs within different organizational units—the individual, the small group, and the whole school. Learning within these units does not just happen naturally. It is stimulated by sources that must be better understood. Furthermore, characteristics of the organization—such as its goals, culture, and structure, for example—not only mediate organizational learning but are influenced by such learning as well. These conditions change in response to organizational learning, and these changed conditions eventually have a direct or indirect effect on the educational experiences of students. Bryk and Schneider (2002), for instance, provide a useful link between the development of social trust in a school and the degree to which the school can build collective capacity, thus leading to improvements in student achievement.

The early years of the so-called cognitive revolution in learning theory (i.e., the 1950s and 1960s) were preoccupied with explanations of the internal mental processes associated with information processing. Explanations of such processing included hypothetical cognitive structures or symbolic architectures and relationships (Newell, Rosenblum, & Laird, 1990) to explain why people attend to some aspects of the information available to them; how that knowledge is stored, retrieved, and further developed; and how it used in problem solving (Rumelhart, 1990). Vermunt and Verloop (1999) describe learning from this perspective as “self-regulated knowledge construction” (p. 258) and offer a synthesis of those individual mental activities that are identified in this early period and are believed to permit such knowledge construction to take place. These learning activities are both cognitive and metacognitive. Cognitive activities include, for example, relating, analyzing, applying, memorizing, critical processing, and selecting. Metacognitive, or regulative, activities involve planning, monitoring, adjusting, and evaluating.

At least two conditions with obvious—and, by now, well understood—implications for school improvement arise from these basic understandings of internal mental processes. First, improvement-oriented teachers and administrators make sense of these initiatives through the application of their existing knowledge structures. So, theoretically at least, there are as many interpretations of any given initiative as there are people hearing

about it. Moving toward a reasonably uniform widespread understanding of a single improvement initiative requires repeated communication of many forms and many opportunities to engage in discussions aimed at clarification of policy initiatives.

The second condition with implications for school improvement arises from information-processing theories of mental functioning, which often distinguish between declarative knowledge (the understanding described above) and procedural knowledge (how-to). Procedural knowledge, the basis of skilled practice, develops through repeated cycles of developing a knowledge structure to guide one's mental or physical activity, engaging in that activity guided by the knowledge structure, obtaining feedback about the adequacy of one's actions, and refining the guiding knowledge structure. As Joyce and Weil's coaching model (1985) and the evidence of its effects made clear some time ago, reform initiatives requiring significantly different practices in schools need to provide opportunities for repeated iterations of this cycle.

Our measures of teacher capacity in this study—more accurately, our measures of capacity building—reflect the importance of multiple opportunities for both sense making and the practice and feedback essential to skill development.

Work settings. Whereas capacity is typically considered to be a quality of individuals, its meaning and importance as a collective or organizational property is increasingly being recognized. To acknowledge the school as a unit of change, for example, implies that its capacity is more than the sum of its individual members' capacities. And research on organizational learning (e.g., Leithwood & Louis, 1999) provides considerable support for this implication. Such collective capacity includes, as well, the infrastructure to support the work of individual organizational members.

The basic conditions influencing collective capacity are evident in the growing understandings of learning as being situated and social. A corpus of psychological theory, beyond information-processing accounts of cognition, is quite useful in helping to understand individual and small group learning in an organizational context. Moving away from those exclusively "inside the head" explanations of how people learn (discussed above), such theory assumes a significant role for the immediate situation in which the learner finds oneself, as well as the larger cultural context in which that situation is embedded.

Commonly referred to as *situativity theory* (e.g., Anderson, Reder, & Simon, 1996), these explanations of individual learning assume that what is learned depends on a person's interaction with features of the context

and one's participation in a community of practice (Wenger et al., 2002). Because a person's knowledge is socially constructed in this context, features of the organization such as, for example, its norms, beliefs, operating procedures, and even its physical characteristics shape what its individual members know and are able to do. Building on many of the same assumptions as situativity theory, theories of distributed cognition (e.g., Salomon, 1993) are especially useful in understanding small group or team learning. Each member of a well-functioning team must share some of the same understandings—the purposes for the team's work and the constraints within which the team must function, for example. But each team member also brings some unique capacities to his or her group's work. It is in this sense that the total capacity of the group is distributed across its members.

In addition, the organizational and/or physical setting in which the group works may add to the group's total capacity. This is the case in groups whose members develop highly interdependent sets of relationships, as in the case of the London Underground line controllers described by Heath and Luff (1998). It is also the case with groups whose work is significantly enhanced by technology—see, for example, Goodwin and Goodwin's description (1998) of the work of airport personnel.

We are aware of efforts to locate leadership in the organizational setting or in the interactions that occur between leader and follower. Although these efforts define leadership as a form of influence, as we do in this article, such an approach treats the causes of such influence as a black box. Yet, there is also a long history of work that defines leadership as practices or behaviors; this includes, for example, most studies of instructional and transformational leadership that aim to assess the effects of various practices or behaviors. This orientation to leadership makes the potential causes of influence explicit and aims to discover the extent of that influence. But the same practices are unlikely to either have the same effects or result in the same influence in all settings. There is considerable evidence to suggest that variations in student population characteristics and organizational size, for example, call for different leadership enactments. These features of the setting, from this perspective, mediate the influence of leaders' practices.

By adopting influence as our independent variable, we are leaving the leadership practices giving rise to influence implicit, and we are focusing on the extent to which those implicit practices are perceived to result in influence. But we consider this a necessary limitation of our present study, not a strength, because the explanations for levels of influence reported in our surveys remain unknown.

Our measures of teachers' work settings in this study were limited to the direct supports for instruction available in the school (e.g., availability of a written curriculum, adequacy of time for professional development, adequacy of budget) and the extent of teachers' workloads, defined in terms of class sizes, distribution of students with special needs, availability of teaching assistants, and number of subjects taught.

METHOD

Sample

This study was part of a larger study, Learning From Leadership (Leithwood et al., 2004), and it used a subset of data collected as part of the first round of surveys for the larger study. States, districts, and schools were selected for this and the larger study using stratified random sampling procedures:

- 9 states were selected to ensure variation in geography, demographics, state governance for education, curriculum standards, leadership policies, and accountability systems;
- 45 districts within the 9 states were selected to represent variation in size and student diversity (e.g., race/ethnicity, family income), as well as trends in student performance on state accountability measures; and
- 180 schools within the 45 districts were selected to ensure variation in school level (elementary, middle, and secondary), student diversity, and evidence of success in improving student achievement throughout 3 years or more.

All teachers and principals in each school were asked to complete the surveys providing some of the evidence for this study.

The achieved sample of data used for this study included responses by 2,570 teachers (77% response rate) from a total of 90 schools in which 4 or more teachers completed usable surveys and for which usable student achievement data were available.³ Table 1 presents a summary of the characteristics of our achieved sample.

Sources of Evidence

Student achievement. Data used to measure student achievement across schools were collected from state Web sites. These data were schoolwide results on state-mandated tests of language and mathematics at several grade levels over 3 years (2003–2005). For purposes of this study, a school's student achievement was represented by the percentages of students meeting

TABLE 1
Sample School Characteristics

<i>Characteristic</i>	M	SD
Student diversity (1 = <i>low</i> , 3 = <i>high</i>)	1.97	0.71
Students eligible for free lunch (%)	43.82	27.67
Achievement at proficiency or above (%)	67.19	24.27

or exceeding the proficiency level (usually established by the state) on language and math tests. These percentages were averaged across grades and subjects to increase the stability of scores (Linn, 2003), thereby resulting in a single achievement score for each school for each of 3 years. Our analysis also included an achievement change score, calculated as the gain in percentage of students attaining or exceeding the state-established proficiency level from the first to the third year for which we had evidence.

Teacher perceptions. Responses to 49 items from a 104-item survey administered to teachers provided data for this study. On average, the complete survey required about 20 min to complete, and it measured the collective leadership and teacher performance antecedents described in our framework: 9 items, collective leadership; 9 items, teacher capacity; 17 items, teacher motivation; and 14 items, teacher work settings and conditions.

Each item used to measure collective leadership concerned a single source of influence, including district administrators, principals, other school administrators, some individual teachers, teachers with designated leadership roles, staff teams, some individual parents, parent advisory groups, and students. Regarding each source of influence, respondents were asked to rate the extent of direct influence on school decisions (6-point scale). Respondents were also asked to rate the extent to which they agreed with statements about each of three antecedents of teacher performance (also on a 6-point scale).

Analysis

Individual responses to the teacher survey, aggregated to the school level, were merged with school-level student achievement results. SPSS was used to calculate means, standard deviations, and reliabilities (Cronbach's alpha) for scales measuring the four variables for this study. Paired-sample *t* tests were used to compare mean ratings of various sources of leadership. An analysis was carried out to test the factor structure of the

teacher variables included in the study. Hierarchical multiple regression was used to examine the moderating effects of student socioeconomic status (SES) on some relationships in our framework. Finally, LISREL was used to test a model of the relationship among collective leadership, teacher motivation, capacity and setting, and student achievement. This path-analytic technique allows for testing the validity of causal inferences for pairs of variables while controlling for the effects of other variables. Data were analyzed using the LISREL 8.80 analysis-of-covariance structure approach to path analysis and maximum likelihood estimates (Joreskog & Sorbom, 1993). We used four goodness-of-fit statistics to assess the fit of our path model with the data: the root mean square error of approximation, the norm fit index, the adjusted goodness of fit index, and the root mean square residual.

RESULTS AND DISCUSSION

Results are reported in four sections, three of which include a discussion of the results. The first section summarizes responses to the teacher survey and provides information about the statistical properties of our measures, including the results of a factor analysis regarding the measures of teacher capacity, motivation, and setting. The remaining sections report evidence relevant to each of three questions addressed by the study: the impact of collective leadership on key teacher variables and student learning, the relative influence of different collective leadership sources, and the relationship between different patterns of collective leadership and student achievement.

Summary of Evidence

Table 2 reports the internal reliabilities (Cronbach's alpha) of the scales used to measure each of three antecedents to teacher performance—capacity, motivation, and work setting—and the measure of collective leadership. Overall mean ratings of the antecedents are not reported, because z scores had to be calculated to accommodate the use of different response scales. Variable reliabilities were calculated using the z scores. Responses to all variables ranged between slight agreement and moderate agreement, with low to moderate standard deviations. All scales achieved acceptable levels of reliability (between .72 and .96).

Of the 40 items in the survey measuring the three teacher antecedents, 9 measured capacity, 17 measured motivation, and 14 measured work setting. The dimensionality of these 40 items was analyzed using principal component factor analysis. The scree test and the interpretability of the factor

TABLE 2
Reliabilities for Variables

<i>Variable</i>	<i>Cronbach's Alpha</i>
Capacity	.86
Motivation	.96
Setting	.91
Collective leadership	.72

NOTE: $n = 90$ schools; z scores were used to calculate the aggregate values for the capacity, motivation, and setting. Collective leadership was calculated from the sum of nine sources of leadership, each rated on a 6-point scale from *no influence* to *very great influence*.

solution were used to determine the number of factors to rotate. Three factors were rotated using a varimax rotation procedure. The rotated solution yielded three interpretable factors that corresponded very closely with the three variable categories—capacity, motivation, and setting. Capacity accounted for 14.4% of the item variance; motivation, 13.9%; and setting, 8.6%.

Although our initial conception of the three teacher variables suggests a number of distinct subdimensions, these were not supported by the factor analysis. As such, aggregate scores for the three teacher performance antecedents were used in all subsequent analyses. Also in response to the results of the factor analysis, two of the original items measuring capacity and seven of the items measuring motivation were omitted from subsequent analysis.

Collective Leadership Effects on Teachers and Students

Table 3 reports correlations among measures of all variables in the study. As these results indicate, collective leadership is significantly related to all three teacher variables. The strongest relations are with collective leadership and teachers' work setting ($r = .58$), followed by teacher motivation ($r = .55$). All variables but teacher capacity are significantly related to student achievement: Teachers' work setting has the strongest relationship ($r = .37$), followed by teachers' motivation ($r = .36$) and collective leadership ($r = .34$). These data also indicate significant relationships among the teacher variables.

Figure 1 and Table 4 report the results of the LISREL calculation to further test our model of relationships between collective leadership, teacher capacity, motivation and work setting, and student achievement.⁴ This model is an excellent fit to the data (root mean square error of approximation = .00; root mean square residual = .03; adjusted goodness of fit index = .93; norm fit index = .99) and, as a whole, explains 20% of the variation in student

TABLE 3
Relationship Between Survey Variables and Student Achievement:
Pearson Product–Moment Correlation Coefficients

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Collective leadership	1.00	.36**	.55**	.58**	.34**
2. Capacity	.36**	1.00	.44**	.20	.01
3. Motivation	.55**	.44**	1.00	.54**	.36**
4. Setting	.58**	.20	.54**	1.00	.37**
5. Achievement	.34**	.01	.36**	.37**	1.00

NOTE: $n = 90$ schools.
 ** $p < .01$ level (two-tailed).

TABLE 4
Results of Structural Equations Modeling

<i>Variable</i>	<i>Residuals</i> <i>(Explained</i> <i>Variance)</i>	<i>Total Effect on Achievement</i>		
		<i>Indirect</i>	<i>Direct</i>	<i>Total</i>
Achievement	.80 (.20)			
Capacity	.87 (.13)	.08	-.17	-.09
Motivation	.56 (.44)		.30*	.30*
Setting	.66 (.34)	.10*	.25*	.35*
Collective leadership		.24*		.24*
Fit Indices				
Root mean square error of approximation	.00			
Root mean square residual	.03			
Adjusted goodness of fit index	.93			
Norm fit index	.99			

NOTE: $R^2 = .20$.
 * $p < .05$.

achievement. Collective leadership has significant direct effects on all teacher variables. Its strongest effects focus on teachers’ work setting ($r = .58$), followed by teacher capacity ($r = .36$) and motivation ($r = .25$). Collective leadership accounts for only 13% of the explained variation in teacher capacity.

The paths linking the three teacher variables to student achievement indicate that collective leadership influences student achievement through teacher motivation and work setting. The effect of teachers’ work setting on achievement is significant ($r = .25$), but the effect of teacher capacity is insignificant. Total effects on student achievement are greatest for work setting, followed by teacher motivation and the indirect influence of collective leadership. The

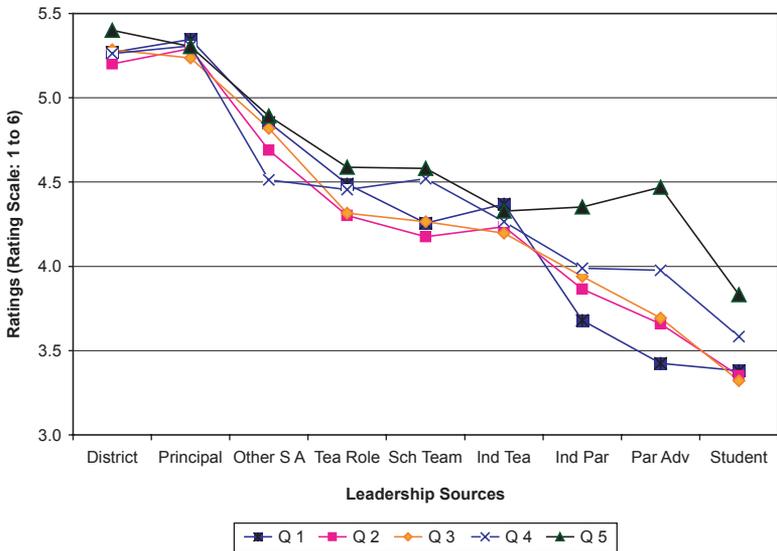


Figure 1. Testing a Model of Collective Leadership Effects on Student Achievement
* $p < .05$.

higher effect for setting is explained by its indirect effect through motivation, as indicated in the data presented at the bottom of Figure 1.

To estimate the contribution of student SES (calculated as the percentage of students in a school eligible for free or reduced-price lunch) to relationships described in the path model between the three teacher variables and student achievement, we computed three hierarchical regressions. In each regression equation, SES was entered first, collective leadership second, and one of the teacher variables third.⁵ Results of these hierarchical regressions, described in Table 5, indicate that only motivation explains a unique and significant proportion of variation in student achievement, after controlling for student SES. Motivation on its own explained 6% of the variation in achievement, whereas setting increased the variation explained by only 1%, in combination with SES and leadership, and capacity decreased the explained variance by the same amount.

In sum, then, these results indicate the following:

- Our model as a whole explains a significant proportion (20%) of variation in student achievement across schools.

TABLE 5
Hierarchical Regression Measuring Effects of Teacher Capacity, Motivation, and Setting on Student Achievement After Controlling for Socioeconomic Status and Collective Leadership

<i>Teacher Antecedent</i>	<i>Beta</i>	<i>t</i>	<i>Unique R²</i>	<i>R²</i>	<i>F</i>
Capacity					
Step 1: Percentage of students eligible for free lunch (SES)				.11	10.57**
Step 2: Add collective leadership				.15	7.55**
Step 3: Add teacher capacity				.14	4.99**
Step 3 significant unique effects					
SES	-.27	2.39*	.06		
Motivation					
Step 1: Percentage of students eligible for free lunch				.11	10.57**
Step 2: Add collective leadership				.15	7.55**
Step 3: Add teacher motivation				.20	7.23***
Step 3 significant unique effects					
SES	-.29	2.66*	.07		
Motivation	.29	2.37*	.06		
Setting					
Step 1: Percentage of students eligible for free lunch				.11	10.57**
Step 2: Add collective leadership				.15	7.55**
Step 3: Add setting				.16	4.60**
Step 3 significant unique effects					
SES	-.24	2.04*	.05		

NOTE: *n* = 76 schools. SES = socioeconomic status.

p* < .05. *p* < .01. ****p* < .001.

- Collective leadership has modest but significant indirect effects on student achievement.
- Of the three teacher variables, the influence of collective leadership on students is through its influence on teacher motivation and work setting.
- Whereas collective leadership does have a significant effect on teacher capacity, this variable is not significantly linked to student achievement in this study.

These results both confirm and contradict evidence from two of our earlier studies, one of which (Leithwood & Jantzi, 2006) incorporated approximately the same measures used in the present study of teachers' capacity, motivation, and work setting. Instead of using collective leadership, however, that study used a measure of individual leaders' transformational practices. In that study, as in the present one, leadership was most strongly

related to teachers' work setting and had weaker effects on teacher capacity than on teacher motivation. This earlier study also reported weaker effects of transformational leadership practices (likely individually provided) on student achievement, as compared with the effects of collective leadership in the present study. This comparison of results should at least be viewed as encouragement for claims about the benefits to students of more widely distributing leadership in schools.

Our second earlier study (Leithwood & Jantzi, 2000) also differed in several important respects from the present study but addressed several of the same questions. Student engagement, rather than student achievement, was used as the dependent variable, and the variables mediating leaderships' influence on students were different from those used in the present study. The measure of collective leadership, however, was almost identical to the measure used in the present study. In contrast to the main findings of the present study, this earlier study found nonsignificant negative effects of collective leadership on students. This important difference in results offers at least modest support for the argument that the choice of mediating variables is a crucial matter in studies of leadership effects on students (Hallinger & Heck, 2002).

The differences that we note among our three studies might well be accounted for by the nontrivial differences in their designs. To this point, consistency is greatest in respect to the effects of collective leadership on teachers' internal states. Specifically, collective leadership has, so far, not been shown to have a demonstrable impact on our measures of teacher capacity—and claims that collective leadership has significant impacts on students have received mixed support. Evidence from other recent studies, however, seems to provide further support this claim, although this evidence has been collected in contexts quite unlike the schools for which we have data. For example, Hiller, Day, and Vance (2006) recently reported significant effects of collective leadership on supervisor-rated team performance in a transportation road maintenance department. They also reviewed evidence from six other studies of collective leadership effects on team effectiveness, concluding that collective leadership is likely to be effective: "When teams are engaged in complex tasks that require large amounts of interdependence, but under more routine conditions . . . the benefits of collective leadership have yet to be demonstrated" (p. 388).

The Relative Influence of Collective Leadership Sources

Data to address this issue were teachers' ratings of the extent of influence on school decisions of the nine measured sources of collective leadership.

TABLE 6
Means and Standard Deviations for Sources of Leadership: Ranked
From Least to Most Direct Influence

<i>Source of Leadership</i>	M	SD
Students	3.49	0.41
Parent advisory groups	3.84	0.58
Some individual parents	3.96	0.49
Some individual teachers	4.28	0.30
Staff teams (e.g., departments, grade levels)	4.36	0.41
Teachers with designated leadership roles	4.43	0.37
Other building-level administrators (not principal)	4.75	0.41
District-level administrators	5.28	0.31
Principals	5.30	0.28
Collective leadership aggregate	4.42	0.24

NOTE: $n = 90$ schools. Rating scale: 1 = none, 6 = very great.

Table 6 reports the mean response of teachers to each source. Paired-samples t tests were calculated to estimate the significance of differences in these ratings of the nine sources of collective leadership. As the table indicates, principals and district administrators were given the highest (almost identical) ratings ($M = 5.30$ and 5.28 , respectively). The small standard deviations of these ratings indicate considerable agreement among respondents about the perceived influence of these two roles. There is a significant drop in the rating of the next most influential role: building-level administrators other than the principal, typically, the assistant principal ($M = 4.75$).

Among teacher sources of influence, teachers with designated leadership roles were perceived to have the strongest influence ($M = 4.43$), followed by staff teams ($M = 4.36$) and then some individual teachers ($M = 4.28$); the ratings of teachers with formal leadership roles were significantly higher than ratings of either staff teams ($t = 3.51, p < .01$) or some individual teachers ($t = 5.54, p < .001$), and the rating of staff teams was significantly higher than the rating of individual teachers ($t = 2.19, p < .05$).

Ratings for parents (some individual parents and parent advisory groups) were considerably lower than those for teachers, ranging from means of 3.84 to 3.96, a statistically significant difference ($t = 3.16, p < .01$). Students were perceived by respondents to have the lowest level of direct influence on school decisions ($M = 3.49$) among all sources of rated influence. The very low standard deviation of ratings for all sources of

TABLE 7
Relationship Between the Sources of Leadership and the Mediating Variables and Achievement: Pearson Product–Moment Correlation Coefficients

<i>Source of Leadership</i>	<i>Capacity</i>	<i>Motivation</i>	<i>Setting</i>	<i>Achievement</i>
Collective leadership	.36**	.55**	.58**	.34**
District administration	.04	.13	.41**	.09
Principal	.22*	.20	.12	-.06
Other building administration	-.01	-.02	.32**	-.11
Teachers in formal roles	.35**	.54**	.34**	.09
Staff teams	.44**	.71**	.44**	.28**
Individual teachers	.23*	.24**	.17	-.08
Individual parents	.16	.10	.34**	.43**
Parent advisory	.32**	.44**	.40**	.56**
Students	.17	.55**	.52**	.30**

NOTE: $n = 90$ schools.

* $p < .05$. ** $p < .01$.

influence, especially for principals, reduces the potential strength of relationships possible with any other variable in our study.

Table 7 reports the relationships between the individual sources of collective leadership and the teacher variables and student achievement (mean annual achievement over 3 years). Among the teacher variables, work setting has a significant relationship with seven of the nine sources of leadership (not principals or individual teachers). This surprising result for principals may be a reflection of the low level of variation in the ratings noted above. The strongest relationship is between motivation and staff teams ($r = .71$). Capacity was the only variable significantly related to principal influence ($r = .22$) and teachers' work setting was the only variable related to other building administrators ($r = .32$) and district-level administrators ($r = .41$).

Teachers in formally designated roles were significantly related to all three teacher variables but not student achievement. Staff teams, individual parents, parent advisory groups and students all have significant relationships with student achievement. Student leadership is most strongly related to motivation ($r = .55$). Parent advisory teams are most strongly related to motivation ($r = .44$) and achievement ($r = .56$), whereas individual parents are most strongly related to achievement ($r = .43$) and weakly to setting ($r = .34$). There appears to be a differentiation between those leaders who are members of the school staff and those who are not. Staff teams have stronger relations with all three teacher variables than with any of the other within-school collective leadership sources, and staff teams are the only in-school source of collective leadership related to achievement ($r = .28$).

We were intrigued to see that the two sources of leadership that had consistently significant relationships with all three of our mediating variables and with student achievement were collectives: Both staff teams and parent advisory groups were identified as having significant correlations with all our mediators, as well as with student achievement. In schools with high levels of student achievement and high ratings for capacity, motivation, and setting, we are more likely to see higher levels of influence from staff teams and parent advisory groups. This suggests that there may be something about the collective nature of these roles that adds to their influence in the schools.

In sum, these results indicate the following:

- School decisions are influenced by a broad array of groups and people, reflecting a distributed conception of leadership.
- The degree of influence on such decisions by these people and groups very much reflects a traditional hierarchical conception of leadership in organizations; teachers rated the influence of traditional sources of leadership much higher than they did nontraditional sources.
- Among teacher roles, the more formalized the leadership expectation, the greater the perceived influence.
- Nonetheless, the influence of parents and students is significantly related to student achievement, likely reflecting the well-known effects of student SES on achievement.

If the profession has become enamored with distributed forms of leadership—as one might be persuaded to believe via current academic and professional literature in the field—the responses of teachers in this study suggest that few changes have occurred in schools that are detectable by teachers. The groundswell of support for distributed conceptions of leadership may well be a kind of meta-rhetoric with little reality on the ground, reflecting a criticism often leveled at schools: that they are more concerned with the appearance of change than with the substance of change as a means of managing public legitimation of their work.

In spite of a decade-long effort to restructure schools—at least in part to give parents greater voice in school decisions (Beck & Murphy, 1998)—we see little evidence of teachers' perceiving much influence from parents or students. This seems likely a reflection of the well-known and persistent challenges that teachers and administrators have faced in creating authentic relationships with parents for school improvement purposes. These results also reinforce two other claims. The first is that significant change in schools requires much more than encouragement and rational argument (Desimone, 2006), strategies that have often been relied on to promote greater parent influence. Second, these results are consistent with Jaques's

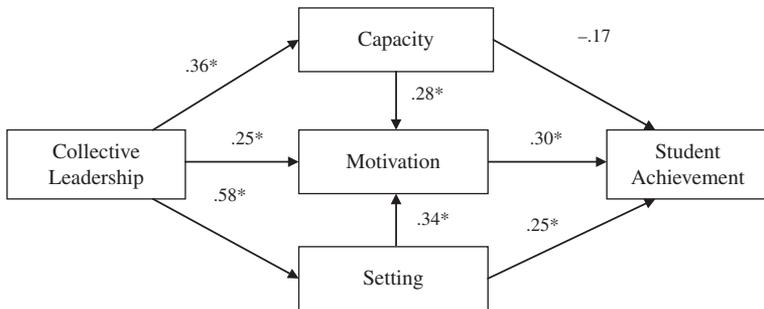


Figure 2 Relationships Between Sources of Collective Leadership Influence and Student Achievement

NOTE: Rating scale: 1–6. Q = quintile. Quintile 1 = lowest mean achievement over 3 years. DST = district; PRIN = principal; SCH-A = other school administrator; TEA = teacher formal role; SCH-T = school team; IND-T = individual teacher; IND-P = individual parent; P-ADV = parent advisory group; STD = students.

longstanding claim (2003) that hierarchy is a necessary and unavoidable feature of any large organization, even though we might add structures and procedures to encourage lateral as well as vertical influence within the hierarchy. If Jaques is correct, current expectations for the extent of possible and desirable leadership distribution in schools will need to be severely modified.

Patterns of Collective Leadership and Student Achievement

As we report above, teachers perceived influence to be exercised in their schools in a distributed but still hierarchical manner. Nevertheless, we were prompted, by the long list found in the literature of proposed benefits to organizations from distributed forms of leadership, to inquire whether variations in these perceptions of influence were related to levels of student achievement in schools.

To address this question, we returned to Tannenbaum's early work (1961) reviewed above on control graphs. Distinguishing schools by mean levels of achievement averaged over 3 years, we constructed a control graph of our own. As Figure 2 indicates, we first divided the schools in our sample into quintiles on the basis of their mean annual student achievement scores. We then compared teachers' rating of each source of collective leadership influence across quintiles.

Results displayed in Figure 2 indicate that teachers in higher-achieving schools (Quintile 5) generally attribute higher levels of influence to all people and groups than do teachers in lower-achieving schools. Even though greater influence is awarded to nontraditional leadership roles in higher-achieving schools, those in traditional leadership roles are perceived to have the same relative amount of influence. For example, increases in the influence of staff teams or parents does not mean less influence for principals and district administrators. Furthermore, schools whose students achieve in the highest and second-highest quintiles award significantly more relative influence to staff teams; highest-quintile schools also award significantly more relative influence to individual parents and groups of parents.

Although we do not include a table reporting all correlations, SES was significantly (and unsurprisingly) related to student achievement—possibly explaining the high level of influence of parents and students in schools within the higher quintiles of performance, which generally serve higher SES students. Correlations of most interest are those between SES and the influence of individual parents ($r = .35$), parent advisory committees ($r = .53$) and students ($r = .36$). The influence of staff teams was also related to student SES as strongly as was student influence ($r = .34$).⁶ Bidwell, Frank, and Quiroz (1997) provide evidence of the relationship between SES and parental involvement but, more interesting, between SES and levels of collegial control in schools. The researchers found that schools in high-SES communities had a propensity to build strong collegial professional practice among teachers and to have a particularly high focus on student learning.

In sum, this evidence indicates that those in traditional leadership roles remain highly influential in high-performing schools, a result not evident from the correlational analyses reported in Table 6. Reflecting Dunlap and Goldman's distinction (1991) of power-over versus power-through, our results help to illustrate that influence in schools is not a fixed sum and that in the highest-performing schools, everyone seems to have influence, as compared with low-performing schools, where leadership may be *laissez-faire*, an approach to leadership almost invariably found to be ineffective (Bass & Avolio, 1994). We also see continuing support for Jaques's claim (2003) about the inevitable nature of hierarchy in large organizations, along with some indication that *flatter* might not be the holy grail that it has been portrayed to be by some organizational theorists.

Indeed, this evidence and the ideas that it stimulates conform quite closely to a hypothesis prompted by Tannenbaum's conception of control graphs (1961) and proposed by McMahon and Perritt (1971). A decade after Tannenbaum's publication, the authors argued that organizational effectiveness may have less to do with power equalization (less hierarchical

distributions of influence) and more to do with perceived concordance, or agreement across roles in what is the control structure. Their research evaluated the degree to which people in different roles in the organization agreed who was most influential. Given the evidence testing this hypothesis in business organizations, the authors concluded that “this study emphasizes the importance of agreement on the perceptions of the control structure of various hierarchical echelons within an organization” (p. 339).

Of course, we are unable to directly test this claim with our own data, because teachers’ perceptions are all that we have; but it is an hypothesis worth further research in light of the still-unfounded claims about the positive consequences of distributed leadership and flat organizational structures. The pattern of leadership distribution evident among the highest-achieving schools in our study reflects none of Tannenbaum’s prototypical models (1961). It is rather a hybrid composed of the autocratic prototype (influence rises with hierarchical level) and polyarchic prototype (high levels of influence for all). If one were to accept the inevitability and value of hierarchy in organizing, this hybrid would be considered a best-case scenario. Let’s call it *intelligent hierarchy* to reflect the opportunities that this approach affords to ensure that such organizations take advantage of the capabilities and strengths of most of their members while ensuring careful coordination of effort in a common direction.

CONCLUSION

Our study had several significant limitations that need to be taken into account when interpreting the results. First, low levels of variation in survey responses to key variables (in particular, school administrators) placed technical (nonsubstantive) restraints on the strength of relationships found in our study. This characteristic of our data has likely produced underestimates of the strength of relationships reported in our study. Second, whereas our preferred dependent measure was that of change in student achievement over time, we could find no significant relationships between our independent (collective leadership) and mediating (teacher) variables and this measure of achievement. Instead, our findings about the effects of collective leadership and teachers’ capacities, motivations, and work settings used annual achievement measures averaged over a 3-year period. Although this is a reasonably stable measure and permits student SES effects to be accounted for, it reduces the significance of our findings about the role of collective leadership in bringing about change in schools and students; given our correlational design, we cannot claim that it makes such

a contribution, only that there is a significant association between collective leadership and high student performance in schools.

Although this study found, like several of our previous studies (Leithwood et al., 2004; Leithwood & Jantzi, 2006), significant but weak relationships between leadership and teacher capacity, our measure of teacher capacity may be part of the explanation—hence, a third limitation. It is primarily a measure of professional development opportunities—that is, opportunities to learn from colleagues in a variety of ways—rather than a measure of the actual knowledge and skills that teachers need in order to foster achievement with their students. This is a critical matter in a context that persistently urges school leaders to be “instructional leaders” and to take responsibility for improving the knowledge and skills of teachers. If our measure of teacher capacity were an authentic reflection of what teachers need to know and be able to do, then our results suggest that asking leaders, whether solely or in combination, to be capacity builders for their teacher colleagues is a very significant challenge. Teachers’ motivation and work setting, however, seem much more susceptible to leadership influence and so have significant effects on student achievement. Yet, it may be the relationship among all these variables that provides the power to the model. Cobb, McClain, Lamberg, and Dean (2003), for instance, provide some insights into the powerful relationship among leadership, teacher learning, and organizational structures in schools.

Finally, our measure of leadership was unidimensional, limited to influence on decision making. Such a unidimensional conception does not reflect the multidimensional models of leadership practice now common in the literature (e.g., Leithwood & Duke, 1999). By design, our study could not speak to important questions about which sources of leadership are best suited to carry out many different and important leadership functions.

Acknowledging the limitations outlined here, this study extends the conversation currently underway in the leadership literature, largely about the nature and causes of distributed leadership (e.g., Gronn, 2002; Harris & Lambert, 2003; Spillane, 2006), to a consideration of consequences for students. Its purposes were to assess the collective impact on student achievement of the most likely sources of leadership in schools. It also aimed to uncover the sources that have the greatest influence and whether such influence varies among schools with different levels of student achievement.

Results suggest that collective leadership does explain significant variation in student achievement across schools. The influence of collective leadership was most strongly linked to student achievement through teacher motivation. Finally, patterns of leadership influence differed among schools with different levels of student achievement. As compared with schools whose students achieved in the lowest 20% of our sample, schools whose

students achieved in the highest 20% attributed considerably more influence to most sources of collective leadership. Furthermore, parents and students were perceived to be relatively influential in those schools, as compared with the lower-performing schools.

Implications for Research

There are at least three types of implications from this study to consider in the design of future studies of distributed leadership effects. The first concerns the independent variable—how leadership is conceptualized and measured. Whereas few previous studies have attempted to assess the link between distributed forms of leadership and student achievement, a number of distributed leadership studies have adopted multidimensional conceptions of leadership functions as the basis of their work. For example, Firestone and Martinez (2007) examined teacher and district sources of leadership using a conception of leadership functions, including developing and maintaining a vision of an effective school or district; developing and managing a culture to support that vision; providing encouragement; procuring and distributing resources; supporting the growth and development of people in the organization; and monitoring instruction, innovation, and the overall climate. Spillane et al. (2007) inquired about the leadership distributed among teachers and principals, using a taxonomy of leadership functions that includes administration, curriculum and instruction, observation, and professional growth. Mayrowetz, Murphy, Louis, and Smylie (2007) conceptualized leadership functions as including the following: providing and selling a vision, providing encouragement and recognition, obtaining resources, adapting standard operating procedures, monitoring the improvement effort, and handling disturbances. And Leithwood et al. (2004) used dimensions associated with a transformational conception of leadership to inquire about how such functions were spread across many roles.

Locke (2002) has argued, convincingly in our view, that leadership functions may differ in terms of roles that are best suited to carry them out. He claims, for example, that establishing a widely shared vision, a function included in almost all models of leadership, is best exercised by those close to the top of the organizational hierarchy. Acknowledging the multidimensional nature of a leader's functions appropriately multiplies the complexity of questions about collective leadership effects by a large number. It also allows for a much richer conceptualization of collective leadership patterns, as compared with the conception used in this study. Future research would do well to assess the effects of significantly different patterns of collective leadership on the basis of functions included in multidimensional conceptions of leadership.

A second set of implications for future research concerns the choice of mediators. As Hallinger and Heck (1996) concluded from their oft-cited review of evidence, few direct-effects leadership studies report significant effects on students, whereas indirect-effects studies often do. The challenge for indirect-effects studies like the present one, however, is to select mediating variables that are susceptible to influence by leaders and that are, in turn, powerful enough to have significant effects on students. As the Hallinger and Heck review indicated, many such variables have been adopted as mediators—for example, school culture, school climate, school goal-setting process, programs and instruction, resources, attitudes toward change on the part of teachers, and more. Although we have used many of these variables in our own previous work (e.g., Leithwood & Jantzi, 1999, 2000), we aimed for something more parsimonious in the present study. Teacher motivation and work setting were clearly good choices. Capacity might be. But future research will need to develop a measure of such capacity that more directly reflects the actual capacities and skills that teachers need in order to improve student achievement.⁷

It also might be useful to adopt mediators with powerful known effects on students, even if previous evidence still leaves unanswered questions about the potential or actual influence of leadership on them. Examples of such mediators include teacher efficacy (Bandura, 1986), trust in leaders (Tschannen-Moran & Hoy, 2000), the newly formulated concept of academic optimism (Hoy, Tarter, & Woolfolk Hoy, 2006), and disciplinary climate, a significant explanation for variation in achievement in the latest results of international student testing by Organization for Economic Co-Operation and Development (Ma & Willms, 2004).

Finally, future research aiming to identify forms and patterns of distributed leadership capable of improving the student achievement would do well to use either value-added or change-over-time measures of student achievement, whenever possible.

Implications for Practice

Our introduction to this study alludes to the popularity of distributed leadership as a desirable approach to leadership practice in schools. Justifications for the optimistic consequences associated with this approach to leadership invoke democratic values, shared expertise, the commitment that arises from participation in decision making, and more (e.g., Pearce & Conger, 2003). Although many of these justifications seem reasonable, we note a contrarian literature concerned with lack of coordination, hints of anarchy, unrealistic time demands on those not in formal administrative

roles, and the like (e.g., Bryk, 1998). The present study, provisional as it is, suggests that the truth of the matter is somewhere in between. Whereas much of the optimistic literature argues for a form of distribution close to Tannenbaum's power equalization hypothesis (1961), our results actually approximate something much closer to McMahon and Perritt's concordance hypothesis (1971). Within a fairly traditional hierarchy of influence, ways need to be found to build on the expertise of all staff.

Recognizing that some form of leadership distribution has always been a necessary feature of school and other professional organizations, there is (as yet) no empirical justification for advocating more planful distribution of leadership as a strategy for organizational improvement beyond those important efforts to enlist the full range of capacities and commitments found within school organizations.

NOTES

1. Although this focus represents a shift in educational leadership research from a preoccupation with the leadership of those in formal roles, the roots and direct study of distributed sources of leadership can be traced back to the mid-1920s. Pearce and Conger (2003) provide a very useful synopsis of these roots and trace their evolution to the present.

2. We are indebted to Karen Seashore Louis for drawing our attention to this paper and the wider body of related evidence.

3. We were able to generate data on the socioeconomic status of only 76 schools, so the calculations for tables drawing on this measure have been adjusted to use this smaller sample.

4. Although a number of iterations of our framework were run testing relationships in a variety of ways, we present here only the results that proved statistically significant. Per the LISREL model presented, $\chi^2 = 1.97$, $df = 2$, $p = .37$.

5. Note that the order in which variables are added to the model has an influence on the strength of the relationship. In our analysis, leadership adds 3.6% to the 11.3% explained variance from socioeconomic status. Entering collective leadership first explains 9.2%; introducing socioeconomic status at Step 2 provides an additional 5.7% for the same total of 14.9%. If they are entered at the same time, socioeconomic status explains 6.8%, leadership explains 4.6%, and their combined effect explains the other 3.5% to the total 14.9%.

6. These correlations are all significant at the $p < .01$ level (two-tailed).

7. Our larger project includes an observation measure that serves this purpose, but such data are only available for a subsample of the 90 schools used for this study.

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