FINAL REPORT: HIGH-NEEDS SCHOOLS — WHAT DOES IT TAKE TO BEAT THE ODDS?

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EXECUTIVE SUMMARY

Both state and local education officials feel a sense of urgency about reducing achievement gaps and raising the level of knowledge and skills of all children. If the intent of the No Child Left Behind Act (NCLB) is to be realized, all children will meet state standards in reading and mathematics by 2014. Research-based knowledge about how to organize schools to achieve these goals, however, is limited. Although a long history of effective schools research has generated lists of critical effectiveness factors, relationships among them have not been extensively researched. Therefore, in this study, a quantitative comparative study design was used to answer questions about how four key components in schools interrelate and what differentiates high-performing (HP) from low-performing (LP), high-need schools.

This study focuses on elementary schools, where it is critical that students develop foundational knowledge and skills in preparation for later advanced coursework. For the study, McREL selected a sample of high-needs elementary (PreK/K–6) schools, defined as moderate- to high-poverty, with 50 percent or more of students eligible for free or reduced-price lunch (FRL). High- and low-performing were defined according to school performance on state assessments in both reading and mathematics over a three-year period (2000, 2001, and 2002). Schools performing above and below levels predicted by their demographic characteristics (e.g., percentage students eligible for FRL) were categorized as HP and LP, respectively.

Each of the four key components (Leadership, Professional Community, School Environment, and Instruction) was defined based on prior research. McREL developed a survey to measure teachers' perceptions of the components as defined. Briefly, three or four subcomponents or elements defined each component. Leadership involved shared mission and goals, instructional guidance, and organizational change. Professional community involved professional development, collaboration, and support for teacher influence. School environment involved academic press for achievement, safe and orderly climate, assessment and monitoring, and productive parental involvement. Instruction involved individualizing and structuring instruction and feedback and providing challenging opportunities to learn.

More than 1,000 teachers in 76 (49 HP and 27 LP) high-needs elementary schools across 10 states completed the survey. These data were analyzed using structural equation modeling in a manner that accounted for the teacher data nested within schools. In general, results indicated that the same configuration of relationships among the four key components adequately fit the data from both HP and LP schools. In other words, for this sample of high-needs schools, there were no differences between high- and low-performing schools in the relationships among Leadership, Professional Community, School Environment, and Instruction.

The relative role of each relationship, or path, hypothesized between each pair of the four components also was examined. Of the six relationships, the relationship between Leadership and School Environment was strongest (with a path coefficient of about 0.86). The relationship between Leadership and Professional Community was nearly as strong (with a path coefficient of about 0.75). Leadership's relationship to Instruction appeared to be indirect, indicated by two other pairs of significant and moderately strong relationships, one pair connecting Leadership and Environment (.86) and connecting Environment and Instruction (.53), and one pair connecting Leadership and Professional Community (.75) and connecting Professional

Community and Instruction (.55). The direct relationship connecting Leadership and Instruction was an inverse relationship and small in magnitude (.31). The finding of indirect relationships connecting Leadership and Instruction is consistent with other models of principal leadership. In these models (e.g., Heck, Larsen & Marcoulides, 1990), the primary role of the principal in enhancing student achievement is in influencing school-wide climate, policies and practices and supporting teacher quality and input.

McREL also found that teachers in high-performing, high-needs schools, as compared to teachers in low-performing, high-needs schools, were more strongly favorable about some of the school components. Effect sizes associated with the differences between high-performing and low-performing schools were calculated for each of the four components. The largest effect size was for School Environment (.67), followed by Instruction (.34) and Leadership (.22). Thus, favorable ratings of the identified components by teachers in high performing schools were one quarter to two thirds of a standard deviation above those of teachers in low-performing schools.

There are several possible implications of the present findings. The discovery that the model of relationships applied to *both* the high-performing and the low-performing schools suggests that reorganizing low-performing schools may not be a priority. Rather than having to reconstruct the model of relationships in a low-performing school to move students toward improved achievement, it may be a matter of strengthening the role of leadership in influencing school-wide policies and practices and in supporting teacher quality. However, this and other present findings need to be interpreted with caution. The researchers acknowledge possible sample biases, for example, those associated with the voluntary nature of study participation. Further study, involving different samples of schools, is needed to examine the stability of the conclusions and inferences that might be drawn from the present research.

INTRODUCTION

> The goal of the No Child Left Behind Act parallels what educators have long set their sights on: to equip every child with the knowledge and skills necessary for success in future schooling and in life (Cicchinelli, Gaddy, Lefkowits, & Miller, 2003, p. 7).

To expand the research base available to educators to guide their efforts to improve student achievement in high-poverty elementary schools, Mid-continent Research for Education and Learning (McREL) conducted a multi-state study of academically successful high-needs schools. This study was launched in response to the goal of the No Child Left Behind (NCLB) Act of 2001 that all students demonstrate proficiency in reading and mathematics by 2014. Under the current trajectory, however, it is not clear that schools nationwide are prepared to meet this goal: in 2002–2003, for example, more than 25,000 schools did not reach their target for annual yearly progress (AYP) (Quality Counts, 2004). In this study, the focus is on elementary schools where preventing students from falling behind is critical for later entry into and success in advanced coursework in high school.

McREL's line of inquiry, also pursued by other researchers, was to identify "beat-the-odds" schools, high-needs schools that were having success with improved student achievement, and compare them with comparable low-performing, high-needs schools. Studies of successful districts (Sammons, 1999; Shields, Knapp, & Weschler, 1995; St. John & Pratt, 1997) indicated the importance of high expectations for student accomplishment, pervasive instructional focus, competent local leadership, supporting relationships with the national reform community, teachers able to use national standards to guide instruction, and local programs such as reform-based professional development. This study also focuses on a systemic approach within the context of high-needs schools.

This technical report on the research on academic success in high-needs schools is intended for use by researchers whose scholarship addresses school effectiveness. In particular, this report is intended to advance understanding of how, from a systemic perspective, different school components work together in elementary schools serving moderate to low-income communities across multiple states. In other presentations, reports and briefs, McREL will continue to disseminate these findings to other audiences, such as state and local educators and decision makers who will be able to use the findings to help evaluate options when adopting approaches to school improvement. This introduction provides a brief review of the project's origins and purpose. The next section, Conceptual Framework, includes an overview of the conceptual framework and the research design. The Research Design and Methods sections summarize the method: sampling, data collection, and analysis. In the Results and Discussion sections of the report, study results are presented and discussed.

PROJECT ORIGINS

The issue addressed by this project is the limited research available to educators about the factors associated with success in high-poverty schools and whether high-performing, high-needs schools are organizationally different than low-performing, high-needs schools. Effective schools research generally examines academic success broadly, across different socio-economic contexts. Although several researchers have examined effectiveness in high-poverty schools (e.g., Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Teddlie, Stringfield, Wimpelberg, & Kirby, 1989), research in the current context of standards-based education and accountability is needed. Within the current context, the predominant methodology has been case study research. Based on this research, HPHN schools are characterized by comprehensive use of content standards to align curricula, teaching, professional development, and assessment (The Charles A. Dana Center, 1999; The Education Trust, 1999; Togneri & Anderson, 2003). One explanation of this effectiveness is that coherence brings about academic success. Without the inclusion of demographically comparable, low-performing schools, however, the practice of using standards as a unifying focus or other factors as potential explanations for success remains unverified.

The purpose of McREL's study was to examine the adequacy of a comprehensive model for representing the systemic links and connections among different functions in the organization of successful schools. We sought a model of school organization that would compare the key components, and the component interrelationships, of high-performing, high-needs schools with those of low-performing, high-needs schools. It was not clear at the outset if the same model would accurately represent both types of schools. In fact, we expected to find separate models for high- and low-performing schools.

Pilot studies conducted by McREL suggested that several features distinguished the high-performing (HP) from low-performing (LP) high-needs schools.

- Teachers in HP schools demonstrated a stronger sense of responsibility for student learning than teachers in LP schools (Lauer, 2001).
- High-performing schools provided teachers with significantly more professional development focused on content standards and diverse learners than LP schools (Lauer, 2001).
- Teachers in HP schools, as compared with LP schools, more frequently reported using adaptive instructional practices, including leveled books in reading, as well as tutoring to individualize instruction in both mathematics and reading (Akiba & Apthorp, 2003; Apthorp, 2002).

These distinguishing features — a strong sense of responsibility for student learning, attention to diverse and individual student learning profiles, and an emphasis on content-focused professional development — are consistent with other research (Garet, Birman, Porter, Desimone & Herman, 1999; Goddard, 2001; Hill & Rowe, 1998). Research and understanding about how the features and others interrelate, however, was limited. To conceptualize a model, we reviewed and integrated literature from four lines of research.

CONCEPTUAL FRAMEWORK

The conceptual framework for this research project is based on an integration of four lines of research related to the role of instruction, school environment, professional community, and leadership in effective schools.

INSTRUCTION

Classroom instruction, which gives students the opportunity to develop proficiency in state or local academic standards through teacher guidance, curriculum content, and a variety of learning activities, is the core work of schools. Prior research suggests three subcomponents of instruction are likely to be critical for student academic success in high-needs schools. These include (1) structure, (2) individualized, responsive instruction, and (3) opportunity to learn cognitively challenging content.

Structure helps to make goals and expectations clear for students. Teachers in high-performing high-needs schools, as compared to low-performing high-needs schools, more frequently and explicitly teach students how to independently manage their work, actively guide and coach them through study or exploration, and are more proficient in classroom management (Brookover, Beady, Flood, Schweitzer & Wisenbaker, 1979; Crone & Teddlie, 1995; Mortimore, Sammons, Stoll, Lewis, and Eco, 1989; Teddlie, Virgilio & Oescher, 1990; Taylor, Pearson, Clark, & Walpole, 2000). Systematic motivational strategies (e.g., specifying learning and behavioral goals and awarding prizes when goals are met) entice student engagement, and, in turn, are associated with higher achievement of students with low socioeconomic status (Heistad, 1997). Meta-analytic reviews also have concluded that the use of explicit instruction and feedback is positively associated with higher student achievement in both elementary mathematics and reading (Baker, Gersten, & Lee, 2002; National Reading Panel, 2000).

Structured instruction, however, does not necessitate rigid, non-responsive instruction. In successful high-poverty, inner city schools, teachers are caring and generous in their efforts toward assisting rather than dismissing struggling learners (Weber, 1971). Student performance data and resources are used to *individualize* classroom instruction and learning activities. Use of informational systems, such as but not limited to Accelerated Reader™ and Accelerated Math™, which identify individual student skill levels, match activities and books or problem sets, and provide feedback on individual progress, is associated with increased student academic engagement and achievement (Baker, Gersten & Lee, 2002; Topping & Sanders, 2000; Ysseldyke, Spicuzza, Kosciolek & Boys, 2003). Tailoring instruction to individual learning profiles results in positive academic achievement gains (Hill & Rowe, 1998; Waxman, Wang, Anderson & Walberg, 1985).

Opportunity to learn is defined as the enacted curriculum, including both the content and cognitive demand represented in what teachers say and do (Porter, 2002). Both the content and cognitive demand of class work appear to be more challenging in high-performing, as compared to low-performing, high-needs schools. In Title I schools, emphasis on developing higher-order thinking for comprehension (as measured by developing writing skills and an appreciation for the importance of writing) is significantly related to higher student achievement in reading (D'Agnostino & Hiestand, 1995; Lauer, Palmer, Van Buhler, & Fries, 2002; Puma, Karweit, Price, Ricciuti, Thompson, & Vaden-Kiernan, 1997). In Title I school mathematics, although emphasis on remedial instruction was positively related to achievement in grade 1, emphasis on remedial instruction was somewhat negatively related to math achievement in grade 3 (Puma et al., 1997).

Research supports the conceptualization of effective instruction in high-needs schools as encompassing these three, complementary subcomponents. To provide students with clear goals and expectations, instruction is structured; to recognize and respond productively to student diversity, instruction is individualized; to align classroom experiences with challenging content standards, instruction includes challenging opportunities to learn. We posit that all three subcomponents are necessary, and together, help explain why some high-needs schools are academically high-performing while others are not. In this study, relationships between instruction and each of the other three key components, school environment, professional community, and leadership are posited as directly leading to instruction.

SCHOOL ENVIRONMENT

School environment refers to those school-level variables that relate directly to the school environment and cannot be ascribed to a particular position (i.e., teachers, curriculum coordinators, or principals). Rather, these factors reflect policies created at the school, district, or community level that impact the entire school faculty, parents, and students.

Research conducted in the area of effective schools identified many school-level factors that correlate with increased school-level effectiveness (Creemers, 1994; Heck, 2000; Teddlie & Reynolds, 2000; Scheerens, 1992; Marzano, 2000). These include parent involvement, a safe and orderly school environment, highly operationalized expectations and requirements, outstanding leadership, practice-oriented staff development, an emphasis on basic skill acquisition, appropriate monitoring of student progress, and coordination of curriculum. In order to create a more parsimonious model but one that incorporates the variables that research has indicated to be the most critical, McREL researchers examined a recent school effectiveness synthesis (Marzano, 2000). This synthesis highlighted several key factors: school climate, monitoring, parent involvement, and pressure to achieve. Because of the consistency of these factors in previous school effectiveness studies, and in Marzano's research synthesis, they were identified as the critical components of school environment that would be included in this research design. Four subcomponents of school environment, the variables to be observed, were identified: (1) orderly climate, (2) assessment and monitoring, (3) parent involvement, and (4) academic press for achievement.

Orderly climate in an effective school is most frequently characterized as one that supports school safety and an orderly environment. A school with an orderly climate has policies in place that clearly articulate rules and codes of behavior, along with associated rewards and punishments. In such a setting, students, faculty, and staff understand the policies and the policies are consistently followed. In addition, an effective school encourages the "thoughtful prevention" of disruptions, and ensures that enforcement and punishment are dealt with consistently (McCollum, 1995). The literature on school climate clearly stipulates that this does not mean that the school has a strictly negative or severe environment but, rather, that positive and open interactions between staff and students are encouraged (Rutter, Maughan, Mortimer, & Ouston, 1979; Creemers, 1994; Hallinger & Heck, 1996; Heck, 2000; Marzano, 2000).

One can easily make the inference that a school with an orderly environment would promote a more academic atmosphere and thus increased student achievement because, with fewer disruptions, students could be more productive, and teachers could focus on monitoring students' progress and working on academics**.** Research indicates that when a school reports fewer incidences of disciplinary problems, there is a decrease in achievement differences between White and minority students (Raudenbush & Bryk, 1989). A safe and orderly school environment was one of the most important variables in helping low-achieving students (Borman & Rachuba, 2001).

Assessment and monitoring in an effective school is a complex system that occurs at all levels — school, classroom, and student. This evaluation policy and monitoring system includes testing, identifying learning problems, and providing remediation (Teddlie & Reynolds, 2000; Creemers, 1994). Principals play a large role in this process by examining the overall progress of the school, using data to make program and resource decisions, evaluating teachers' performance, and giving teachers time to share assessment results and strategies for incorporating results in their classrooms. Teachers, in turn, need to place a strong emphasis on using assessment results to determine students' progress toward learning critical content and to make instructional decisions on student assessment results. Monitoring also helps teachers focus on important core goals, monitor progress, and provide remedial assistance. (McCollum,1995; Mortimore et al., 1989).

Parent involvement in an effective school should be viewed in terms of the degree to which there is a positive and productive relationship between the school's staff and students' parents (Teddlie & Reynolds, 2000). This includes determining not only how involved parents are in the school but also how much their voice is represented in the school culture and operating principles. In order to accomplish this, there must be good written exchange between schools and parent, a parent involvement policy, and ready access to administrators and teachers. An informal open-door policy tends to be more effective — parents helping with reading at home and then also during visits to the school (Mortimore et al., 1989).

Mapp and Henderson's (2002) research synthesis found that most effective parent involvement programs (1) trained parents to work with their child at home (and were sustained over a period of time); (2) involved teachers who communicate regularly with parents (e.g., high levels of outreach – meeting face to face, sending materials parents can use at home to help their children, telephoning parents routinely, but also when there is a particular problem); and (3) linked the parent involvement program to students' learning.

Academic press for achievement asserts that all students will achieve at a high level and is a factor that is cited consistently in the school effectiveness literature as being critical to success (Teddlie & Reynolds, 2000; Creemers, 1994; Marzano, 2000). This component most closely aligns with the nature of effective schools because it is a necessary factor in helping low-achieving students perform to standards. Researchers Teddlie and Reynolds (2000) found that the ability to instill in students a belief that they could learn was critical to the success of low-SES, effective schools. The underlying components of this factor include a clear focus on mastering basic skills, high expectations for all students, the use of records to monitor student progress, and a clear, school-wide emphasis on high achievement (Marzano, 2000). Pressure to achieve in an effective school involves the use of homework, setting clear academic goals, and having high expectations.

In this study school environment is posited as having a direct relationship leading to instruction. Additionally, the relationships between leadership and school environment and between professional community and school environment are posited to be direct and leading to school environment.

Professional Community

A professional community is defined by shared norms and values, collective focus on student learning, collaboration, deprivatization of practice, and reflective dialogue (Louis, Marks, & Kruse, 1996; Newmann, King, & Secada, 1996). Secada and Adajian (1997), as cited in Grodsky & Gamoran, 2002) included collective control over important decisions in their definition of professional community. In this study, three subcomponents of professional community, the variables to be observed were identified: *professional development, collaboration and deprivitization*, and *support for teacher influence.*

Professional development within a community of learners is an important aspect of professional community. Research by Garet, et al. (1999) supports the importance of collective participation by teachers in changing teachers' instruction. Newmann and Wehlage (1995) also found that professional development has a greater impact school-wide when the entire staff participates and it is continuous. In their study of professional development**,** Smylie, Allensworth, Greenberg, Harris, and Luppescu (2001) found a positive relationship between teacher professional community and the quality of professional development. In addition to quality professional development, reflective dialogue allows teachers to think about, analyze, and share knowledge related to instruction, curriculum, and student learning, which leads to a deeper understanding of teaching (Louis et al., 1996; Secada & Adajian, 1997; Bryk, Camburn, & Louis, 1999).

Collaboration among teachers fosters the sharing of work and expertise, as well as creates a sense of affiliation and support (Louis et al., 1996; Secada & Adajian, 1997; Newmann & Wehlage, 1995). Bruner and Greenlee (2000) examined work culture in high- and low-performing schools and found that there was more collaboration among teachers in schools with higher student achievement. Schools that had a highly developed work culture were more focused on improvement through teacher training and had clearly communicated school vision and goals. Teachers in these schools were recognized for innovation and shared new knowledge with one another. Research also indicates that teachers in professional communities are encouraged to work together in one another's classrooms (*deprivitization of practice)* by team teaching, observing, mentoring, providing feedback, and sharing expertise (Louis et al., 1996; Bryk et al., 1999).

In a professional community, teachers are empowered. Principals and administrators share leadership responsibilities with staff and create ownership of norms, values, mission, and expectations (Hord, 1997; Louis et al., 1996). In order to accomplish this, democratic school structures are put in place and teachers have freedom and influence to respond to issues and offer input (Newmann & Wehlage, 1995, as cited in Louis et al., 1996). A climate of respect from the community, colleagues, and leaders for teachers' input regarding the learning environment supports and sustains the *support for teacher influence* component of professional community (Louis et al., 1996; Bryk et al., 1999).

Researchers have found that the level of professional community has an influence on teachers and on student achievement (Newmann & Wehlage, 1995). In their study of restructuring schools, Louis and Marks (1998) found that professional community was associated with authentic pedagogy and instruction that emphasizes higher-order thinking, deeper understanding, and connections to the real world. This existence of a strong professional community was also found to increase social support for student achievement. Schools in the study that promoted the development of a professional community had higher student achievement. In Newmann and Wehlage's (1995) research on restructuring schools, students in schools in which teachers reported higher levels of responsibility for student learning had higher levels of achievement in mathematics, science, reading, and history (Newmann & Wehlage, 1995).

Given this research base, professional community in this study is posited as having a direct relationship with instruction and school environment.

LEADERSHIP

Several studies, as well as reviews by Hallinger and Heck (1996), Stein and Spillane (2003), and Leithwood and Riehl (2003), were influential in suggesting both the subcomponents of leadership to be measured and the relationships between leadership and the other three components. Six categories of principal leadership activity that distinguish between high- and low-achieving schools have been identified: a) goal setting, b) school-community relations, c) school climate, d) staff development, e) supervision and evaluation, and f) instructional coordination (Heck, Larsen, & Marcoulides, 1990). Heck et al. (1990) developed a predictive model of principal instructional leadership, which includes governance, school climate, and instructional organization as directly influencing student achievement. They drew in part from Hallinger and Murphy's (1985) three domains of instructional leadership: defining school mission, creating a positive learning climate, and managing the school's instructional program. Since we had already placed school environment and professional community as key factors in the model categories related to those were not needed in leadership. We also drew from McREL's emerging work on leadership adding organizational change to goal setting and instructional guidance. Thus the three subcomponents of leadership, the variables to be observed, were identified for this study: *shared mission and goals, instructional guidance*, and *redesigning the organization.* The subcomponents are measured using eight to ten items each focused on aspects indicated in the paragraphs below.

Shared mission and goals deals with framing, communicating, and enlisting engagement in a common mission and a set of clearly defined goals that determine the areas in which school staff expend their resources. The focus is on linking beliefs and actions in the school, for example, academic expectations, opportunity to learn (OTL), and time for learning. The principal's values and beliefs are known to teachers and are aligned with the mission and goals. The mission and goals are a prominent part of the day-to-day operation of the school.

Instructional guidance includes developing and allocating the resources necessary for effective instruction; ensuring that curriculum, assessment, and instruction are aligned; and monitoring the day-to-day work of teachers in classrooms. It requires knowledge on the part of the principal of curriculum, assessment, and instruction in the primary disciplines of language arts, mathematics, science, and social studies. It also requires an understanding of national and state standards and how they are and can be implemented in the school. The principal must be visible and supportive in classrooms and must maintain information on student performance that can translate into school and classroom practices. In the effective schools literature, Levine and Lezotte (1990) suggest three characteristics of principals that are needed for this area: frequent, personal monitoring of school activities and frequent sense making, support for teachers, and availability and effective utilization of instructional support personnel.

The principal in a high-needs school must "beat the odds" and therefore must be able to make changes in the school policies, structures, and culture (*redesigning the organization*). The principal must draw on a wide array of knowledge, skills, and tools for change to happen: 1) incentives and disincentives to make those changes perceived to result in higher performance, 2) knowledge and ability to communicate the research basis for changes, 3) willingness to risk and support teachers in trying new things, and 4) the ability to generate quick wins and sustain the long march to improvement. Levine and Lezotte (1990) suggest four additional characteristics related to this aspect of leadership: vigorous selection and replacement of teachers, "maverick orientation" and buffering (i.e., stepping into the middle to release tension), high expenditure of time and energy for school improvement actions, and acquisition of resources.

In this study, leadership is posited to have direct relationships leading to each of the other three components, instruction, school environment and professional community.

THE INTEGRATED MODEL

In developing the model it was necessary to specify how the key components would be measured and the order of the influences among them (the direction of the paths connecting the components). As indicated above, the research literature was reviewed in the four areas of leadership, professional community, instruction, and school environment and integrated to suggest a comprehensive model of school practices and policies associated with high academic performance. The literature suggested critical subcomponents or elements of each component to be measured to assess each component. Therefore, the research team developed the model as presented in Figure 1 where each key component was to be measured by the set of subcomponents identified, and the set of relationships among the key components was to be examined as specified by the paths in the order as indicated according to theoretical importance.

Research Design and Purpose

In 2003, a quantitative comparative study design was proposed to examine the adequacy of the model of school success (Apthorp, 2003). This design is appropriate for studying relationships between a presumed cause and effect when both are identified and measured, but in which other structural features of experiments, such as random assignment, are missing (Shadish, Cook, & Campbell, 2002). This project addresses three main research questions which are:

1. What is the configuration or structure of relationships among the key model components of Leadership, Professional Community, School Environment, and Instruction?

2. Is this structure the same for high-performing, high-needs schools and low-performing, high-needs schools?

3. If the configuration of relationships among the key components does not differ between HP and LP groups, what aspects of the model differentiate high-performing, high-needs schools from low-performing, high-needs schools?

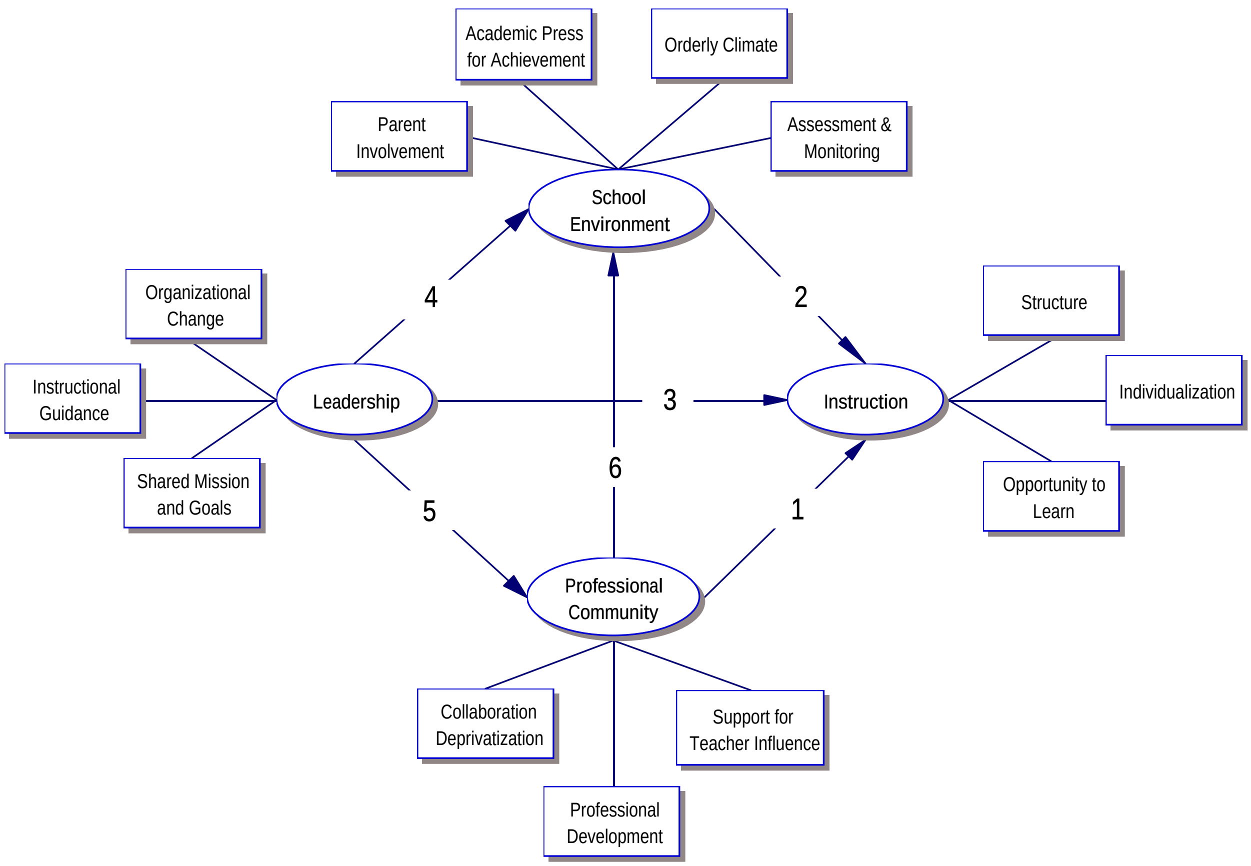

Figure 1. Conceptual model of policies and practices in academically successful high-needs elementary schools.

External reviewers provided feedback on the research design, affirming the general adequacy of the methodology planned, identifying particular aspects of model components that needed clarification, and reiterating the importance of verifying assumptions about the two-group sample proposed for the comparative design. Reviewer feedback was incorporated into our sampling procedures, model refinement, and instrument development. We secured comparable samples of high- and low-performing, high-needs schools, developed and refined the teacher and principal surveys, and collected data. The procedures and results of each of these tasks are described in the following sections of this report.

Method

This section of the report describes the study sample, survey administration, the measures, and data analyses plan.

SAMPLE

A multi-step process was used to establish the final two-group sample of high-needs schools: high-performing and low-performing (HP and LP). In service of the research design, the objective was to create groups of schools similar in demographic characteristics but distinct in performance. Thus, only high-needs schools were included with high-needs defined as high-poverty (50% or more students eligible for free or reduced-price lunch).

The first step was to identify pools of HP and LP high-needs schools. We selected states based on the following criteria (1) assessment systems with established standards-referenced proficiency levels in reading and mathematics at grade 3 or 4 and (2) the availability of three consecutive years (2000, 2001, and 2002) of school-level data from such assessment systems. By examining *Quality Counts* reports and state websites, 14 states were identified that met these criteria. Of these, 11 states either made their school-level performance data available when requested.

Second, within each state, the population of high-needs elementary schools was identified and each school was assigned to one of two performance level groups (HP and LP) based on the results of a regression formula applied to school-level demographic and performance data. The regression formula predicted performance based on the percentage of FRL students, percentage of minority students, and locale. A cut point of a 0.75 standard deviation above or below predicted score was used to define HP and LP. Schools whose performance was above the cut point were identified as HP and schools whose performance was below the cut point were identified as LP. Additionally, to minimize potential overlap in the two samples, the bottom one-third of schools from the HP and the top one-third of schools from the LP lists were removed from the sample to magnify the differences between the two groups.[1]

These two steps resulted in a pool of 739 HP and 738 LP high-needs schools from across a total of 11 states. The number of HP and LP schools per state ranged from 17 in Minnesota to 291 in Texas (See Appendix A, Table A-1 for distribution of HP and LP schools across states).

The last step in establishing the sample was to invite school participation. District superintendents were contacted first; and with their approval, school principals then were

[1] A cut-point of a +0.75 residual was used to define HPHN schools and a -0.75 residual to define LPHN schools. Use of $\pm$ 0.75 residuals as the cutoff points has been recommended for creating consistent school effectiveness indices (Crone & Teddlie, 1995).

contacted and recruited. As soon as approval from the principal was obtained, teacher recruitment began. All teachers in a school were invited to participate.[2]

Our intent was to recruit all schools in a district. Participation was voluntary but also contingent upon both superintendent and principal approval. Follow-up opportunities were offered, incentives and gestures of appreciation provided to encourage both school-wide and teacher participation, including:

- minimal data collection burden; only a one-time survey to be completed online at the respondent's convenience;
- summary report of the study's findings;
- chance for teachers to win a gift certificate from a national book store; and
- $1 gift certificate per teacher to local fast-food restaurant, and
- chance to receive professional products, such as *Teaching Reading in Social Studies* (Doty, Cameron & Barton, 2003).

Recruitment began at the district level. In each state, district superintendents did or did not respond to the recruitment; in each district responding, principals did or did not respond or agree to participation. Principals' reasons for declining participation included prior commitments to other data collection efforts (e.g., for state or national accountability purposes) or desire to maintain focus and attention on their current school improvement efforts (e.g., Reading First and Comprehensive School Reform). The final sample included only schools where at least 5 teachers or at least 25 percent of the faculty participated in the data collection.

Schools

The final sample consisted of 76 high-needs elementary schools, grades PreK through 6. The schools were located in 10 states and included 49 HP and 27 LP schools. As intended, the HP and LP groups of schools differed with respect to student performance. On average, over 70 percent of students performed at proficiency or above in the HP schools, as compared to 40 percent of students in the LP schools. Since data collection occurred two years after identification of HP and LP status, stability of performance level was checked for 2002–2003 and 2003–2004. Data for this purpose were available for 59 (78%) of the 76 schools in 8 of the 10 states. Performance level (HP/LP) remained stable in all of the schools for which data were available.

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[2] For the purposes of this study, teachers were defined as professionals who provide student instruction as their primary responsibility in either classroom or small group pull-out sessions. This includes special content teachers (e.g., music, PE, computer lab, etc.), English as a Second Language (ESL) teachers, Title I teachers, reading teachers, reading or mathematics coaches, and long-term substitute teachers. This definition does not include professionals who provide related and/or health services, such as school psychologists, nurses, guidance counselors, speech and language pathologists, or parent liaisons/coordinators.

In terms of school demographics, the HP and LP groups were not significantly different on three of the four variables. The HP and LP groups were not significantly different in size (as measured by student enrollment) nor in percentage of students eligible for free or reduced lunch rate (FRL). Neither distribution of HP and LP schools by locale nor state was significantly different. Thirty-three percent of the schools are located in rural areas, 26 percent in midsize cities, 25 percent in large cities, and 16 percent in small towns. Schools in the LP group, however, had a significantly higher average percentage of minority students (see Table 1). The difference between these two groups was analyzed using a nonparametric test which showed statistically significant (<0.05) differences in percentages of minority students in HP and LP schools.

Table 1. School Demographics (Means and Standard Deviations) for HP and LP Groups

	Groups	
School Demographic	HP (*n* = 49)	LP (*n* = 27)
Student Enrollment	345 (183)	353 (219)
Percentage of Students on FRL	66.07 (12.32)	71.08 (11.98)
Percentage of Minority Students	36.52 (27.78)	53.67* (33.52)

* significantly different, $p \leq 0.05$

Selection bias in the study sample was explored by examining the similarity between the group of schools that agreed to participate and the schools that were recruited but did not participate. Results revealed some differences between the participant and non-participant groups of schools. As can be seen in Table 2, the schools that did participate in the study had a lower mean percentage of students who qualified for free and reduced price lunch, a lower percentage of minority students, and a significantly higher mean academic performance score than the non-participant schools. These differences limit the generalizability of the findings, clearly restricting the types of schools to which the findings might apply to schools with rates of participation in FRL program around 63 percent and minority group membership around 50 percent.

Teachers

A total of 1,053 teachers completed the Teacher Survey; 312 teachers in LP schools and 741 teachers in HP schools. Per school, the average teacher survey completion rate was 67 percent in HP schools and 57 percent in LP schools.

Survey respondent teachers in the HP and LP groups did not significantly differ in terms of their role in the building. In both groups, the majority of teachers (66%) were regular classroom teachers. Remaining teachers in both groups of schools were Special Education teachers (12%), Title I teachers (5%), teachers of Art, Music and other specials (8%), and others (3%). In both the HP and LP groups, teachers were distributed across grade levels as follows: about 10 percent at each grade level, including PreK/K, 1, 2, 3, 4, and 5/6, and about 33 percent teaching multiple grades.

Table 2. School Variable Means and Standard Deviations for Participant and Non-Participant Groups

	Groups of Schools	
School Variable	Participant (*n* = 76)	Non-Participant (*n* = 1290)
Achievement[3]	-0.28 (1.13)	-0.59* (1.26)
Percentage FRL	63.01 (19.40)	70.85* (18.41)
Percentage Minority	50.33 (28.62)	68.63* (29.75)

*p<0.05

There were no significant differences between teachers in the HP and LP groups with regard to years of teaching experience, certification, or highest degree earned. In the HP schools, teachers on average had taught for 14.7 years (8.1 in the current school) and in the LP schools, teachers on average had taught for 13.6 years (7.6 in the current school). In each group, 83% of the teachers hold a professional certification to teach. Ninety-nine percent of the teachers had a bachelor's degree, 49 percent had a master's degree, 16 percent had an education specialist degree, and six teachers (.6%) had a doctorate degree.

SURVEY ADMINISTRATION

Invitations and informed consent letters that accompanied the teacher survey were sent electronically to each teacher in each participating school. Teachers agreeing to participate completed online surveys during one of two data collection periods: March 1 to June 30, 2004 (Wave I) or August 23 to October 31, 2004 (Wave II). The same survey content was used for both data collection periods. Questions asked about activities and practices at their school during the 2003–2004 school year. Survey items were written in the present tense for the Wave I data collection and in the past tense for the Wave II data collection.

The survey consisted of five major sections: four sections addressed the model components and one section asked respondents about their professional preparation, certification and experience. Examples of survey items are shown in Table 3. It was our expectation that the survey data would produce scales reflecting each model component and that each scale would be comprised of three or four subscales.

[3] Achievement was determined based on mathematics and reading proficiency on the state assessment. These scores were then averaged across three years and z-scores were created for each school.

Table 3. Sample Teacher Survey Items for Each Model Component and Subcomponent

Model Component & Subcomponents	Sample Teacher Survey Item
School Environment	
Assessment & Monitoring	Teachers in my school have opportunities to collaboratively use assessment results to discuss student progress.*
Academic Press for Achievement	A primary mission of my school is that all students become proficient in core subjects.*
Safe & Orderly Climate	Rules are well understood and enforced by staff and students.*
Productive Parental Involvement	School staff and teachers are open to suggestions from parents.*
Leadership	
Shared Mission and Goals	Administrators, teachers, and parents share a common vision of school improvement.*
Instructional Guidance	The principal provides guidance for the teachers in knowing what effective classroom practice is.*
Organizational Change	The principal is comfortable making major changes in how things are done.*
Professional Community	
Professional Development	My professional development occurred in sessions that were connected and built on one another.**
Collaboration	Teachers meet with other teachers on lesson planning or other collaborative work related to instruction.**
Support for Teacher Influence	Most teachers and staff members feel comfortable voicing their concerns in this school.*
Instruction	
Individualizing Instruction	I use academic materials specific to individual student skill levels.*
Structure	My students focus their discussions on lesson objectives.**
Challenging Opportunities to Learn	My students take tests requiring open-ended responses (e.g., descriptions, justifications of solutions).**

* Response options: Strongly Agree, Somewhat Agree, Neither Agree nor Disagree, Somewhat Disagree, Strongly Disagree
** Response options: Great Extent, Considerable Extent, Some Extent, Very Limited Extent, Not at all

MEASURES

Characteristics related to scale sensitivity, reliability, and standard error of measurement had previously been examined for sufficiency using data from the first data collection period (Wave I) (Apthorp, Barley, Englert, Gamache, Lauer, Van Buhler, & Martin-Glenn, 2004). To check whether survey items were functioning in a comparable manner for the second data collection period (Wave II), differences in item discrimination indices were examined for each item in the context of the variability of these indices for the Wave I data. An item was flagged for review if there was a difference between the Wave 1 and Wave II indices of more than one-half a Wave 1 standard deviation of that index. In addition, items exhibiting more than a one point difference in means between Wave I and Wave II respondents were flagged. Flagged items were then reviewed by the content experts for construct-related issues that would result in systematic differences in the measurement for the two data collection periods. No items needed to be deleted. A series of eight tables in Appendix B provides the comparison information for the Wave 1 and Wave II data for each of the four scales.

Once item performance was examined and deemed sufficient for use of the combination of the Wave I and Wave II dataset, participant responses to each item were transformed to enable interpretation along a common scale and ensure that each item reflected the intended, equal weighting in the aggregations for the subscales.[4] The appropriate subscale scores were then summed to create composite scores for each of the subscales. All subsequent analyses utilized the combined Wave I and Wave II dataset.

Reliability and validity information for the 1,053 teacher respondents is provided in Appendix C. All four total scales yielded reliability estimates greater than 0.90 for this group of teacher respondents. As would be expected due to the fewer number of items, the subscale reliability estimates were generally less than those for the total scales; subscale reliability estimates ranged from a low of 0.76 for *Assessment and Monitoring* to a high of 0.91 for *Shared Mission*. As shown in the Appendix Table C-1, all subscales evidenced either a standard error of measurement (s.e.m.) of less than 4% or a reliability estimate in excess of 0.80 for this group of respondents. Correlations of overall scales to the respective subscales were strong, ranging from approximately 0.80 to 0.86, and subscales exhibited noticeably lower correlations with other overall scales within the survey as shown in Appendix Table C-2. Thus, with this group of respondents, each subscale appears to provide reasonably stable information about the construct measured, and patterns of relationships between scales and subscales are generally consistent with that expected for coherent and unique scales.

[4] For detail see *McREL's Study of Academic Success in High Needs Schools: Mid-point Progress and Measurement Viability*, Regional Educational Laboratory Contract #ED-01-CO-0006 Deliverable #2004-11. Item responses were placed on a z-score scale to maintain the intended equal weighting of item content during the aggregations to observed scores and, thus, to maintain the essential characteristics of content validity given the research literature in these areas. Results from the confirmatory factor analysis supported continuing the planned analyses based on these data. Use of observed scores based on unscaled item responses would, of course, have required that a fundamentally different set of content findings had been identified from the literature.

DATA ANALYSIS

Given our interest in determining the interplay among a number of variables, the data were analyzed using Structural Equation Modeling (SEM) using MPlus software which accounts for the fact that teacher perception data are nested within schools (Muthen & Muthen, 2003). Using this analytical methodology, although not typically used in school evaluation, allowed for a more rigorous analysis of the data and supplied a more comprehensive picture of relationships between model components. As we describe the analysis plan and report results, we refer to the model components as latent variables and the subcomponents, specified to assess each key component, as observed variables.

Accounting for the nested design of the data is essential to a more accurate understanding of effective schools (Raudenbush & Bryk, 2002; Bryk & Driscoll, 1988; Raudenbush & Bryk, 1992; Phillips, 1997). One of the main issues in traditional analyses is the fact that Ordinary Least Squares regressions conducted at either the school or student level are inadequate because they do not take into account the dependency among the outcomes for the teacher data. This can result in an underestimation of standard error.

In the analysis for this study, MPlus allowed for teacher data to be specified as 'nested' within schools and for schools to be defined as clusters rather than estimating a multi-level model in which schools were treated as units of analysis. Specifying that the teacher data were clustered within schools was determined to be sufficient because it would allow for an accurate calculation of the standard errors based on the nonindependence of teachers in schools. Moreover, a multilevel model was considered unnecessary because examination of the Intraclass Correlation Coefficients (ICCs) for the latent variables indicated only a small portion of the variance was accounted for between schools (0.01-0.12).

The data were analyzed in two stages:

1. Establishment of a <u>measurement model</u> to link (a) item responses to observed variables[5], and (b) observed variables to hypothesized latent variables (components).

2. Estimation of a <u>structural model</u> that includes relationships between latent variables.

The first step in the data analysis plan is to utilize factor analysis to examine the measurement model. These analyses provided evidence that the items loaded appropriately on the intended observed variable and thus a scale score could be created for each observed variable based on item scores. A second factor analysis confirmed that the observed variables also loaded onto the intended latent variable.[6] The second step is to conduct Structural Equation Modeling (SEM)

[5] The observed variables in the model are the subcomponents indicated by rectangles as shown in figures 1 and 2. Observed variables are those that have scores associated with them. In this case, item responses were aggregated to create observed variable scores.

[6] The latent variables are the components indicated by the ovals as shown in figures 1 and 2.

analyses using a multigroup framework to examine how the relationships between the latent variables might differ between HP and LP schools.

RESULTS

The goal for the measurement model stage was to both (1) collect information that would address questions relevant to measurement that might impact the hypothesized structure of the model, and (2) provide evidence that the items were loaded as intended to justify continuing to the structural stage of the analysis.

MEASUREMENT MODEL

Exploratory and confirmatory factor analyses were conducted to examine the factor structures of the intended observed and latent variables using responses of teachers to the survey items before clustering teachers by school. The quantitative results of these analyses were consistent with the theoretical expectations that the items could be combined to create an observed score variable. It was therefore determined that these scores could then be used in subsequent analyses.

Exploratory Factor Analyses (EFA)

Two sets of exploratory factor analyses (EFA) were conducted. The first set of EFAs examined item loadings on each intended observed variable or subscale (for example, items such as "Rules are well understood and enforced by staff and students" for Safe & Orderly Climate). This analysis was conducted to test whether items could be combined to form a single score for each observed variable. Second, we conducted an EFA to examine the degree to which the observed variables (such as Safe and Orderly Climate) loaded on the intended latent variables (such as to Environment).

Item Response Loadings on Observed Variables. A separate EFA was undertaken for each intended observed variable. With few exceptions, the results of these factor analyses reflected item loadings consistent with the intended subscales. Each exception was examined in the context of the literature-based rationale. Given this review and the advice concerning model modification of Arbuckle (1999), no items were deleted or reassigned to another subscale. Details of these analyses are provided in Appendix D. Based on the results of these analyses, it was determined that subscale scores could appropriately be derived from the set of item responses intended as measures of each observed variable.

Latent and Observed Score Variables. The next analysis examined the degree to which these observed scores loaded on the latent variables. The results of this single EFA indicated that, in general, the observed variables loaded as expected on their theorized latent variable. Table 4 provides the loadings of observed scores on the latent variables. Bolded numbers indicate the expected factor for the loading. The Environment latent variable, for example, shows bolded numbers for the loadings of all four of the observed variables that were theorized to comprise this variable.

There were several observed variables that either loaded on multiple latent variables or loaded on latent variables other than those hypothesized. Observed variables that loaded on variables other than the theorized latent variable are shown in Table 4 as hatched cells. For example, *support for teacher influence*, in addition to loading on Professional Community (PC), also loaded on Leadership (LDR). The loading of *support for teacher influence* onto Leadership is high (0.70) relative to the degree that it loaded on the construct of its expected latent variable. Upon reflection, this makes theoretical sense, due to the role that principals or school leaders have in facilitating and giving power to teachers to make decisions. Even though the intended loading of *support for teacher influence* on Professional Community is small (0.15), allowing this observed variable to remain with Professional Community is theoretically appropriate to reflect teacher initiative and active participation. As such, we allowed this subscale to load on both latent variables in the structural model described in the next major section.

Table 4. EFA Loadings of Observed Variables on Latent Variables

			PROMAX ROTATED LOADINGS			
			Factor 1	Factor 2	Factor 3	Factor 4
Observed Variable	**Theoretical**	**Statistical**	**ENV**	**PC**	**INS**	**LDR**
Parent Involvement	ENV	ENV	**0.50**	0.02	0.00	0.26
Academic Press	ENV	ENV	**0.58**	-0.07	-0.03	0.35
Orderly Climate	ENV	ENV	**0.49**	-0.10	0.05	0.39
Assessment and Monitoring	ENV	ENV	**0.64**	0.35	-0.09	-0.05
Collaboration/ Deprivitization	PC	PC	0.05	**0.58**	-0.06	0.17
Professional Development	PC	PC	-0.07	**0.68**	-0.07	0.26
Support for Teacher Influence	PC	PC/LDR	0.11	**0.15**	-0.01	0.70
Shared Mission and Goals	LDR	LDR	0.23	0.01	0.04	**0.70**
Instructional Guidance	LDR	LDR	-0.06	0.18	0.03	**0.82**
Organizational Change	LDR	LDR	0.05	0.18	0.02	**0.74**
Individualization	INS	ENV/PC/INS	0.38	0.38	**0.10**	-0.09
Structure	INS	INS	-0.02	0.08	**1.18**	0.06
Opportunity to Learn	INS	PC/INS	0.07	0.45	**0.21**	-0.14

In addition, there were two variables that were hypothesized to load on *Instruction* (INS) but instead loaded more strongly on School Environment (ENV) and Professional Community. Based on prior research cited earlier in the report, Instruction was defined by these three components rather than allowing them to load on latent variables that produced the highest statistical loadings. Furthermore, the three observed variables related to Instruction were theorized to measure classroom practices while School Environment and Professional

Community latent variables were theorized to measure school-wide practices. In short, it was determined that there was sufficient theoretical reason to support the Instruction latent variable as being measured by the three observed variables. To test the appropriateness of this theoretically based decision, the model was rerun with additional paths from *Individualization* and *Opportunity to Learn* to Professional Community and *Individualization* to Environment. The loadings for these paths were not statistically significant, nor did they change the overall model fit significantly. Thus, the paths for these variables were left as they were originally intended.

In summary, results of the first series of EFAs support the intended use of scores derived from item responses as measures of the observed variables in the model. Results of the second EFA support use of the intended loadings between observed variables and latent variables, with a slight modification: s*upport for teacher influence* was deemed to load on both Professional Community and Leadership. All subsequent analyses included this dual loading for *support for teacher influence.*

Confirmatory Factor Analysis (CFA)

The confirmatory factor analysis (CFA) extended the exploratory findings above by examining the comprehensive measurement model with both (1) items specified to load on specific observed variables and (2) observed variables specified to load on theorized latent variables. Fit statistics then were examined to ascertain the adequacy of the comprehensive measurement model. During the process, this analysis also provided data to examine the correlations between the latent variables. These correlations provided guidance for the next stage, in which directional relationships between latent variables would be specified in building the structural model.

Examining the estimated loadings of items on the observed variables showed that, in general, the items loaded well as had been theorized. Appendix E provides details of the results of this analysis. There were eight items with standardized loadings of less than 0.5. The findings for these items were consistent with results of previous item analyses, during which process the project team had reviewed the associated literature and made a decision to retain these items because they reflected a concept important to the overall definition of the observed variable.

As anticipated, the latent variables correlated with each other. The latent variable correlations are weakest for Instruction and the other three factors (ranging from 0.50 to 0.59) and strongest between School Environment, Leadership, and Professional Community (ranging from 0.85-0.93). This is a reasonable pattern of correlation, given that these three variables reflect teachers' perceptions of school-level practices and conditions, whereas *Instruction* reflects teachers' perceptions of their own classroom-level practices. Details of this analysis is provided in Appendix E.

Model Fit

The overall fit of the proposed model to the data can be examined through consideration of a number of fit statistics. Multiple fit indices are generated by MPlus (as is typically the case in SEM software) each of which describes a different aspect of fit (e.g. relative versus absolute). However, there is no generally agreed upon fit statistic or group of fit statistics that would collectively indicate adequate model fit. Rather, multiple indicators should be considered to determine the reasonableness of the model fit.

The model fit statistics show a significant Chi-square (χ^2=10432, df=5030) (see Table 5), typically interpreted to indicate that the fit of the model is significantly worse than if it was just-identified[7] (low and non-significant values are desirable). Because the chi-square fit statistic is designed for small sample sizes (i.e. large samples are much more likely to be significant regardless of model fit); the significant value is not surprising. With the relatively large sample sizes in this study, other fit statistic values should be given equal consideration. One option recommended by Kline (1998) is the Normed Chi-Square. This value is the chi-square statistic divided by the degrees of freedom. This statistical adjustment provides some correction for large sample sizes. Kline's recommendation is that this value to be less than three and the calculated value of 2.07 is well within the cutoff. This indicates that although the chi-square test was significant, after adjusting for the large sample, the model does appear to fit the data.

Table 5. Model Fit Statistics

Fit Statistic	Value	Cutoff	Within Cutoff
Chi-Square	10431.546 (df=5030)	$p < 0.001$	No
Normed Chi-Square (χ^2/df)	2.07	Less than 3	Yes
RMSEA	0.05	RMSEA < 0.05	Yes
SRMR	0.07	SRMR < 0.07	Yes

Other fit indices examined included the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) which are statistics that are not biased based on sample size. These fit indices provide evidence of model fit taking into account the parsimony or number of parameters specified by the model. The RMSEA value is at the conventional cutoff score of 0.05 – right at the conventional cutoff of 0.05 for indication of adequate model fit (Arbuckle, 1999; Kaplan, 2000). Likewise, the SRMR is within the typical cutoff of 0.07 (Yu, 2002) providing additional support for the fit of the model. Overall, the results of the fit statistics support the notion that the model adequately represents the data.

STRUCTURAL MODEL

This phase of the analysis addressed two of the three research questions:

1. What is the configuration or structure of relationships among the key model components of Leadership, Professional Community, School Environment, and Instruction?

[7] A just-identified or saturated model is one that fits the data perfectly.

2. Is this structure the same for high-performing, high-needs schools and low-performing, high-needs schools?

To address these two questions, SEM analyses were conducted to examine the structural relationships, identified as paths, initially hypothesized between the latent variables. These analyses estimated the magnitudes of the relationships, as well as the differences in the magnitudes of these relationships between HP and LP groups.

The paths were specified, sequenced, and examined beginning with relationships between Instruction and each of the other three latent variables because Instruction was considered to be the core work of schooling. Instruction, in turn, was hypothesized to be predicted by the nature of a school's professional community, environment, and leadership. The six paths, ordered highest to lowest in terms of theoretical importance, were examined in the following sequence:

Path 1. Instruction predicted by Professional Community

Path 2. Instruction predicted by School Environment

Path 3. Instruction predicted by Leadership

Path 4. School Environment predicted by Leadership

Path 5. Professional Community predicted by Leadership

Path 6. School Environment predicted by Professional Community.

Table 6 shows the Chi-square difference test using the Satorra-Bentler method, the method preferred when using the Maximum Likelihood Method (MLM) of estimation (Muthen & Muthen, 2003). This method involves comparison of results between the analysis that specified the paths to be the same and the analysis that allowed the paths to vary. Chi-square difference testing allowed for a determination to be made about whether specifying the paths as different allowed for a statistical improvement in the chi-square value relative to equalizing the paths for the two groups. At no point in the analysis did allowing differences between HP and LP produce a statistical improvement over equalizing them.

Table 7 provides a summary of the second examination of group differences in terms of standard error. None of the HP and LP coefficient comparisons exceeded the criterion established for two or more standard errors' difference. Overall, the results presented in Tables 6 and 7 suggest that the same model explained the relationships between the latent variables for HP and LP schools in this study.

Table 6. Results of the Satorra-Bentler scaled chi-square analysis

	Specifying HP & LP Path Coefficients to be the Same			Specifying HP & LP Path Coefficients to be Different		
	Regular Chi-Square values	Degrees of Freedom (df)	Scaling Correction Factor	Regular Chi-Square Values	Degrees of Freedom (df)	Chi-Square difference test
Instruction/Prof. Community	501.07	136	1.24	500.45	135	0.45
Instruction/School Environment	501.99	137	1.24	501.27	136	0.52
Instruction/Leadership	498.69	138	1.25	500.10	137	-0.78
School Environment/ Leadership	501.74	139	1.25	498.69	138	1.99
Prof. Community/ Leadership	500.60	140	1.26	501.74	139	-0.68
School Environment/ Prof. Community	501.40	141	1.26	497.15	140	3.80

Table 7. Results of Practical Significance for Test of Standard Error Differences

	HP Standard Error	HP Coef. (N=741)	LP Standar d Error	LP Coef. (N=312)	Weighted Pooled Standard Error	2X Weighted Pooled Standard Error	HP Coef - LP Coef.
Instruction predicted by							
Professional Community	0.063	0.749	0.093	0.814	0.072	0.144	-0.065
School Environment	0.098	0.347	0.079	0.430	0.092	0.185	-0.083
Leadership	0.142	-0.307	0.176	-0.276	0.152	0.304	-0.031
School Environment predicted by							
Leadership	0.050	0.850	0.052	0.914	0.051	0.101	-0.064
Professional Community predicted by							
Leadership	0.049	0.728	0.070	0.769	0.055	0.110	-0.041
School Environment predicted by							
Professional Community	0.058	0.051	0.078	0.157	0.064	0.128	-0.106

Having determined that a single model explained the latent variable relationships for teachers in both HP and LP schools, we then considered whether or not the results confirmed the hypothesized model. Relationships between latent variables were examined by incorporating one path into the model at a time according to a sequence based on what was considered to be the theoretically most important path. For each newly incorporated path, a model analysis was undertaken which established the direction of that path and allowed the remaining paths in the model to correlate in both directions. This involved multi-group analysis to allow that path to differ in strength for HP and LP groups. The resulting HP and LP coefficients were tested for statistical significance of the difference between the HP and LP groups. If the difference was not significant, the HP and LP coefficient values were set to be equal, adding the next theoretically important path. This process resulted in the building of a series of eight successive models.

Path 1 was posited as being the theoretically most important. When this path was specified in the model, it showed a positive and significant relationship (0.675/0.682) (see Model I, Table 8). When Path 2 (was added, this also produced a significant and positive relationship and did not have an effect on the significance of Path 1. When Path 3 was added, this surprisingly produced a negative and significant relationship (see Model III, Table 8).

When Path 4 was added, results indicated a significant and positive relationship (0.860/0.897) (see Model IV, Table 8). Also, this path had relatively little influence on the previously added coefficients. Similarly, the path added in Model V (see Table 8) did not impact the existing coefficients but showed a strong relationship between Leadership and Professional Community. The 6th and final path was the only addition that did not produce a statistically significant path at 0.079/0.077. It also did not impact the strength of the previous paths.

One possible reason why the relationship between Leadership and Instruction was an inverse relationship (Path 3 with a coefficient of about -0.30) is related to the high correlations between the school-wide variables (Leadership, Environment, and Professional Community) (see the end of Appendix E) which resulted in a large amount of shared variance. Because of the shared variance, adding Path 3 did not contribute a substantial amount of unique variance to the model resulting in a negative correlation. In other words, this relationship is likely attenuated by the prior relationships that leadership has with School Environment and Professional Community. As a further check on the nature and role of the negative coefficient between Leadership and Instruction, we conducted another analysis. We removed this Path (Path 3) and examined the effects on the remaining coefficients. The one noticeable change was that the coefficient for the path between Environment and Instruction (Path 2) was considerably lower (0.30). This gave further evidence that the reason for the negative path from Leadership to Instruction might be due to the strong correlations among the variables.

A final consideration in the model analysis is to examine the model fit of the final model or Model VI presented in Table 8. The last two rows show the fit statistics for each progressive introduction of the analyzed model. These fit statistics did not significantly change with each added path which indicates that specifying a direction to each of these paths in turn did not affect the model fit.

Table 8. Pat Coefficients, Standard Errors and Model Fit Statistics

	Model I		Model II		Model III		Model IV		Model V		Model VI	
Paths	HP (SE)	LP (SE)	HP (SE)	LP (SE)	HP (SE)	LP (SE)	HP (SE)	LP (SE)	HP (SE)	LP (SE)	HP (SE)	LP (SE)
1 - Instruction on Professional Community	0.675 (0.057)	0.682 (0.057)	0.459 (0.074)	0.459 (0.074)	0.546 (0.089)	0.542 (0.089)	0.540 (0.089)	0.550 (0.089)	0.539 (0.089)	0.555 (0.089)	0.536 (0.088)	0.557 (0.088)
2 - Instruction on Environment			0.309 (0.083)	0.345 (0.083)	0.504 (0.180)	0.565 (0.180)	0.516 (0.183)	0.553 (0.183)	0.517 (0.184)	0.550 (0.184)	0.517 (0.184)	0.552 (0.184)
3 - Instruction on Leadership					-0.296 (0.146)	-0.371 (0.146)	-0.293 (0.148)	-0.327 (0.148)	-0.295 (0.148)	-0.327 (0.148)	-0.293 (0.149)	-0.327 (0.149)
4 - Environment on Leadership							0.860 (0.042)	0.897 (0.042)	0.723 (0.046)	0.777 (0.046)	0.724 (0.046)	0.777 (0.046)
5 - Professional Community on Leadership									0.860 (.042)	0.897 (0.042)	0.803 (.062)	0.839 (0.062)
6 - Environment on Professional Community											.079 (.058)	.077 (0.058)
Model Fit Statistics												
RMSEA	0.071		0.071		0.07		0.07		0.07		0.07	
Chi-Square (df)	501.07 (136)		501.99 (137)		498.69 (138)		501.74 (139)		500.60 (140)		501.40 (141)	

Multiple fit statistics were examined for this analysis. RMSEA and Chi-square were considered because RMSEA provides information about model fit relative to model parsimony and Chi-square, in general, tends to be cited most frequently in the literature. Although the values for RMSEA and Chi-Square do not meet the generally accepted criteria for model fit, the Normed Chi-Square statistic had a value of 3.56, which may indicate reasonable fit. In fact, while Kline (2005) indicates that a value up to 3 indicates good fit, a value between 3 and 5 may represent adequate fit.

The results of the structural model analysis as presented in Figure 2, confirm most, but not all, of the conceptual model as hypothesized. Five of the six hypothesized relationships were statistically significant with magnitudes ranging from 0.29 to 0.88. The relationship between Environment and Professional Community had a coefficient not significantly different from zero (0.08). Moreover, one relationship between Instruction and Leadership was in the opposite direction from what was hypothesized.

There are several important findings that result from these analyses. First, determining that a single model fits both high and low performing schools seems an extremely important. Rather than reconstructing the relationships in a low performing school to move them toward improved achievement, it may be a matter of working within the existing structures to improve them. In the material that follows the strength and direction of the paths between components are discussed. The numeric value of the path represents the relative influence between two components in this model.

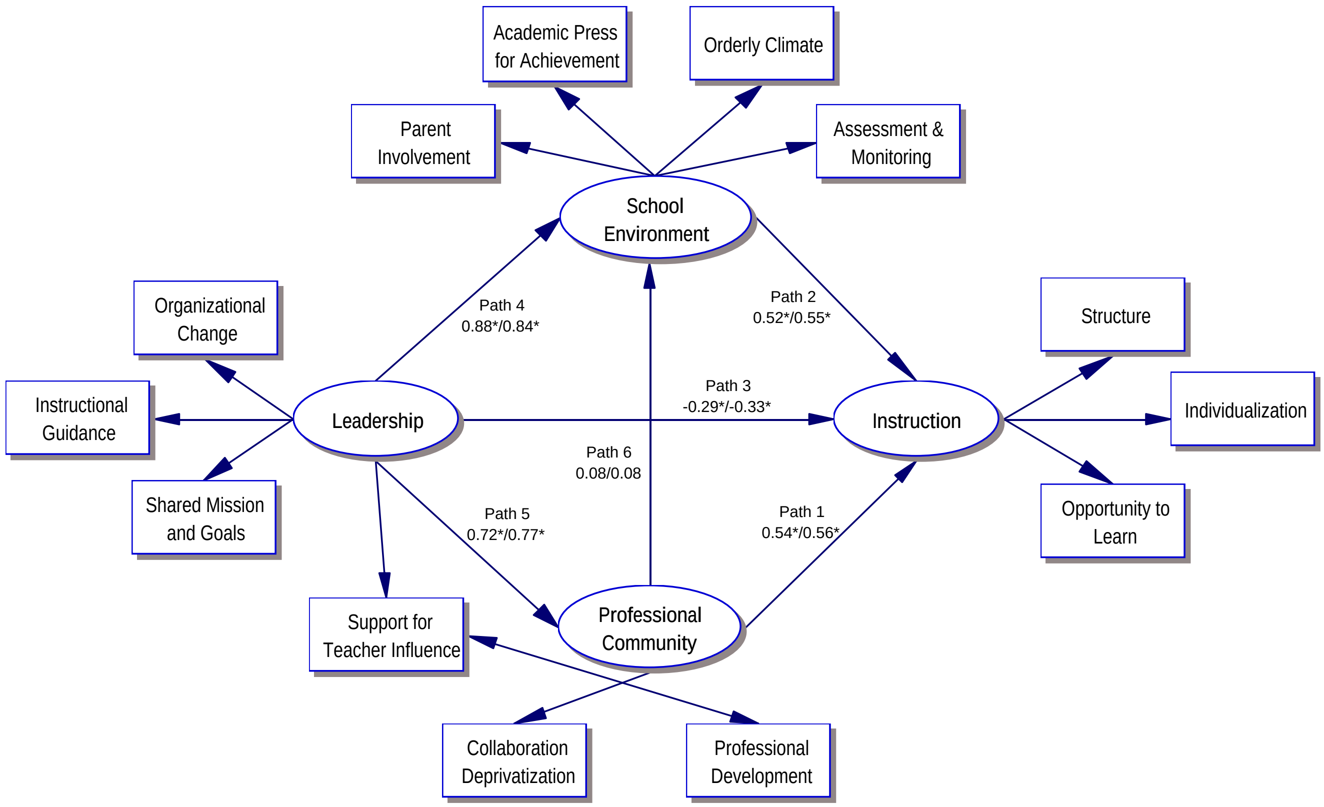

Figure 2. Final Model

INTERRELATION AMONG MODEL COMPONENTS

Next, we present findings regarding the relationships between the model components and their relative strength. In the model, Leadership was hypothesized to be the one component that potentially influences all other components, but is not itself influenced by the others. We refer to such a variable as being "upstream" with "downstream" referring to variables that are directly influenced, or predicted, by other variables. We begin this section with a presentation of findings concerning Leadership.

Leadership

The "upstream" variable is the one variable that influences all other model components, but is not itself influenced by the others. In the present model, Leadership is the upstream variable. From Leadership, there are three paths, Path 3, 4, and 5 (see Figure 2). Leadership's strongest relationship with another component is with school environment (Path 4 = 0.88/0.84). The relationship between Leadership and Professional Community (Path 5 = 0.72/0.77) is nearly as strong. The relationship between Leadership and Instruction (Path 3),is significant, not large, and is an inverse relationship. As previously discussed there is a high level of shared variance among model components which contributes to the inverse relationship, and because the coefficients for the paths already entered into the structural equation are large, there is little unique variance left when the path from Leadership to Instruction is added to the model.

From a broader perspective of the model results, the influence of Leadership on Instruction may be indirect. Both the path that combines Paths 4 and 2 (between Leadership and School Environment and then School Environment and Instruction) and the path that combines Paths 5 and 1 (between Leadership and Professional Community and then Professional Community and Instruction) indicate that classroom effects associated with Leadership are mediated by other in-school processes. This interpretation is consistent with research indicating that principals in effective schools allocate valuable time and energy to influencing internal school-level processes which support attaining student goals (Hallinger & Heck, 1996; Heck, Larsen & Marcoulides, 1990). According to Hallinger and Heck's (1996) review, "sustaining a school-wide purpose focusing on student learning" consistently shows up as a significant factor associated with principal leadership for academically successful schools (p. 38).

Downstream Variables

"Downstream" variables are variables predicted by the other latent variables. Each "downstream" variable played a role in the model that we examined statistically by computing R-squared (similarly, we examined the roles of each observed variable in the model by computing R-squared for each of them). The R-squared values indicate the amount of covariance among observed variables accounted for by that particular variable. This gives an idea of that particular variable's relative position or influence in the model.

As shown in Table 9, the R-squared values for the downstream latent variables are all medium to large indicating that the relationships as specified are linked with an influential construct in the model. With this assurance that each downstream latent variable is moderately positioned in the model, we now turn to a presentation and discussion of each downstream variable.

Table 9. R-squared Values for Downstream Variables

Variable	R-Squared Values for Each Group	
	HP	**LP**
Environment	.742	.810
Parent Involvement	.485	.536
Academic Press	.645	.570
Orderly Climate	.607	.499
Assessment	.463	.487
Professional Community	.524	.603
Collaboration	.510	.503
Professional Development	.576	.628
Support for Teacher Influence	.726	.735
Instruction	.518	.563
Individualization	.455	.474
Structure	.742	.747
Opportunity to Learn	.363	.375

School Environment. The magnitude of the R-squared value for the latent variable of School Environment is large indicating a strong position in the model. There are three paths involving School Environment. The path from Leadership to School Environment has the strongest loading of the three. This is not surprising given the strong theoretical connection between these two latent variables. School leaders often assume prime responsibility for setting the school-wide policies that comprise environment. For example, a principal typically establishes the rules and policies to define and create a school climate that is safe and orderly. In larger schools, there is an assistant principal whose primary role is to ensure rules are established and followed consistently by both staff and students.

The other direct path to the School Environment is from Professional Community. This path is neither practically or statistically different than zero. This finding differs than what was originally hypothesized. However, it is possible that while a strong professional community is important, it does not relate to a strong school environment when all of the variables are included as is the case here; the coefficient for the School Environment and Professional Community path was computed as the 6th and final path added.

Perhaps the most interesting connection is the path between School Environment and the final 'downstream' or dependent variable of Instruction. Because it is assumed that Instruction is the major link to improved student achievement, the significant path from School Environment is important because it links a strong environment with higher levels of good instructional practice. This confirms the research-based observation that environment influences instruction which is included in our model. For example, we would expect a school-wide culture of expecting high levels of performance and norm of assessing and monitoring student achievement would support teachers in providing challenging and appropriate instruction and remedial assistance to students. In addition, it is possible that an orderly climate allows teachers to spend more time on instruction and academics if they are dealing with fewer behavioral issues (Marzano, 2000; Teddlie & Reynolds, 2000; Creemers, 1994).

Professional Community. The R-squared value for Professional Community is of medium size. Three paths exhibit relationships with the latent variable of Professional Community. The path between Leadership and Professional Community was statistically significant and has the strongest path coefficient of the three. There is support for this relationship in the literature, which shows the importance of administrators in establishing professional development policies and assuring their implementation (Bredeson & Johansson, 2000). The path is strong even though the final model accounts for the relationship of the observed variable of *support for teacher influence* between Professional Community and Leadership, not posited in our original model.

The path from Professional Community to Instruction was also statistically significant. This finding suggests that collaboration among teachers, high-quality professional development, and policies that engage teachers in influential decision-making are associated with the quality of teacher instruction. Research on professional community supports this finding. For example, Louis and Marks (1998) reported that professional community was associated with authentic pedagogy and increased social support for student achievement. In Newmann and Wehlage's (1995) study of restructuring schools, collaboration among teachers fostered the sharing of work and expertise, as well as a sense of affiliation and support.

The path between Professional Community and the latent variable of School Environment was not significantly different from zero, although a meaningful relationship between the two was originally hypothesized. This finding is likely explained by the strong relationships of the each of the variables with the latent variable of Leadership. It appears that Leadership mediates the influences of both Professional Community and School Environment resulting in a nonsignificant direct relationship between the latter two variables.

Instruction. It is assumed that good instruction is necessary but not sufficient for students in high-needs schools to achieve satisfactory performance on student assessments. Thus, it is positioned in the model as the most "downstream" variable, the variable predicted by the others and not predictive of any others. Results indicated a relatively strong position for Instruction and linked it to two of the three other latent variables.

The magnitude of the R-squared value for Instruction is medium (0.518 for HP and 0.563 for LP) indicating that it has a viable position in the model. The relationships between Professional Community and Instruction (Path 1) is both positive and of moderate magnitude. This finding supports the idea that instructional competence is enhanced by a professional community involving teacher collaboration and research-based professional development focused on improving classroom instruction (Bruner & Greenlee, 2000; Garet et al., 1999). The relationship between School Environment and Instruction (Path 2) also was both positive and of moderate magnitude. This finding supports earlier claims in research about high-performing, high-need schools. Previous research suggests that school social systems that are characterized by assumptions and norms for high achievement of all students, and support business-like but rewarding classroom environments and practices that focus on learning and mastery, result in generally high achievement (Brookover et al., 1979; Crone & Teddlie, 1995; Mortimore et al., 1989; Taylor et al., 2000; Teddlie, Virgilio & Oescher, 1990).

The path between Instruction and Leadership revealed a relatively weak, and inverse, relationship. This relationship may be attenuated by the prior relationships that Leadership has with School Environment and Professional Community, or may reflect tensions between classroom- and some of leadership practices.

DIFFERENCES BETWEEN HIGH- AND LOW-PERFORMING SCHOOLS

The final analyses addressed the third research question:

3. If the configuration of relationships among the key components does not differ between HP and LP groups, what aspects of the model differentiate high-performing, high-needs schools from low-performing, high-needs schools?

Identifying what, if any, aspects of the model differentiate teacher perceptions in HP and LP schools provides an external validity check on the model in terms of whether or not key components, and relationships among them, are associated with academic performance.

Differences between HP and LP groups with regard to mean scaled scores of the latent variables were examined. The group means were compared for effect size differences. As a reference group, the latent variable means of the LP group were set to zero. The means and effect sizes are shown in Table 10.

The analysis revealed differences between HP and LP groups for three latent variables, School Environment, Instruction and Leadership, with effect sizes ranging from a high of 0.67 (School Environment) to low of 0.22 (Leadership). Teacher perceptions regarding all three of these variables were more positive in HP than in LP schools. These findings reflect medium effects as to differences in HP and LP schools associated with characteristics of School Environment and small effects associated with characteristics of Instruction and Leadership.

Table 10. Effect Sizes for Differences Between LP and HP Schools

Variable	**Scaled Score Means and Standard Deviations**		**Effect Size***
	LP Group (*n* = 312)	**HP Group (*n* = 741)**	
School Environment	0.0	1.187 (1.81)	0.672
Professional Community	0.0	0.037 (2.55)	0.015
Leadership	0.0	.942 (4.14)	0.219
Instruction	0.0	1.001 (2.95)	0.343

* An effect size less than 0.20 is considered too small for interpretation; 0.20 to 0.50 is considered small; 0.50 to 0.80 is considered medium.

DISCUSSION

This study, comparing high-performing, high-needs elementary schools to low-performing, high-needs schools, was designed to identify a parsimonious set of key components and relationships among them in a systemic model of schooling. Initially, it was presumed that models for high-performing and low-performing schools would differ in the relationships among the components.

Having established the adequacy of the measurement model for the observed variables and the key components, we next determined if our theorized relationships of observed variables to latent variables were correct. For the most part they were. Prior literature supported leaving two as hypothesized but allowing support for teacher influence to load on two of the latent variables, Professional Community, as originally hypothesized, and Leadership, not originally hypothesized. All four latent variables are correlated, as might be expected.

We then were able to turn to analyses which considered the model as a whole. There were six paths posited in the model among the four latent variables. In these analyses, we learned that the same set of relationships applied to both the high-performing and the low-performing schools. We also learned that five of the six paths were significantly different from zero.

In the final model, which incorporates all of the components, the strongest relationships were between Leadership and Professional Community and School Environment. The next strongest paths were between each of Professional Community and School Environment and Instruction. The path between Leadership and Instruction was the least significant path and it was negative suggesting, when all of the components are in the model, teachers who were more positive about Leadership were less positive about Instruction and vice versa.

As with any study, there are limitations. The sample of schools and teachers is not a representative sample of the population of high-needs schools. States were selected based on availability of academic performance data. Superintendents and then principals could choose not to participate in the study, proportionally fewer LP than HP schools chose to participate. The biases that this nonrepresentativeness introduces can not be fully understood. While we drew heavily from the existing literature to formulate the model, the literature offered few comprehensive integrated models. Of necessity, we were selective in what we included. Other components of schools could have been considered resulting in very different models. The literature also was at times sparse when hypothesizing relationships among the selected components when placing them all in one model. In identifying the elements of each component to serve as the observed variables. In other words, many other models could be developed and tested.

What we believe is a valuable finding based on this model is that the organization of high- and low-performing schools is not different. It would seem it is not necessary to reorganize a low-performing, high-needs schools in order to move them toward higher performance. Reorganizations are disrupting and divest resources from the everyday work of schools. They can also shift attention away from the core components that must be improved if better student results are to be obtained.

The distinctions between low- and high-performing, high-needs schools are found in the magnitude of difference between HP and LP teacher perceptions of each of the individual components. The largest effect size for the difference was for School Environment (.67), the next was for Instruction (.34), and the third largest was for Leadership (.22).

The final model suggests that the role of leadership is indeed important in shaping or supporting professional community among teachers (i.e., in assuring effective professional development and in supporting collaboration and deprivitization). Leadership is also key in influencing the school environment (i.e., in establishing effective parent involvement and an orderly climate), and in supporting teachers in monitoring student progress and holding high standards for all students. As these two are strengthened, their role in realizing improved instruction is also strengthened.

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APPENDIX A: NUMBER OF SCHOOLS IDENTIFIED FOR EACH SAMPLE POOL

Time of Data Collection	**State**	**Number of Schools in Each Sample Pool**	
		HP	**LP**
Wave I (Mar 1 – Jun 30, 2004)	Ohio	68	79
	Oregon	32	34
	Texas	291	245
	Michigan	79	73
	Minnesota	17	17
Subtotal		487	448
Wave II (Aug 23 – Oct 31, 2004)	Colorado	25	27
	Kansas	23	22
	Georgia	71	84
	Virginia	23	51
	Missouri	54	51
	New Jersey	56	55
Subtotal		252	290
Total		**739**	**738**

APPENDIX B: ITEM FUNCTIONING COMPARISONS FOR WAVE 1 AND WAVE 2 DATA COLLECTIONS

ENVIRON (HP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
School Environment	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	3.90	1.04	0.45	3.87	1.05	0.59	**1.45**	0.15
2	4.31	0.72	0.58	4.27	0.72	0.61	0.43	0.18
3	4.51	0.77	0.50	4.49	0.77	0.53	0.29	0.12
4	4.48	0.74	0.52	4.41	0.76	0.53	0.12	0.31
5	4.76	0.56	0.45	4.73	0.57	0.57	**1.20**	0.12
6	4.51	0.77	0.54	4.40	0.82	0.54	0.04	**0.51**
7	4.09	0.93	0.50	3.98	0.97	0.54	0.42	**0.50**
8	4.76	0.61	0.52	4.72	0.64	0.43	**0.95**	0.18
9	4.80	0.50	0.52	4.76	0.53	0.62	**1.19**	0.17
10	4.56	0.78	0.63	4.49	0.82	0.65	0.29	0.32
11	4.34	0.81	0.44	4.23	0.91	0.51	**0.65**	**0.51**
12	4.65	0.67	0.57	4.58	0.74	0.54	0.32	0.30
13	4.70	0.61	0.64	4.67	0.63	0.61	0.29	0.11
14	4.67	0.62	0.57	4.61	0.69	0.59	0.17	0.26
15	4.65	0.64	0.55	4.58	0.71	0.56	0.12	0.31
16	4.74	0.57	0.55	4.58	0.81	0.55	0.02	**0.72**
17	4.61	0.71	0.60	4.49	0.84	0.54	**0.71**	**0.56**
18	4.19	0.98	0.58	4.04	1.04	0.54	0.48	**0.69**
19	4.65	0.56	0.58	4.57	0.67	0.54	0.39	0.40
20	4.62	0.71	0.56	4.53	0.77	0.55	0.11	0.42
21	4.93	0.35	0.43	4.93	0.33	0.21	**1.42**	0.02
22	4.66	0.71	0.55	4.62	0.72	0.53	0.29	0.17
23	4.61	0.78	0.45	4.61	0.77	0.28	**1.31**	0.00
24	4.59	0.64	0.48	4.55	0.67	0.42	**0.61**	0.16
25	4.65	0.59	0.42	4.63	0.60	0.33	**0.61**	0.10
26	4.66	0.69	0.32	4.65	0.69	0.20	**0.60**	0.08
27	4.37	0.96	0.52	4.38	0.92	0.53	0.11	0.06
28	4.64	0.67	0.47	4.60	0.68	0.40	**0.59**	0.16
29	4.61	0.71	0.53	4.57	0.73	0.56	0.29	0.17
30	4.69	0.63	0.63	4.66	0.65	0.60	0.37	0.17

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

ENVIRON (LP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
School Environment	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	3.81	1.07	0.57	3.54	1.19	0.45	**0.93**	**0.79**
2	4.19	0.73	0.51	4.28	0.75	0.31	**1.32**	0.26
3	4.43	0.77	0.37	4.58	0.67	0.47	**0.66**	0.43
4	4.28	0.80	0.59	4.27	0.81	0.57	0.22	0.02
5	4.68	0.59	0.48	4.63	0.62	0.40	**0.56**	0.14
6	4.18	0.87	0.50	4.40	0.89	0.30	**1.30**	**0.65**
7	3.76	1.02	0.62	3.76	1.06	0.48	**1.20**	0.01
8	4.64	0.68	0.53	4.68	0.66	0.51	0.22	0.12
9	4.69	0.57	0.55	4.72	0.55	0.48	**0.62**	0.07
10	4.35	0.88	0.64	4.43	0.84	0.64	0.03	0.24
11	4.00	1.04	0.65	4.16	0.97	0.53	**1.10**	0.45
12	4.45	0.85	0.63	4.40	0.98	0.47	**1.42**	0.16
13	4.63	0.68	0.69	4.69	0.69	0.54	**1.52**	0.18
14	4.50	0.81	0.65	4.44	0.82	0.55	**0.91**	0.17
15	4.45	0.82	0.66	4.57	0.72	0.61	0.42	0.36
16	4.27	1.08	0.59	4.04	1.09	0.61	0.22	**0.68**
17	4.24	1.02	0.60	4.19	1.07	0.71	**1.11**	0.16
18	3.74	1.09	0.60	3.66	1.25	0.62	0.16	0.23
19	4.40	0.82	0.66	4.44	0.78	0.53	**1.25**	0.13
20	4.35	0.87	0.63	4.35	1.02	0.46	**1.48**	0.02
21	4.94	0.28	0.27	4.96	0.20	0.14	0.44	0.06
22	4.55	0.73	0.50	4.37	1.04	0.65	**1.40**	**0.54**
23	4.61	0.77	0.37	4.82	0.47	0.25	**0.58**	**0.62**
24	4.48	0.72	0.43	4.72	0.54	0.24	**1.01**	**0.70**
25	4.58	0.63	0.41	4.63	0.65	0.24	**0.90**	0.15
26	4.61	0.69	0.33	4.55	0.75	0.35	0.09	0.19
27	4.41	0.84	0.49	4.22	1.00	0.46	0.27	**0.57**
28	4.54	0.70	0.38	4.62	0.64	0.26	**0.64**	0.25
29	4.50	0.75	0.56	4.62	0.68	0.41	**1.18**	0.37
30	4.58	0.69	0.56	4.72	0.63	0.51	0.45	0.41

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

LEAD (HP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Leadership	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	4.14	0.89	0.66	4.06	0.95	0.60	**0.56**	0.40
2	4.25	0.97	0.77	4.29	0.89	0.75	0.23	0.18
3	4.38	0.83	0.71	4.35	0.80	0.69	0.21	0.21
4	4.33	0.91	0.68	4.07	0.96	0.72	0.41	**1.38**
5	4.40	0.90	0.71	4.30	0.90	0.71	0.03	**0.55**
6	4.33	0.88	0.68	4.22	0.87	0.72	0.41	**0.58**
7	4.25	0.97	0.53	4.17	0.96	0.48	0.43	0.45
8	4.00	1.15	0.79	4.09	1.00	0.74	**0.61**	0.48
9	3.24	1.25	0.70	3.98	1.04	0.60	**0.98**	**4.00**
10	3.79	1.21	0.77	3.99	1.06	0.78	0.07	**1.09**
11	4.05	1.11	0.80	3.99	1.05	0.72	**0.96**	0.30
12	4.07	1.06	0.76	4.04	1.01	0.70	**0.68**	0.19
13	3.92	1.12	0.73	4.04	0.94	0.65	**0.85**	**0.64**
14	3.76	1.22	0.01	3.76	1.19	0.07	0.04	0.01
15	4.46	0.72	0.61	4.41	0.74	0.59	0.19	0.22
16	4.29	1.00	0.79	4.42	0.81	0.66	**1.44**	**0.69**
17	4.46	0.75	0.70	4.48	0.67	0.68	0.22	0.13
18	4.12	0.95	0.76	3.99	0.90	0.69	**0.77**	**0.70**
19	3.97	1.06	0.69	3.87	1.04	0.70	0.17	**0.55**
20	4.31	0.89	0.76	4.23	0.79	0.68	**0.80**	0.40
21	4.18	0.94	0.77	4.10	0.91	0.74	0.35	0.41
22	4.14	1.07	0.71	4.14	0.95	0.58	**1.29**	0.01

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

LEAD (LP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Leadership	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	3.93	1.09	0.67	3.79	1.05	0.63	0.38	**0.75**
2	4.15	1.04	0.73	4.09	1.08	0.78	0.47	0.37
3	4.19	0.97	0.76	4.22	0.88	0.75	0.12	0.17
4	4.19	0.94	0.66	4.03	1.01	0.68	0.14	**0.85**
5	4.15	0.99	0.70	4.30	0.97	0.76	**0.55**	**0.81**
6	4.14	1.02	0.77	4.15	1.04	0.74	0.29	0.06
7	4.26	0.98	0.57	4.00	0.97	0.51	0.38	**1.37**
8	3.84	1.19	0.78	3.97	1.16	0.77	0.14	**0.69**
9	3.70	1.20	0.58	3.96	1.11	0.60	0.12	**1.40**
10	3.74	1.18	0.77	3.90	1.11	0.77	0.06	**0.84**
11	3.90	1.09	0.79	3.80	1.18	0.77	0.25	**0.52**
12	4.00	1.07	0.69	3.85	1.12	0.74	0.45	**0.81**
13	3.73	1.17	0.71	3.67	1.19	0.55	**1.31**	0.31
14	3.96	1.13	- 0.06	4.08	1.09	- 0.08	0.02	**0.65**
15	4.27	0.85	0.65	4.27	0.79	0.64	0.09	0.02
16	4.21	0.94	0.70	4.22	1.04	0.68	0.13	0.04
17	4.29	0.85	0.66	4.31	0.79	0.72	**0.53**	0.11
18	3.90	1.05	0.71	3.80	1.07	0.72	0.11	**0.52**
19	3.86	1.01	0.62	3.90	1.09	0.51	**0.78**	0.17
20	4.25	0.84	0.71	4.28	0.87	0.61	**0.91**	0.16
21	4.11	1.00	0.76	3.98	1.17	0.80	0.33	**0.66**
22	4.08	1.08	0.65	4.10	1.07	0.61	0.33	0.14

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

ProfCom (HP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Professional Community	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	3.94	0.94	0.62	3.71	1.00	0.56	**0.72**	**0.62**
2	3.96	1.00	0.56	3.87	1.01	0.53	0.33	0.24
3	4.02	0.97	0.59	3.87	1.06	0.49	**1.23**	0.39
4	3.04	1.03	0.53	2.97	1.09	0.47	**0.68**	0.18
5	3.62	1.09	0.59	3.65	1.08	0.54	**0.67**	0.09
6	3.31	1.14	0.40	3.22	1.14	0.39	0.02	0.23
7	4.30	0.84	0.48	4.25	0.81	0.47	0.13	0.14
8	3.43	1.14	0.50	3.26	1.15	0.42	**0.78**	0.47
9	4.09	0.92	0.61	4.05	1.01	0.60	0.21	0.10
10	3.85	0.95	0.69	3.82	1.05	0.63	**0.78**	0.09
11	3.75	1.04	0.69	3.66	1.16	0.64	**0.79**	0.24
12	3.45	1.09	0.67	3.39	1.16	0.66	0.06	0.16
13	3.73	1.06	0.67	3.60	1.24	0.67	0.01	0.35
14	3.87	0.95	0.68	3.87	1.04	0.65	0.46	0.01
15	3.34	1.20	0.63	3.32	1.29	0.61	0.20	0.05
16	3.84	1.09	0.63	3.48	1.27	0.59	**0.52**	**0.97**
17	3.81	1.20	0.55	4.04	1.13	0.47	**0.93**	**0.61**
18	3.88	1.13	0.56	4.10	0.97	0.53	0.36	**0.58**
19	3.88	1.15	0.41	3.68	1.24	0.44	0.30	**0.52**
20	3.84	1.12	0.64	4.00	1.06	0.55	**1.13**	0.43
21	3.81	1.14	0.59	3.78	1.10	0.62	0.40	0.08
22	4.27	0.93	0.55	4.21	0.84	0.53	0.34	0.17
23	4.44	0.78	0.54	4.47	0.78	0.44	**1.11**	0.07
24	4.28	0.91	0.56	4.24	0.92	0.49	**0.84**	0.11

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

ProfCom (LP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Professional Community	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	3.96	0.91	0.57	3.97	0.94	0.57	0.08	0.02
2	3.96	0.97	0.48	3.86	1.02	0.63	**2.36**	0.26
3	4.13	0.97	0.52	3.93	1.03	0.57	**0.75**	**0.55**
4	3.08	1.10	0.46	3.01	1.11	0.51	**0.77**	0.19
5	3.57	1.09	0.66	3.51	1.06	0.62	**0.85**	0.17
6	3.43	1.14	0.42	3.34	1.20	0.44	0.31	0.25
7	4.28	0.85	0.53	4.22	0.91	0.52	0.04	0.14
8	3.28	1.06	0.47	3.41	1.20	0.51	**0.61**	0.37
9	4.00	0.94	0.63	4.03	0.94	0.63	0.04	0.08
10	3.87	0.96	0.63	3.81	1.02	0.66	**0.50**	0.18
11	3.74	1.06	0.64	3.67	1.10	0.60	**0.70**	0.18
12	3.43	1.13	0.67	3.09	1.08	0.69	0.32	**0.96**
13	3.65	1.18	0.74	3.39	1.17	0.66	**1.65**	**0.73**
14	3.85	1.06	0.71	3.85	0.90	0.60	**2.04**	0.02
15	3.38	1.25	0.60	3.27	1.31	0.57	**0.55**	0.30
16	3.98	0.95	0.60	3.75	1.22	0.55	**0.76**	**0.63**
17	3.69	1.29	0.52	3.53	1.39	0.46	**0.72**	0.42
18	3.94	1.14	0.60	3.91	1.23	0.56	**0.54**	0.09
19	3.89	1.14	0.47	3.14	1.40	0.61	**2.16**	**2.08**
20	3.83	1.11	0.64	3.72	1.24	0.58	**1.10**	0.29
21	3.61	1.21	0.60	3.51	1.31	0.65	**0.90**	0.29
22	4.11	1.02	0.58	3.99	1.05	0.58	0.07	0.32
23	4.27	0.92	0.58	4.33	0.77	0.58	0.06	0.16
24	4.08	1.06	0.59	4.15	0.95	0.51	**1.32**	0.18

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

Instruct (HP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Instruction	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	4.62	0.59	0.34	4.62	0.60	0.34	0.03	0.01
2	4.75	0.51	0.43	4.71	0.54	0.38	0.31	0.06
3	4.66	0.57	0.38	4.56	0.66	0.42	0.26	0.18
4	4.42	0.83	0.40	4.46	0.86	0.36	0.26	0.08
5	4.75	0.51	0.42	4.80	0.45	0.37	0.33	0.08
6	4.66	0.55	0.45	4.58	0.68	0.38	0.41	0.14
7	4.75	0.50	0.44	4.73	0.52	0.43	0.05	0.04
8	4.05	0.91	0.36	4.11	0.93	0.40	0.24	0.11
9	4.04	1.03	0.47	3.98	1.06	0.40	0.47	0.10
10	4.13	0.92	0.37	4.04	0.89	0.36	0.05	0.16
11	4.20	0.81	0.60	4.13	0.79	0.60	0.02	0.12
12	4.56	0.68	0.45	4.46	0.70	0.46	0.08	0.18
13	4.22	0.76	0.63	4.19	0.75	0.59	0.40	0.07
14	3.93	0.91	0.63	3.93	0.87	0.60	0.32	0.01
15	4.02	0.92	0.66	3.92	0.91	0.66	0.00	0.18
16	3.81	1.01	0.65	3.84	0.92	0.58	**0.72**	0.04
17	4.17	0.87	0.59	4.15	0.79	0.50	**0.76**	0.04
18	2.98	1.10	0.61	3.02	1.04	0.57	0.41	0.06
19	3.54	1.06	0.67	3.52	1.06	0.69	0.16	0.04
20	3.09	1.22	0.67	3.09	1.19	0.68	0.06	0.00
21	3.51	1.20	0.60	3.34	1.19	0.64	0.35	0.30
22	2.88	1.19	0.65	2.93	1.12	0.67	0.21	0.09
23	3.33	1.27	0.64	3.34	1.29	0.63	0.11	0.01
24	3.61	1.14	0.67	3.58	1.13	0.65	0.22	0.05
25	3.47	1.16	0.64	3.64	1.10	0.67	0.37	0.30
26	3.51	1.21	0.61	3.48	1.18	0.63	0.18	0.06

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

Instruct (LP)	Wave 2 Responses			Wave 1 Responses			Relative Difference in	
Instruction	Mean	s.d.	Item to scale correlation	Mean	s.d.	Item to scale correlation	Variance Accounted for	Means
1	4.56	0.59	0.46	4.57	0.59	0.18	**1.83**	0.02
2	4.65	0.55	0.50	4.72	0.49	0.40	**0.96**	0.12
3	4.57	0.64	0.50	4.47	0.70	0.39	**0.99**	0.20
4	4.39	0.87	0.53	4.42	0.73	0.43	**0.88**	0.07
5	4.73	0.49	0.52	4.74	0.48	0.48	0.44	0.02
6	4.57	0.63	0.42	4.51	0.77	0.29	**0.90**	0.11
7	4.71	0.48	0.48	4.69	0.56	0.32	**1.32**	0.05
8	3.90	0.97	0.48	3.87	1.06	0.46	0.16	0.06
9	4.00	1.08	0.53	3.81	1.15	0.47	**0.60**	0.35
10	3.96	0.97	0.28	3.85	1.02	0.38	**0.64**	0.20
11	4.06	0.80	0.63	4.06	0.78	0.46	**1.92**	0.00
12	4.40	0.75	0.47	4.36	0.71	0.51	0.37	0.06
13	4.06	0.86	0.64	4.09	0.79	0.56	**1.01**	0.04
14	3.77	0.94	0.63	3.78	0.86	0.48	**1.72**	0.01
15	3.86	0.96	0.64	3.83	0.90	0.64	0.05	0.05
16	3.68	1.04	0.61	3.72	0.98	0.54	**0.83**	0.08
17	4.04	0.90	0.57	3.97	0.87	0.47	**1.00**	0.13
18	3.10	1.12	0.58	2.87	1.05	0.59	0.14	0.42
19	3.59	1.07	0.69	3.53	0.97	0.60	**1.23**	0.12
20	3.11	1.21	0.58	3.11	1.13	0.58	0.06	0.01
21	3.45	1.24	0.65	3.28	1.13	0.62	0.38	0.32
22	3.05	1.15	0.62	2.91	1.14	0.59	0.45	0.26
23	3.34	1.28	0.62	3.17	1.14	0.58	0.47	0.31
24	3.61	1.15	0.73	3.78	0.95	0.58	**2.03**	0.31
25	3.53	1.12	0.70	3.69	0.96	0.57	**1.61**	0.29
26	3.59	1.18	0.67	3.70	1.12	0.46	**2.38**	0.20

*Note: The five response possibilities for each item are scaled to a nine-category z-score continuum.

APPENDIX C: RELIABILITY AND VALIDITY INFORMATION FOR COMBINED WAVE I AND II TEACHER SURVEY RESULTS

Table C-1. Summary Characteristics of Teacher Survey*

Scale	No. of Items	Reliability* (Coefficient Alpha)	s.e.m.* (%)
School Environment	**30**	**0.92**	**4.94 (1.8)**
Parent Involvement	7	0.82	2.19 (3.5)
Academic Press	8	0.84	2.23 (3.1)
Safe and Orderly Climate	7	0.84	2.19 (3.5)
Assessment and Monitoring	8	0.77	2.53 (3.5)
Leadership	**22**	**0.95**	**3.63 (1.8)**
Communication of Mission	6	0.90	1.52 (2.8)
Manage Instruction	6	0.88	1.77 (3.3)
Redesign Organization	10	0.88	2.57 (2.9)
Professional Community	**24**	**0.92**	**4.00 (1.9)**
Collaboration	8	0.83	2.16 (3.0)
Professional Development	8	0.91	1.83 (2.5)
Support for Teacher Influence	8	0.87	2.18 (3.0)
Instruction	**26**	**0.92**	**4.23 (1.8)**
Individualization	9	0.83	2.55 (3.1)
Structure	8	0.85	2.02 (2.8)
Opportunity to Learn	9	0.90	2.04 (2.5)

*Five response possibilities for 1053 teacher respondents on item's nine-category z-score continuum, utilizing Wave 1 scale

Table C-2. Relationships for Teacher Scales and Subscales

	Correlations					Percent Variance Shared			
	Environ	Communit	Lead	Instruc		Environ	Communit	Lead	Instruc
Environ	1.00	0.66	0.75	0.52	Environ	100.0	43.6	56.3	27.0
Communit	0.66	1.00	0.75	0.54	Communit	43.6	100.0	56.3	29.2
Lead	0.75	0.75	1.00	0.47	Lead	56.3	56.3	100.0	22.1
Instruc	0.52	0.54	0.47	1.00	Instruc	27.0	29.2	22.1	100.0
ParInvlv	0.79	0.53	0.58	0.39	ParInvlv	62.4	28.1	33.6	15.2
AcadPres	0.86	0.54	0.66	0.36	AcadPres	74.0	29.2	43.6	13.0
OrdClim	0.82	0.53	0.64	0.38	OrdClim	67.2	28.1	41.0	14.4
Assmt&Mo	0.78	0.55	0.56	0.56	Assmt&Mo	60.8	30.3	31.4	31.4
Collab	0.47	0.80	0.49	0.45	Collab	22.1	64.0	24.0	20.3
ProfDev	0.46	0.85	0.55	0.47	ProfDev	21.2	72.3	30.3	22.1
SupptTIn	0.69	0.82	0.81	0.41	SupptTIn	47.6	67.2	65.6	16.8
CommMiss	0.74	0.67	0.90	0.42	CommMiss	54.8	44.9	81.0	17.6
ManInstr	0.66	0.70	0.92	0.39	ManInstr	43.6	49.0	84.6	15.2
Redesign	0.69	0.70	0.95	0.46	Redesign	47.6	49.0	90.3	21.2
Individz	0.51	0.46	0.44	0.79	Individz	26.0	21.2	19.4	62.4
Structur	0.50	0.50	0.47	0.85	Structur	25.0	25.0	22.1	72.3
OpptLrn	0.27	0.36	0.25	0.80	OpptLrn	7.3	13.0	6.3	64.0

APPENDIX D: EXPLORATORY FACTOR ANALYSIS RESULTS

The following tables provide detailed evidence of the item loadings on the observed variables within each latent variable. Overall, the EFA showed that the items loaded consistently on their hypothesized observed variable with few exceptions noted. These results support scaling the items to create a single score for each observed variable.

The results for the Environment latent variable showed that most items loaded on their intended observed variable with a few exceptions (See Table D1). One Orderly Climate item (OC_6 – There were positive and open interactions between staff and students) loaded on the Assessment and Monitoring observed variable. One item theorized to measure Academic Press cross-loaded on Orderly Climate (AP_3 – Our faculty valued school improvement).

Two other items cross loaded on both Assessment and Monitoring and Academic Press (AM_7 – Year to year changes in student achievement were monitored at the school level and AM_8 – School level progress towards academic proficiency was communicated to all teachers at my school). These cross-loadings make sense given the overlap in the way the constructs were theorized. For example, it could be implied that the Assessment and Monitoring variable was similar to Academic Press in that both are intended to focus on improving student achievement or reaching academic proficiency as determined by student level assessment.

Table D1: Environment

Promax Rotated Loadings				
	1	**2**	**3**	**4**
	Parental Involvement	**Assessment and Monitoring**	**Orderly Climate**	**Academic Press**
ENV_PI_1	0.71	-0.06	0.06	-0.08
ENV_PI_2	0.62	0.01	0.09	-0.06
ENV_PI_3	0.74	-0.06	-0.08	-0.02
ENV_PI_4	0.59	0.08	-0.06	0.07
ENV_PI_5	0.43	0.11	0.07	0.01
ENV_PI_6	0.73	-0.02	-0.11	0.00
ENV_PI_7	0.60	-0.05	-0.04	0.14
ENV_AP_1	0.08	-0.05	0.03	0.54
ENV_AP_2	0.14	-0.03	-0.01	0.58
ENV_AP_3	0.11	-0.06	0.37	0.32
ENV_AP_4	-0.06	-0.03	0.09	0.63
ENV_AP_5	-0.05	-0.01	0.05	0.68
ENV_AP_6	0.04	-0.01	-0.07	0.79
ENV_AP_7	-0.05	-0.03	-0.02	0.81

PROMAX ROTATED LOADINGS				
	1	2	3	4
	Parental Involvement	Assessment and Monitoring	Orderly Climate	Academic Press
ENV_AP_8	0.05	0.03	-0.04	0.70
ENV_OC_1	-0.11	-0.03	0.90	-0.02
ENV_OC_2	-0.06	-0.02	0.85	0.02
ENV_OC_3	0.03	0.03	0.72	-0.02
ENV_OC_4	0.09	0.05	0.54	0.07
ENV_OC_5	0.15	0.09	0.38	0.11
ENV_OC_6	-0.01	0.34	0.07	0.09
ENV_OC_7	0.11	-0.06	0.66	-0.01
ENV_AM_1	0.05	0.34	0.00	0.10
ENV_AM_2	0.00	0.68	-0.05	0.00
ENV_AM_3	-0.05	0.63	0.00	0.01
ENV_AM_4	-0.06	0.67	-0.07	-0.04
ENV_AM_5	0.23	0.28	0.08	0.04
ENV_AM_6	-0.03	0.84	-0.01	-0.10
ENV_AM_7	0.13	0.21	0.08	0.25
ENV_AM_8	0.12	0.20	0.13	0.29

The results for the Leadership latent variable showed that most items loaded on their intended observed variable with a few exceptions (See Table D2). Two items that were theorized to measure Instructional Guidance (INS_3 – In my school, the instructional time of teachers is well protected, and INS_6 – Leaders in our school, facilitated teachers working together) cross-loaded on Organizational Change. In addition, one variable that was intended to measure Organizational Change cross-loaded on Instructional Guidance (RO_1 – Leaders support risk-taking and innovation in teaching). It makes theoretical sense that these items would load on both Organizational Change and Managing Instruction given the close link between the constructs.

Table D2: Leadership

PROMAX ROTATED LOADINGS

	1 Mission	2 Instructional Guidance	3 Organizational Change
LD_M_1	0.48	0.15	0.21
LD_M_2	0.52	0.25	0.20
LD_M_3	0.57	0.04	0.34
LD_M_4	0.51	-0.03	0.39
LD_M_5	0.50	0.13	0.29
LD_M_6	0.48	0.10	0.33
LD_INS_1	0.23	0.40	0.02
LD_INS_2	0.07	0.75	0.08
LD_INS_3	0.07	0.23	0.38
LD_INS_4	0.01	0.83	0.06
LD_INS_5	0.01	0.82	0.08
LD_INS_6	0.02	0.34	0.46
LD_RO_1	-0.07	0.30	0.52
LD_RO_2	-0.14	0.04	0.07
LD_RO_3	0.11	-0.05	0.65
LD_RO_4	-0.07	0.46	0.42
LD_RO_5	0.07	-0.05	0.77
LD_RO_6	0.02	0.08	0.72
LD_RO_7	0.02	0.09	0.62
LD_RO_8	0.04	0.02	0.73
LD_RO_9	0.06	0.06	0.73
LD_RO_10	-0.11	0.31	0.51

The results for the next two latent variables show consistent item loadings within the designated observed variable (see Table D3 and D4).

Table D3: Professional Community

PROMAX ROTATED LOADINGS

	1 Collaboration Deprivatization	2 Support for Teacher Influence	3 Professional Development
PC_C_1	0.65	0.04	0.04
PC_C_2	0.58	0.10	0.05
PC_C_3	0.77	-0.04	-0.02
PC_C_4	0.77	-0.05	-0.01
PC_C_5	0.51	0.20	0.05
PC_C_6	0.75	-0.08	-0.06
PC_C_7	0.50	0.11	0.04
PC_C_8	0.67	-0.09	0.06
PC_PD_1	-0.04	-0.05	0.79
PC_PD_2	0.00	0.04	0.76
PC_PD_3	0.06	-0.02	0.78
PC_PD_4	0.13	0.01	0.71
PC_PD_5	0.02	0.01	0.82
PC_PD_6	-0.06	0.05	0.83
PC_PD_7	0.10	0.04	0.64
PC_PD_8	0.23	-0.04	0.54
PC_S_1	-0.04	0.86	-0.11
PC_S_2	-0.07	0.84	-0.03
PC_S_3	0.15	0.49	-0.03
PC_S_4	-0.06	0.82	0.01
PC_S_5	0.00	0.64	0.18
PC_S_6	0.10	0.51	0.12
PC_S_7	0.07	0.40	0.15
PC_S_8	0.12	0.62	-0.03

Table D4: Instruction

PROMAX ROTATED LOADINGS

	1 Individualization	2 Structure	3 Opportunity to Learn
TQ_INS_1	0.65	-0.04	-0.04
TQ_INS_2	0.79	-0.05	-0.05
TQ_INS_3	0.78	-0.09	-0.03
TQ_INS_4	0.58	-0.07	0.11
TQ_INS_5	0.69	-0.01	0.02
TQ_INS_6	0.47	0.09	0.06
TQ_INS_7	0.71	-0.05	0.03
TQ_INS_8	0.34	0.25	-0.05
TQ_INS_9	0.22	0.25	0.10
TQ_S_1	0.21	0.29	-0.04
TQ_S_2	0.07	0.61	0.06
TQ_S_3	0.25	0.40	-0.03
TQ_S_4	0.09	0.67	0.02
TQ_S_5	-0.15	0.76	0.09
TQ_S_6	-0.09	0.81	0.07
TQ_S_7	-0.05	0.66	0.13
TQ_S_8	0.12	0.66	-0.06
TQ_OL_1	-0.03	0.08	0.65
TQ_OL_2	0.02	0.12	0.67
TQ_OL_3	-0.05	0.02	0.81
TQ_OL_4	0.06	0.05	0.65
TQ_OL_5	0.01	0.09	0.67
TQ_OL_6	-0.01	-0.08	0.84
TQ_OL_7	0.07	-0.04	0.78
TQ_OL_8	-0.03	0.02	0.78
TQ_OL_9	0.01	0.11	0.60

APPENDIX E: CONFIRMATORY FACTOR ANALYSIS RESULTS

Model Results for Confirmatory Factor Analysis - Items loading on observed variables, Observed Variables loading on latent variables, Latent variables are correlated.

Items Loading on Observed Variables

	Estimates	S.E.	Est./S.E.	Std	StdYX
PARINVLV BY					
ENV_PI_1	1.000	0.000	0.000	0.629	0.631
ENV_PI_2	0.673	0.069	9.707	0.423	0.607
ENV_PI_3	0.655	0.069	9.496	0.412	0.591
ENV_PI_4	0.733	0.074	9.906	0.461	0.623
ENV_PI_5	0.465	0.053	8.759	0.292	0.536
ENV_PI_6	0.760	0.078	9.723	0.478	0.608
ENV_PI_7	1.012	0.096	10.516	0.636	0.673
ACADPRES BY					
ENV_AP_1	1.000	0.000	0.000	0.328	0.520
ENV_AP_2	1.070	0.120	8.949	0.350	0.655
ENV_AP_3	1.624	0.174	9.327	0.532	0.707
ENV_AP_4	1.621	0.185	8.742	0.531	0.629
ENV_AP_5	1.388	0.156	8.880	0.455	0.646
ENV_AP_6	1.175	0.127	9.254	0.385	0.696
ENV_AP_7	1.237	0.141	8.748	0.405	0.629
ENV_AP_8	1.380	0.149	9.256	0.452	0.696
ORDCLIM BY					
ENV_OC_1	1.000	0.000	0.000	0.517	0.698
ENV_OC_2	1.167	0.088	13.202	0.603	0.763
ENV_OC_3	1.362	0.109	12.554	0.704	0.721
ENV_OC_4	0.742	0.073	10.129	0.383	0.573
ENV_OC_5	0.927	0.081	11.422	0.479	0.651
ENV_OC_6	0.098	0.020	4.783	0.050	0.266
ENV_OC_7	0.827	0.072	11.468	0.427	0.653
ASSMTMO BY					
ENV_AM_1	1.000	0.000	0.000	0.397	0.579
ENV_AM_2	0.842	0.107	7.838	0.335	0.505
ENV_AM_3	0.576	0.080	7.209	0.229	0.454
ENV_AM_4	0.507	0.089	5.681	0.201	0.343
ENV_AM_5	1.567	0.166	9.454	0.623	0.656
ENV_AM_6	0.758	0.097	7.834	0.301	0.504
ENV_AM_7	1.043	0.116	9.016	0.414	0.611
ENV_AM_8	1.018	0.104	9.819	0.404	0.697
COLLAB BY					
PC_C_1	1.000	0.000	0.000	0.716	0.723
PC_C_2	0.971	0.075	12.954	0.695	0.706
PC_C_3	1.077	0.080	13.476	0.771	0.735
PC_C_4	1.270	0.094	13.476	0.909	0.735
PC_C_5	1.037	0.084	12.338	0.742	0.673

PC_C_6	1.255	0.103	12.140	0.898	0.662
PC_C_7	0.675	0.058	11.544	0.483	0.629
PC_C_8	1.184	0.104	11.427	0.848	0.623
PROFDEV BY					
PC_PD_1	1.000	0.000	0.000	0.639	0.735
PC_PD_2	1.109	0.073	15.271	0.709	0.784
PC_PD_3	1.286	0.082	15.728	0.822	0.806
PC_PD_4	1.424	0.086	16.515	0.911	0.843
PC_PD_5	1.408	0.085	16.529	0.900	0.844
PC_PD_6	1.236	0.078	15.932	0.790	0.816
PC_PD_7	1.334	0.094	14.143	0.853	0.730
PC_PD_8	1.099	0.083	13.247	0.703	0.687
SUPPTTIN BY					
PC_S_1	1.000	0.000	0.000	0.884	0.734
PC_S_2	0.879	0.061	14.528	0.777	0.760
PC_S_3	0.721	0.069	10.477	0.637	0.556
PC_S_4	0.880	0.061	14.484	0.778	0.758
PC_S_5	0.964	0.068	14.205	0.852	0.744
PC_S_6	0.687	0.052	13.282	0.607	0.698
PC_S_7	0.494	0.043	11.351	0.436	0.601
PC_S_8	0.730	0.053	13.852	0.645	0.727
COMMMISS BY					
LD_M_1	1.000	0.000	0.000	0.676	0.752
LD_M_2	1.189	0.069	17.282	0.804	0.854
LD_M_3	0.995	0.059	16.913	0.673	0.838
LD_M_4	0.895	0.063	14.185	0.605	0.718
LD_M_5	0.983	0.061	15.991	0.665	0.798
LD_M_6	1.004	0.063	15.977	0.679	0.798
MANGINST BY					
LD_INS_1	1.000	0.000	0.000	0.530	0.572
LD_INS_2	1.627	0.135	12.034	0.863	0.856
LD_INS_3	1.246	0.130	9.563	0.661	0.599
LD_INS_4	1.902	0.154	12.363	1.009	0.900
LD_INS_5	1.815	0.148	12.258	0.962	0.885
LD_INS_6	1.415	0.127	11.141	0.751	0.751
REDESIGN BY					
LD_RO_1	1.000	0.000	0.000	0.802	0.773
LD_RO_2	0.078	0.081	0.963	0.062	0.051
LD_RO_3	0.491	0.042	11.812	0.394	0.596
LD_RO_4	0.866	0.052	16.700	0.694	0.800
LD_RO_5	0.569	0.041	13.896	0.457	0.687
LD_RO_6	0.834	0.052	16.026	0.669	0.774
LD_RO_7	0.748	0.061	12.357	0.600	0.620
LD_RO_8	0.693	0.046	15.016	0.555	0.733
LD_RO_9	0.861	0.050	17.131	0.691	0.817
LD_RO_10	0.790	0.058	13.560	0.633	0.672
INDIVIDZ BY					

TQ_INS_1	1.000	0.000	0.000	0.382	0.661
TQ_INS_2	1.013	0.082	12.315	0.387	0.751
TQ_INS_3	1.053	0.089	11.809	0.402	0.713
TQ_INS_4	1.092	0.110	9.888	0.417	0.579
TQ_INS_5	0.807	0.069	11.628	0.309	0.699
TQ_INS_6	0.759	0.081	9.319	0.290	0.542
TQ_INS_7	0.719	0.064	11.179	0.275	0.667
TQ_INS_8	1.119	0.130	8.585	0.428	0.495
TQ_INS_9	1.101	0.143	7.702	0.421	0.440
STRUCTUR BY					
TQ_S_1	1.000	0.000	0.000	0.325	0.373
TQ_S_2	1.540	0.226	6.812	0.501	0.697
TQ_S_3	0.945	0.156	6.047	0.307	0.498
TQ_S_4	1.742	0.250	6.961	0.567	0.756
TQ_S_5	2.022	0.291	6.943	0.658	0.748
TQ_S_6	2.242	0.316	7.100	0.729	0.825
TQ_S_7	2.155	0.311	6.925	0.701	0.741
TQ_S_8	1.751	0.258	6.794	0.570	0.690
OPPTLRN BY					
TQ_OL_1	1.000	0.000	0.000	0.742	0.713
TQ_OL_2	1.016	0.071	14.324	0.754	0.769
TQ_OL_3	1.278	0.085	15.104	0.949	0.811
TQ_OL_4	1.090	0.080	13.645	0.809	0.732
TQ_OL_5	1.138	0.084	13.527	0.845	0.726
TQ_OL_6	1.286	0.091	14.201	0.955	0.762
TQ_OL_7	1.129	0.077	14.700	0.838	0.789
TQ_OL_8	1.090	0.077	14.105	0.810	0.757
TQ_OL_9	1.060	0.081	13.064	0.787	0.701

Observed Variables Loading on latent Variables

	Estimates	S.E.	Est./S.E.	Std	StdYX
ENV BY					
PARINVLV	1.000	0.000	0.000	0.812	0.812
ACADPRES	0.522	0.069	7.613	0.814	0.814
ORDCLIM	0.846	0.093	9.124	0.836	0.836
ASSMTMO	0.604	0.077	7.857	0.776	0.776
PROFCOM BY					
COLLAB	1.000	0.000	0.000	0.738	0.738
PROFDEV	0.821	0.089	9.192	0.678	0.678
SUPPTTIN	1.538	0.145	10.603	0.920	0.920
LEAD BY					
COMMMISS	1.000	0.000	0.000	0.890	0.890
MANGINST	0.820	0.080	10.268	0.930	0.930
REDESIGN	1.247	0.093	13.432	0.937	0.937

	Estimates	S.E.	Est./S.E.	Std	StdYX
INST BY					
INDIVIDZ	1.000	0.000	0.000	0.704	0.704
STRUCTUR	1.142	0.195	5.862	0.945	0.945
OPPTLRN	1.823	0.226	8.057	0.661	0.661

Correlations of Latent Variables

	Estimates	S.E.	Est./S.E.	Std	StdYX
INST WITH					
ENV	0.074	0.013	5.714	0.542	0.542
PROFCOM	0.084	0.014	6.060	0.593	0.593
LEAD	0.080	0.013	5.948	0.495	0.495
LEAD WITH					
ENV	0.261	0.034	7.736	0.851	0.851
PROFCOM	0.297	0.036	8.272	0.934	0.934
PROFCOM WITH					
ENV	0.238	0.033	7.241	0.883	0.883