Instructional Leadership, Teaching Quality, and Student Achievement

Suggestive Evidence from Three Urban School Districts

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Overview

Does providing instruction-related professional development to school principals set in motion a chain of events that can improve teaching and learning in their schools? The Instructional Leadership Study provides suggestive although not definitive evidence that it does. The study examines a theory of school change articulated by the Institute for Learning at the University of Pittsburgh. The IFL provides technical assistance to school districts, primarily through strategic planning, coaching, and professional development for district and school administrators; it has also enunciated a set of "Principles of Learning" about the ideas and practices that promote students' academic achievement. According to the IFL's theory, through leadership training, school principals learn about high-quality instruction and about actions that they can take to motivate and support their teachers. Principals then organize professional learning for their teachers and otherwise help teachers improve their classroom practices. With improved instruction, the theory maintains, student achievement will also improve.

To test this theory, the researchers recruited 49 elementary schools in three districts that had been working with the IFL for one to five years at the time the study began. The schools were located in Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City (which has since been reorganized). By design, all the schools served large proportions of economically and educationally disadvantaged students, and all the schools volunteered to participate in the study. The study focuses on elementary schools because the researchers reasoned that the principal's role as an instructional leader would be especially pronounced in these settings. Principals and third- and fourth-grade teachers at the schools completed surveys that asked about the professional development activities with which they had been involved and about other matters. The research team also conducted observations in some 300 third-grade reading and math classes, and school-level data on the achievement of third-graders came from state Web sites. Data were collected primarily during the 2005-2006 school year; budgetary constraints precluded carrying out a second round of data collection that had been planned.

Statistically significant associations connected each pair of steps in the theory of action. Thus, principals who received more professional development were more actively involved in the professional development of their teachers. Teachers who got more professional development taught lessons that were of higher instructional quality. And schools where instructional quality was higher also had students with higher academic achievement. Because the data were collected during the same time period, however, the time sequence of these phenomena cannot be established, and the absence of a counterfactual (evidence of what would have happened had the principals not received professional development in the first place) makes it impossible to conclude that one event caused another. While the results of this study are promising, a more rigorous evaluation is needed to establish with greater certainty that instruction-related professional development for principals makes a difference for teachers and students at their schools.

Contents

Appendixes

List of Tables, Figures, and Boxes

Table

Table

Table

Figure

Figure

Box

Preface

Schools and school districts spend considerable time and money on professional development for teachers and administrators, with the aim of improving classroom instruction and student achievement. In the context of standards-based education reform, high-quality professional development for principals and teachers is arguably more important than ever. However, despite the substantial investments currently being made in every state, too little is known about how professional development can improve teachers' practice and student outcomes.

The Instructional Leadership Study focuses on a program of leadership training for school principals that the Institute for Learning (IFL) at the University of Pittsburgh provided to three urban school districts. The study was not intended to be an evaluation of the effect of the IFL intervention, and it cannot be used to draw causal inferences about the role of professional development in improving teaching and learning. (In partnership with the American Institutes for Research, MDRC is currently conducting two random assignment impact evaluations of professional development for teachers that will yield such inferences; early results from the first study will be published in 2008.)

Instead, the Instructional Leadership Study examines the theory behind the IFL's program. In brief, that theory holds that, through leadership training, principals learn what constitutes high-quality instruction. They also learn how to support their teachers in adopting better instructional practices, both through professional development opportunities and through ongoing encouragement and monitoring. Better classroom instruction, the theory maintains, will result in higher student achievement.

Using survey and classroom observation data collected from more than 40 elementary schools in the three districts, the study develops quantitative indicators of each step in the theory of change and examines the statistical associations among these indicators. In so doing, it provides some support for providing instruction-related professional development to school principals in order to improve classroom teaching and student learning. A more rigorous study to confirm these relationships is still needed, however.

Gordon L. Berlin
President

Acknowledgments

This report reflects the dedication and effort of many parties. First and foremost, our thanks go to the administrators of the study districts — Pat Forgione, Pat Harvey, the late Maria Lamb, and Gale Reeves — whose support for research made this study possible. Next, we thank the principals and third- and fourth-grade teachers at the 49 participating schools, who shared their experiences freely in surveys and allowed researchers to observe their classrooms. Liaisons at the study schools greatly facilitated the collection of both survey and observational data. Interviews with other administrators at the study sites — in particular, Yolanda Rocha and Dorothy Levin — helped us understand the work of the Institute for Learning in their districts.

At the Institute for Learning, the study has received the unwavering support of Lauren Resnick and Nancy Israel. Other current and former IFL staff members and associates provided assistance in many ways. Sharon Cadman Slater and Maureen Peterson trained us on the use of the Instructional Quality Assessment, and Lindsay Clare Matsumura and Brian Junker made many useful suggestions about how to analyze IQA data. Rosita Apodaca, Beth Lief, Donna Micheaux, and Margaret Reed were instrumental in increasing our knowledge about the IFL's work.

We acknowledge the contributions of Laura Ascenzi-Moreno, who helped refine the teacher survey, and MDRC's William Corrin, who reviewed the principal survey.

The fieldwork in Austin and Saint Paul could not have been completed without the assistance of two skilled classroom observers, Belita Leal and Donna Samelian. We are appreciative of their efforts and hard work.

At MDRC, James Kemple made a number of useful analytic suggestions. He, along with Howard Bloom, Fred Doolittle, Corinne Herlihy, John Hutchins, and Robert Ivry, read earlier drafts of the report; their comments helped us hone the discussion and make it more reader-friendly. Vivian Mateo created the tables and figures. Glee Holton, formerly of MDRC, contributed to the project's management and to the smooth functioning of the research team. Robert Weber edited the report, and David Sobel prepared it for publication.

The Authors

Executive Summary

Nowhere is improving teaching and learning in America more critical than in those chronically low-performing schools that serve large proportions of economically disadvantaged and nonwhite students. This is the mission that the Institute for Learning (IFL), an arm of the Learning Research and Development Center (LRDC) at the University of Pittsburgh, has set for itself. Established in 1995, the IFL provides technical assistance to school districts, primarily in the form of strategic planning, coaching, and professional development for district and school administrators. In its work with districts, the IFL enunciates a set of "Principles of Learning" about the ideas and practices that lead to academic achievement for all students.

The IFL's program of learning for district and school administrators is guided by a theory of action that is depicted in Figure ES.1. As the figure suggests, principals play a key role in the instructional improvement process by setting in motion a sequence of school-level behavior changes that make for improved teaching and learning. In the IFL's leadership training for principals — which is designed to last at least two years, with principals typically receiving between 36 and 63 hours of training per year — principals learn about the Principles of Learning and about concrete actions that they can take to motivate and support their teachers. Principals are expected to organize professional learning for their teachers as well as to monitor teachers' classroom practices and help them incorporate new behaviors that are in accordance with the Principles of Learning into their instructional repertory. With improved instruction, the theory holds, student achievement will improve.

This report was not intended to be an evaluation of the impact of the IFL's work, which would have assessed whether changes in instructional quality and student achievement took place over and above what would have occurred without the IFL's presence in the schools and districts. Instead, the analysis tests the IFL theory of action by examining the empirical relationships among measures of principal, teacher, and student behavior and performance that are associated with each step in that theory. It finds evidence of systematic relationships that is consistent with the conceptual framework: Statistically significant linkages connect variables at each step in the theory of action with variables at the next step. While these findings are suggestive and promising, however, limitations in the research design and the data collected mean that these linkages cannot be interpreted as causal; on the question of causality, the results are ultimately inconclusive.

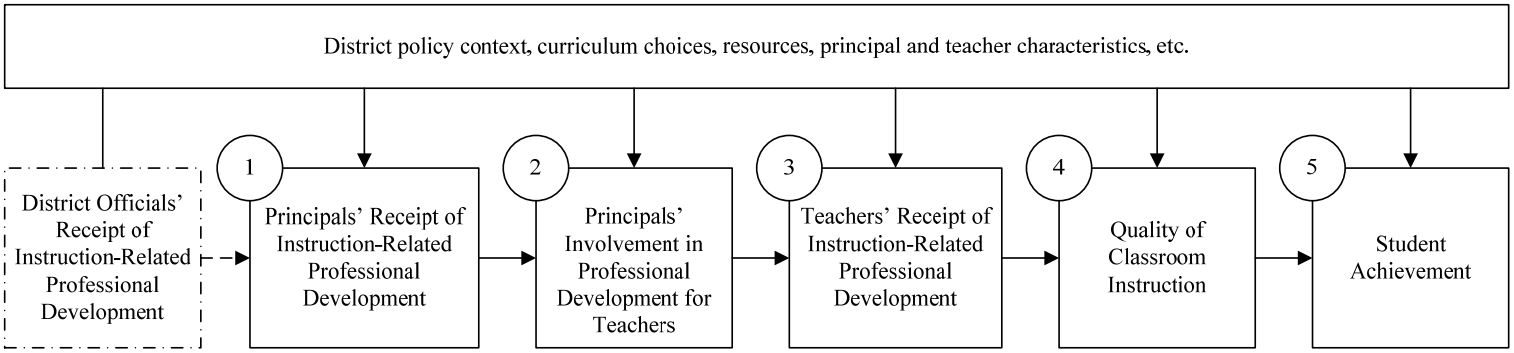
Study Sites, Data, and Analytic Strategy

Research for this report was conducted at 49 elementary schools in three districts, or "sites" — Austin, Texas; Saint Paul, Minnesota; and Region 10 within New York City — that

The Instructional Leadership Study

Figure ES.1

The IFL Theory of Action



NOTE: District officials' receipt of professional development is not discussed in this report.

had worked with the IFL for between one and four years at the time that data collection began. Reflecting the shared priority placed by both the IFL and MDRC on improving educational outcomes for disadvantaged students, study schools were selected to include large numbers of students at high risk of adverse educational outcomes. Thus, between 82 percent and 87 percent of the students served by the study schools in each district were eligible for free or reduced-price lunch, and the schools also included more nonwhite students than did elementary schools in their districts more generally. Districts and schools participated voluntarily in the research.

At all sites, the scores of third-graders at each study school on the statewide high-stakes test were used to measure student achievement in the spring of 2006; the average of third-grade students' test scores from the three previous years served as a control variable in the analyses of the relationships between student achievement and other variables. Because of budgetary limitations, all the other quantitative data used in the report were collected during the 2005-2006 school year. Surveys were collected from 44 principals and 274 third- and fourth-grade teachers in the study schools during the spring of 2006. Their primary purpose was to obtain information about the frequency and value of instruction-related professional development that both groups had received and, in the case of principals, had passed on to teachers at their schools.

Researchers conducted observations in third-grade classrooms to ascertain the extent to which practices that incorporated three key IFL Principles of Learning — Accountable Talk, Academic Rigor, and Clear Expectations — were evident in the study schools. Two observation instruments that were developed by LRDC researchers — the Reading Instructional Quality Assessment (IQA) and the Math IQA — were adapted for use in the study. Almost all third-grade teachers in the study were observed once during a reading lesson and once during a math lesson, for a total of 151 reading observations and 151 math observations.

Qualitative research, including interviews with high-level district officials and IFL liaisons for the study districts, enabled researchers to gain a better understanding of the IFL's work. Further, case studies involving daylong visits to eight schools across the three sites helped illuminate the findings from close-ended surveys.

The analysis uses multiple regression analysis to ascertain the extent to which outcomes at each step of the theory of action are associated with (that is, are statistically linked to) outcomes at the one or two preceding steps in the theory. Data from teacher surveys and classroom observations at individual schools were aggregated so that, in all the regression analyses, the school is the unit of analysis. Since the goal of the study is to examine the nature of the relationships between the steps in the theory of action *independent* of other factors that may influence the outcomes, additional measures — principals' length of experience, the average experience of the teachers at the school, and indicators for the three school districts in the study — are included in every analysis in order to control for the effects of these factors.

Key Findings

Findings About Relationships Between Steps in the Theory of Action

As noted above, outcomes at every step in the theory of action are linked to outcomes at earlier steps in statistically significant ways. With regard to principals' involvement in the professional development environments at their schools:

- Greater receipt of instruction-related professional development on the part of principals and a greater value attached to that professional development are both significantly and positively associated with the principals' involvement in professional development for their teachers.
- Greater principal involvement in professional development for teachers is significantly and positively associated with the frequency with which teachers reported receiving professional development.

In conjunction with one another, these findings suggest that delivering instruction-related professional development to principals may be an effective first step toward increasing opportunities for professional development offered to teachers at their schools. Principals who reported receiving more instruction-related professional development and valuing it more were more likely to organize formal professional development for their teachers and otherwise to engage with their teachers in instructional improvement efforts. In schools where principals reported greater involvement in these activities, teachers also reported receiving more professional development; while such concurrence is to be hoped for, it is by no means assured.

Further, relationships were observed between the professional development received by teachers and instructional quality:

- In schools where teachers reported that they received more instruction-related professional development, researchers were more likely to observe higher implementation of the Principles of Learning in reading lessons.
- Schools where teachers placed greater value on the professional development that they had received related to the Principles of Learning were observed to have higher implementation of these principles in math lessons.
- A direct relationship was observed between the role that principals played in professional development for teachers related to Academic Rigor and Clear Expectations and higher implementation of these principles in reading lessons.

These findings suggest that providing more professional development to teachers can help them improve their instructional practices, especially in reading. Furthermore, these findings provide some evidence for a direct link between principals' involvement in professional development for teachers on good instructional practices and teachers' implementation of these practices, at least in reading lessons.

Finally, relationships were observed between instructional quality and student achievement on standardized exams in math and reading:

- Higher school-level scores on the Reading and Math IQAs are associated with greater percentages of students meeting the standard on the reading and the math state assessments, respectively.
- In particular, higher implementation of the principles of Accountable Talk and Academic Rigor in reading lessons are associated with higher student achievement in reading, and higher implementation of the principle of Accountable Talk in math lessons is associated with higher student achievement in math.

Thus, higher instructional quality is significantly related to higher student achievement in both reading and math. Instruction that requires students to tackle challenging tasks and to back up their assertions with evidence and reasoned arguments is especially associated with higher achievement. These findings are noteworthy because the analysis controlled for the achievement of prior classes of third-graders.

Other Findings

- Both principals and teachers especially valued opportunities to learn from their peers.
- Instructional quality in third-grade reading and math classes, as measured by overall IQA scores and by scores on the three Principles of Learning, was generally low: Students were rarely pushed to analyze their work, to provide evidence for their claims, or to hold each other accountable during class discussions.
- Teachers' reports of what they do during reading and math lessons generally did not match what researchers observed teachers doing.

Implications and Limitations of the Study

The analyses in the report suggest that in-service professional development for principals can serve as a catalyst for positive changes in teaching and learning in the principals' schools. While statistically significant linkages were discovered between all the steps in the theory of action, these connections must be regarded as exploratory and provisional rather than definitive, for two main reasons.

First, the small number of schools and of teachers sampled within each school makes the quantitative estimates about the size of relationships unstable — that is, highly sensitive to the exact sample used in the statistical analyses. The small sample size also limits the generalizability of the findings. It is impossible to know whether the same patterns would be observed in other districts where the IFL is working, in other schools in the same districts as the study schools, or even in grades other than third grade within the study schools.

Second, the theory of action informing the report assumes that behaviors will unfold in sequences that have an implicit temporal order. But because budgetary pressures precluded a second round of data collection, the data used in the study were all collected within the same academic year, so that is not possible to determine which actions come first and which follow. For this reason, the analysis can provide no empirical evidence that one action *caused* another.

In fact, for most of the linkages set forth above, an alternative explanation to the one suggested by the IFL theory of action can be found. For example, more professional development in reading may be associated with higher instructional quality, but it cannot be assumed that the professional development led to better teaching. Rather, teachers who are already skilled may be especially motivated to seek professional development that will make them even better at what they do.

Because the data supporting the theory of action are promising but inconclusive, a more definitive research project to study the impacts of professional development aligned with this theory is warranted. The key requirement for such a study is the presence of a *counterfactual* — an estimate of what would happen in similar schools if their principals do *not* receive such professional development — preferably a counterfactual that is established through a lottery-like process known as "random assignment." If selection for the treatment is truly random and the sample size is reasonably large, preexisting differences between the treatment and control group principals and schools should be effectively eliminated, so that any differences between the two sets of schools that emerge over time can safely be attributed to their principals' having received the professional development or not having done so. The present study, it is hoped, will lead to a rigorous evaluation of the theory of action guiding the IFL's promising efforts to improve instructional leadership, teaching, and learning.

Chapter 1

Introduction

The association between school leadership and student achievement is well established in the research literature. Reviews of quantitative studies suggest that leadership is second only to classroom instruction among the school-related factors that contribute to student learning.[1] Much is known, too, about *how* effective principals lead: by setting goals, by improving the school setting, and by helping teachers develop instructional skills.[2] Finally, researchers have linked high-quality instruction to student achievement.[3]

What is less well understood is whether professional development offered to school leaders can improve low-performing schools — or the process by which such transformation can occur. A study of the chain of actions linking professional development for principals to better teaching and increased student learning is particularly timely, given the accountability context in which school leaders now operate. Principals are under pressure to produce results, especially increased test scores and reduced achievement disparities associated with income and race. This pressure to improve achievement places a premium on defining effective leadership and producing credible findings about the connections between leaders' actions, desired instructional practice, and student achievement.

The Instructional Leadership Study, an exploratory effort to describe these connections in quantitative terms, was conducted by MDRC, a nonpartisan, nonprofit research organization whose mission is to build knowledge to inform educational and social policy. The study relies chiefly on data for the 2005-2006 school year, from multiple sources — data from principal and teacher surveys, classroom observations, and student scores on standardized tests, along with qualitative data from interviews and job-shadowing of principals in case-study schools — to examine the behavior of principals, teachers, and students at various steps of the school trans-

[1]See Hill (1998). See also reviews by Hallinger and Heck (1996a, 1996b, 1998). The reviews conclude that leadership has small but important effects on student outcomes. According to Creemers and Reezigt (1996), leadership accounts for one-quarter of the total variation in student learning across schools that is explained by school-level variables (as opposed to the characteristics of the students who attend those schools). For a broad review of the literature on leadership and learning, see also Leithwood, Seashore Louis, Anderson, and Wahlstrom (2004).

[2]See Heck and Hallinger (1999); Conger and Kanungo (1998); and Leithwood, Menzies, Jantzi, and Leithwood (1996). While these authors have developed different vocabularies for describing what leaders do, the underlying concepts are similar.

[3]See Aaronson, Barrow, and Sander (2007); Borman and Kimball (2005); Resnick, Matsumura, and Junker (2006); and Wenglinski (2000). Each of these studies demonstrates a significant association between a measure of teaching practice or teacher effectiveness and student achievement on standardized examinations.

formation process and to describe how behaviors at these different steps are linked with one another.[4] This report presents the results of analyses that exploit this data set to address questions about instructional leadership, effective teaching, and how leadership and teaching together affect student achievement. These analyses seek to:

- Develop reliable quantitative measures of principals' leadership actions, which encompass both learning behaviors (for example, receiving professional development focused on instructional improvement) and teaching behaviors (such as being involved in professional development for teachers in their schools)
- Generate reliable nonexperimental estimates of the empirical linkages among variables that describe (1) the actions of school leaders, (2) teachers' receipt of professional development, (3) teachers' instructional practices, and (4) student achievement

The opening section of Chapter 3 addresses the first of these objectives; the concluding sections as well as Chapters 4 and 5 present findings that address the second goal.

The theory of action guiding the Instructional Leadership Study was developed by the Institute for Learning (IFL), an arm of the Learning Research and Development Center (LRDC) at the University of Pittsburgh. Established in 1995, the IFL provides technical assistance to school districts, primarily in the form of strategic planning, coaching, and professional development for district and school administrators. The 25 districts with which the IFL has partnered over its 12-year history are primarily urban and serve large numbers of nonwhite students who are economically disadvantaged. The IFL's professional development translates research findings into actions that leaders can take to improve teaching and learning. Thus, its focus is on instruction and, specifically, on inculcating a set of ideas and practices that are associated with increased student achievement.

The findings presented in this report are based on research conducted at 49 schools in three districts, or "sites" — Austin, Texas; Saint Paul, Minnesota; and Region 10 within New York City — that had worked with the IFL for between one and four years at the time that data collection began.[5] At the same time, however, the report should *not* be considered an evaluation

[4]The original plan was to collect an additional round of survey, observational, and achievement data during the 2006-2007 school year, but resource constraints made this plan infeasible. The decision to limit data analysis to one year, while unavoidable, has consequences for the analysis, as described in Chapter 2.

[5]For purposes of convenience, Region 10 in New York City is referred to as a "district" in this report, although this is obviously a misnomer. During the period of the study, New York City's public schools were organized into geographical regions, each headed by a regional superintendent. The regional superintendents

(continued)

of the impact of the IFL's work. A proper evaluation of that impact would require measuring the outcomes that occur with and without the IFL's intervention in order to ascertain the difference that the IFL's work makes. Such an evaluation is beyond the scope of this study.

Instead, the analysis examines whether the data from the study schools line up in patterns that are consistent with the IFL theory of action. Such alignment could not be taken as proof that the IFL's work *caused* the patterns of behavior that the data reflect. But it would provide empirical evidence for the theoretical framework that underlies the IFL's efforts to improve teaching and learning in low-performing schools by enhancing the knowledge and skills of school leaders.[6]

The next section of this introductory chapter discusses the key principles that guide the IFL's work and the theory of action that is explored in this study. Subsequent sections describe, in turn, the process for selecting the study districts and schools and the IFL's work in the study districts. The chapter's final section provides a "roadmap" for the rest of the report.

The IFL's Philosophy of Instructional Change and the Professional Development That It Offers

In its work with districts, the IFL promulgates a set of principles about the ideas and practices that lead to academic achievement for all students. It also organizes a program of learning for district and school administrators that is intended to set in motion a sequence of school-level behavior changes that make for improved teaching and learning.

Box 1.1 presents the IFL's "Principles of Learning," a set of statements about student learning and the conditions that promote it. The shorthand forms of these statements (shown in bold type in the box) help to create a common vocabulary for talking about effective instruction. As one district official put it, "The Principles of Learning cover all the things that make excellent classrooms excellent. The Principles of Learning give a name to what these practices are."

The first Principle of Learning shown in Box 1.1 — Organizing for Effort — is arguably the most fundamental. This is the belief that students' sustained and directed effort is more important to their academic success than mere aptitude — or, as one district official put it, "Intelligent is something you get, not something you are." (In IFL parlance, the principle is often

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had considerably less autonomy and control over the budget than the school superintendents in Austin or Saint Paul, although the number of elementary schools in Region 10 (there were 49) surpassed the number in many medium-size districts. Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced the regional organization.

[6]One recent study by IFL researchers has established a link between middle school teachers' instructional quality scores and student achievement on standardized assessments (Resnick, Matsumura, and Junker, 2006).

Box 1.1

The IFL Principles of Learning

Organizing for Effort

Sustained and directed effort, rather than aptitude, determines what and how much students learn. Everything should be organized to evoke and support this effort: Schools should set high minimum standards, teach all students a rigorous curriculum, and give students as much time and instruction as they need to meet expectations.

Fair and Credible Evaluations

To evoke sustained effort, schools should use assessments that students find fair — that are aligned with what is taught and with standards and that are graded against absolute standards rather than on a curve. Such assessments also provide parents, colleges, and employers with credible evaluations of what students know and can do.

Recognition of Accomplishment

Recognition of authentic accomplishment motivates students. Recognition can celebrate work that meets standards or that reaches intermediate benchmarks en route to the standards. Progress points should be articulated so that each student can meet real accomplishment criteria often enough to be recognized frequently.

Socializing Intelligence

Intelligence is a set of problem-solving and reasoning capabilities, along with the habits of mind that lead one to use these capabilities regularly; it also encompasses beliefs about one's right, obligation, and capacity to make sense of the world over time. Educators should "teach" intelligence by holding students responsible for using these thinking skills.

Self-Management of Learning

Students need to develop and use an array of metacognitive (self-monitoring) and self-management strategies: noticing when they don't understand something and taking steps to remedy this, formulating questions that lead to deeper understandings, and judging progress toward a goal. Schools should model and encourage use of these strategies.

(continued)

Box 1.1 (continued)

Learning as Apprenticeship

Learning environments should be organized so that teachers model complex thinking and analysis and so that students receive mentoring and coaching as they undertake extended projects.

***Accountable Talk**

Classroom talk that promotes learning must put forth knowledge that is accurate and relevant to the issue under discussion, use appropriate evidence, respond to and further develop what others in the group have said, and follow norms of good reasoning. Teachers should create the norms and skills of Accountable Talk in their classrooms.

***Academic Rigor in a Thinking Curriculum**

Problem-solving and thinking should be taught in the context of a solid foundation of knowledge of major concepts that students are expected to know deeply. Teaching should engage students in active reasoning about these concepts and promote the active use of knowledge in every subject and at every grade level.

***Clear Expectations**

Schools should define explicitly what students are expected to learn. Descriptive criteria and models of work that meets standards should be publicly displayed and used to help students analyze and evaluate their own work.

SOURCE: Adapted from descriptions of the Principles of Learning available on the IFL Web site (University of Pittsburgh, Learning Research and Development Center, Institute for Learning, 2007).

NOTE: *Asterisks denote the Principles of Learning that are of central concern to this study.

referred to as "Effort Creates Ability.") A corollary of this belief is that schools and classrooms must be organized to guide and support student effort. The remaining Principles of Learning detail the specific ways that such guidance and support can occur. These include such practices as instituting a standards-based curriculum and assessing students' achievement against those standards, assigning rigorous tasks, recognizing students' accomplishments, encouraging teach-

ers to model thinking about complex issues, and encouraging students to become cognizant of what they do and don't know so that they can take steps to fill the gaps.

The three asterisked Principles of Learning in Box 1.1 — Accountable Talk, Academic Rigor in a Thinking Curriculum (Academic Rigor, for short), and Clear Expectations — are central to the Instructional Leadership Study. These principles represent key observable characteristics of high-quality instruction as the IFL has defined it. Researchers at the Learning Research and Development Center (LRDC) at the University of Pittsburgh developed an observational instrument designed to ascertain the extent to which these characteristics are present in the classroom, and the instrument has been field-tested and refined by LRDC and IFL researchers.[7] As discussed in Chapter 2, MDRC adapted this instrument, known as the "Instructional Quality Assessment (IQA)," for use in the Instructional Leadership Study.

Instructional quality is also the most immediate forerunner of student achievement in the theory of action that animates the IFL's work, represented graphically by Figure 1.1. Indeed, the efforts to build the capacity of school system personnel — district officials, principals, and teachers — may all be seen as directed toward the ultimate objective of improving instructional practice.

IFL's work with districts recognizes the importance of working with instructional leaders at all levels. IFL Fellows (district liaisons) and other staff members engage with the superintendent (and his or her deputy or chief academic officer, where this position exists) to develop strong understanding and support for change. They work with central-office staff to create the capacity to support instructional improvement, and they provide training to school-building leadership. These activities have three main objectives: (1) to establish strong top-level support for the IFL that will assure those further down the hierarchy of district personnel that the initiative is a key policy priority; (2) to begin creating a common language about, understanding of, and focus on, good instruction; and (3) to create a culture of continuous learning at all levels of the system.

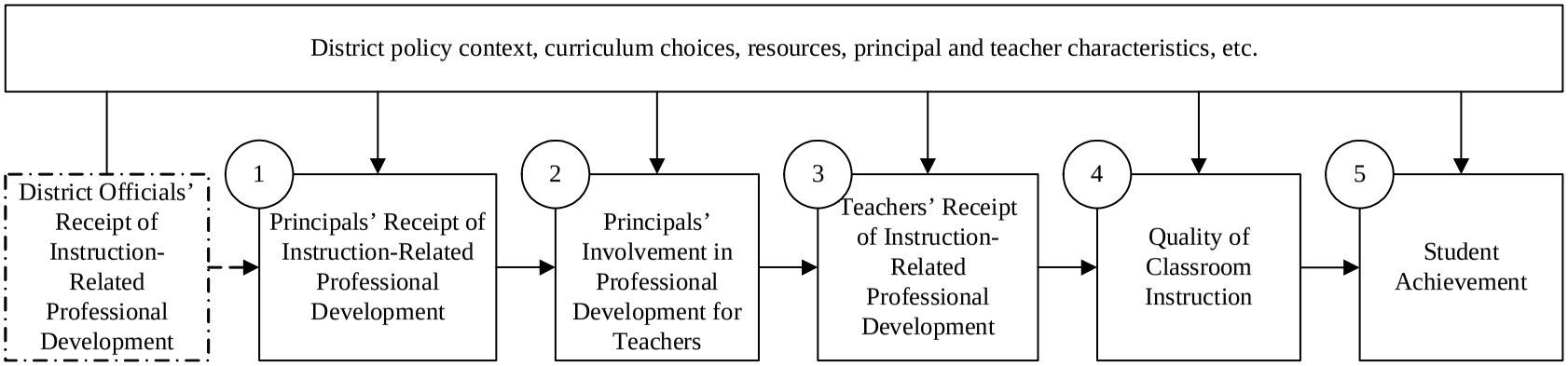
A full examination of the district context is beyond the scope of the study. Rather, the study focuses on instructional leadership as it is exercised by principals and on the subsequent steps in the theory of action. For convenience, these are referred to as "Steps 1 to 5" in the text and figures.

[7]See Junker et al. (2006) and Matsumura et al. (2006).

The Instructional Leadership Study

Figure 1.1

The IFL Theory of Action



NOTE: District officials' receipt of professional development is not discussed in this report.

As Figure 1.1 suggests, principals play a pivotal role in the instructional improvement process. The IFL's work with principals — unlike that of some principal training institutes — involves all school leaders, not just new principals or principals-in-training. It is aimed at helping these principals to understand the district's vision and to take concrete action to motivate and support teachers in changing their instructional practices. The leadership training is designed to occupy at least two years, with principals typically receiving between 36 and 63 hours of training per year, organized in several six- or seven-hour blocks.

The training for principals covers five broad topics: implementation of district and school reforms; the concept of effort-based education; the Principles of Learning as a framework for studying curriculum and learning environments; coherence in curriculum, professional development, and assessment; and the grounding of leadership practice in evidence from assessments, student work, and other sources. Each topic occupies a number of units that include readings, videos, PowerPoint presentations, homework assignments, and tools that principals are expected to use with their teachers. Principals are also exposed to lessons in language arts and, to a lesser extent, mathematics — lessons in which they are the learners, so that they can ground the discussion of Accountable Talk, Academic Rigor, and Clear Expectations in their personal experience. The units are customized to fit the reform plans, curricula, and assessments that are in place in different districts, with the second year, in particular, being targeted increasingly toward meeting a district's specific needs. During the first or second year, too, principals practice conducting "Learning Walks," a key IFL tool for improving instruction.[8]

Because IFL staff have generally lacked the time to provide more than limited (if any) training directly to elementary school teachers, it is the responsibility of the principal to organize professional learning for teachers, as well as to participate directly in such learning. The professional development for principals includes training and simulations on how to do this. In addition, IFL trainers model the approaches and behaviors that principals are expected to use with teachers and that teachers are expected to use with students — asking the principals, for example, to back up their statements with evidence from readings or video clips and assigning challenging readings and exercises. Principals are also expected to build internal standards of professional practice by observing teachers, inspecting student work, and helping teachers learn to incorporate new behaviors that are in accordance with the Principles of Learning into their instructional repertory.

[8]During Learning Walks, participants spend five to ten minutes in each of several classrooms, looking at student work and talking with students and teachers. At the end of the Learning Walk, participants work with the leader (generally the principal) to refine observations, look for patterns within the school, and identify professional development needs and next steps.

As is illustrated at the top of Figure 1.1, district-level factors (for example, leadership stability, curriculum decisions, hiring and compensation practices) as well as the individual characteristics of principals and teachers (especially their level of experience) play an important role in shaping instructional practices and student outcomes. However, the analyses in the following chapters seek to examine the relationships among principal and teacher behaviors, instruction, and student outcomes that emerge *across* all three study districts (rather than focusing on how these relationships may differ among the different districts) and *across* experience levels of school personnel.[9]

The Selection of Study Districts and Schools

The original intention was to recruit 80 elementary schools in three districts to participate in the study. MDRC and the IFL worked together to identify potential study districts. MDRC wanted to select districts that were ethnically and geographically diverse, in order to enhance the relevance of the findings for policymakers and practitioners. IFL staff members suggested districts that met these criteria and that they thought might be amenable to participation in a research effort.[10]

Early on, the decision was reached to limit the study to elementary schools. The research team reasoned that, in elementary schools, the role of principals as agents of instructional improvement is likely to be most pronounced. (In contrast, in middle and high schools, the departmentalized nature of instruction and the presence of assistant principals, deans, and department heads make for much more distributed instructional leadership.) The researchers also elected to focus on third grade, for two main reasons. First, because that is the earliest grade at which all students' reading and math skills must be tested if states are to be in conformity with the requirements of the No Child Left Behind Act of 2001, achievement data were certain to be available for students at this grade level. Furthermore, third-grade students are expected to grapple with more complex texts and mathematical concepts than are taught in earlier grades, making instruction that incorporates the Principles of Learning both more relevant to and (presumably) more evident in third-grade lessons than in lessons for younger pupils. Fourth-grade teachers were also asked to complete teacher surveys, but they were not included in the classroom observations; nor were student achievement data collected for fourth-graders.[11]

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[9]Statistically, this is achieved by treating district, principal's prior experience, and teacher's prior experience as covariates in regression and correlational analyses. See the discussion in Chapter 2.

[10]Districts whose work with the IFL had been studied previously were excluded from consideration for this study, to prevent "research overload" in those districts.

[11]An important part of the survey concerned teachers' views of their principal as an instructional leader, and the researchers wanted to base leadership ratings on more than the handful of responses that would be pro-

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From the outset, it was also determined that participation in the research on the part of school districts, and of individual schools within those districts, would be entirely voluntary. In presentations about the study to potential participants, the study director emphasized that the research would yield valuable information and would impose only a minor burden on teachers and principals. At the same time, participation in the study did not particularly benefit a district — the study was too leanly funded to offer big financial incentives, and the assistance that districts received from the IFL was not linked to joining the research. In all, seven districts were approached, and Austin, Saint Paul, and Region 10 of New York City agreed to participate.[12]

By design, study schools were selected to include large numbers of students at high risk of adverse educational outcomes. This choice reflects the shared priority placed by both the IFL and MDRC on improving educational outcomes for disadvantaged students. Researchers used 2004 data to identify schools eligible for inclusion in the study.[13] Such schools had to serve a student population that was at least 50 percent economically disadvantaged (as measured by eligibility for free or reduced-price lunch) and at least 50 percent nonwhite. The pool was further narrowed to include the schools with lower achievement levels: 47 schools in Austin, 42 schools in Region 10, and 29 schools in Saint Paul.

The participation of schools, like that of districts, was wholly voluntary, and recruiting the schools required intensive effort on the part of research team members. While a letter from the superintendent at each site to the principals of the potential study schools described the study and invited schools to participate, meetings with the principal and/or teachers at the individual schools proved essential for getting schools to sign up. In the end, 49 of the 118 schools in the eligible pool agreed to participate.[14]

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vided by a survey that was limited to third-grade teachers. At the same time, resources were insufficient to allow all teachers in the school to be surveyed. Expanding the survey sample to include fourth-grade as well as third-grade teachers was an effort to compromise between research desiderata and resource constraints.

[12]Two districts declined because they did not want to create any additional work for teachers, who, according to district administrators, were already stretched to the limit. In a third district, it proved impossible to reach a budgetary agreement with the district's research office. The fourth district was undergoing a leadership transition when the research project was initially approved, and when the new superintendent assumed office, he announced that the district would not continue its professional development contract with the IFL. Under these circumstances, it made no sense for the research to go forward in the district.

[13]These data were posted on the Web site www.SchoolMatters.com, which was created by the School Evaluation Services division of Standard & Poor's as an independent, objective source of school and district data. To select eligible Region 10 schools, researchers also examined data posted on the New York City Department of Education Web site.

[14]For the school to be counted as participating, the principal and at least two *third-grade* teachers had to sign and submit Informed Consent Forms. Although consent was not required from all the third-grade teachers in a given school for the school to be considered a study school, with only one exception, all third-grade teachers in the 13 Saint Paul study schools agreed to participate. In Austin, however, there were 91 third-grade

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Table 1.1 shows selected characteristics of the study schools and of all elementary schools in their respective sites as of the 2003-2004 school year, when the schools were selected. As planned, the study schools in all three districts contained higher proportions of low-income students than did other schools in their districts: Between 82 percent and 87 percent of the students in the study schools were eligible for free or reduced-price lunch, compared with a range of 65 percent to 76 percent for all elementary schools in the districts. The study schools also included more nonwhite students than did elementary schools in their districts more generally. That said, the ethnic composition of students attending the study schools differed considerably among the three districts. In Austin, study school students were predominantly Hispanic; in Region 10, the student population was almost evenly divided between African-American and Hispanic students; and the Saint Paul students came from a variety of backgrounds (including a sizable proportion of Asian students, primarily Hmong in extraction). Finally, and also as planned, the study schools had higher proportions of students scoring below standard on state or district tests.[15]

The IFL's Work with the Study Districts

The IFL began its work with Saint Paul in the 2000-2001 school year; with Austin, in the 2001-2002 school year; and with Region 10, in the 2004-2005 school year. Typically, the site contracts called for 25 to 30 days of work with the site each year. The first year in all three

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teachers across the 21 study schools; of these, only 73 (80 percent) agreed to participate. The data for calculating the participation rates of third-grade teachers in Region 10 are not available.

While the participation of fourth-grade teachers was sought as well, their participation was not required, and, at four schools included in the study, only third-grade teachers signed the forms signaling participation.

[15]A much higher proportion of students in Austin than in the other districts met the state standard. The size of the disparity strongly suggests that, at least in 2004, standards in Texas were easier to satisfy than in the other two districts. Evidence from the 2005 National Assessment of Educational Progress (NAEP, often referred to as "the Nation's Report Card") supports this proposition. Fourth-grade students in New York State who were eligible for free or reduced-price lunch had an average NAEP reading score of 210.3; in Minnesota and Texas, the corresponding scores were 208.6 and 207.8, respectively (U.S. Department of Education, National Center for Education Statistics). As Table 1.1 shows, roughly similar proportions of students at the study schools in the three participating districts qualified for free or reduced-price lunches (between 82.4 percent and 87.1 percent). Nonetheless, only 15.9 percent of Austin third-graders in the study schools scored below standard on the state or district reading test, compared with 73.5 percent in Region 10 and 57.5 percent in Saint Paul.

Given the educational and economic disadvantages faced by many study school students, it is perhaps surprising that relatively few of these schools received funding from Reading First, the major federal source of funding for reading instruction. One possible explanation is that 2003-2004 was the first full academic year in which Reading First funds were available to districts; schools that did not receive funding initially may have done so subsequently. Another reason may be that all three study districts have adopted a Balanced Literacy approach that is not fully compatible with the heavy phonics emphasis of Reading First.

The Instructional Leadership Study

Table 1.1

Selected Characteristics of Study Schools and of All Elementary Schools in the Study Districts (2003-2004)[a]

Characteristic	Austin		New York City Region 10		St. Paul	
	Study Schools	All Elementary Schools	Study Schools	All Elementary Schools	Study Schools	All Elementary Schools
Number of elementary schools	21	74	15	49	13	61
Reading First schools (%)	28.6	23.0	0.0	12.2	23.1	8.2
Average student enrollment	565	576	627	752	395	357
Race/ethnicity (%)						
White, non-Hispanic	6.6	24.9	1.9	7.6	16.1	29.8
Black, non-Hispanic	12.6	14.2	49.1	38.8	36.2	32.4
Hispanic	80.2	58.1	47.3	51.2	12.4	11.6
Asian	0.5	2.6	1.4	2.0	31.3	24.1
Other	0.2	0.2	0.4	0.4	4.0	2.1
Students eligible for free or reduced-price lunch[b] (%)	87.1	65.0	82.4	76.0	84.2	69.2
Third-grade students scoring below standard on the state/city achievement test[c] (%)						
Reading	15.9	12.3	73.5	63.0	57.5	46.8
Math	18.4	14.7	60.6	52.1	55.2	46.4

SOURCES: MDRC calculations from publicly available data from the 2003-2004 Common Core of Data; the 2003-2004 New York School Report Cards; the 2003-2005 Southwest Educational Development Laboratory; and the 2004 administrations of the Texas Assessment of Knowledge and Skills (TAKS), the New York City CTB-Reading and CTB-Math tests, and the Minnesota Comprehensive Assessment (MCA).

NOTES: Rounding may cause slight discrepancies in calculating sums and differences.

[a]Characteristics are reported for all public elementary schools that include grades 3 and 4.

[b]For New York City Region 10 schools, only the percentage of students eligible for free lunch is reported.

[c]No statewide test was administered to third-grade students in New York City in 2004, so data from the citywide standardized assessment are used. Eleven schools in St. Paul are missing student achievement data due to the suppression of statistics for schools where seven students or fewer were tested.

sites entailed work with a leadership cadre of key central staff — area supervisors, directors of special education and of the district's initiative for English Language Learners, and so on — and with other leaders, to expose them to the Principles of Learning and to Learning Walks.[16]

After that, the paths of the three districts diverged. From the outset, all elementary school principals in Austin and Region 10 were given the message that the IFL's work would serve as the cornerstone of the district's educational reform efforts and that all schools would be expected to participate in the professional development that the IFL provided. This was not the case in Saint Paul, where schools joined the IFL professional development effort in phases, over a multiyear period and on a voluntary basis. This decision reflected the desire of high-ranking district officials to try out the intervention in a few Saint Paul schools and "get it right" before implementing it more widely, as well as their belief that the district did not have enough coaches to support all schools at once; it also took into account that Saint Paul schools and their leaders exercised considerably more autonomy than in the other sites. (Once schools did sign up, however, they were expected to participate fully.) Seven elementary school principals participated in the professional development in the first year that it was available (2001-2002), and 11 more joined in the second year. By the third year, 30 elementary school principals were receiving IFL professional development, and, by the fourth year, all schools had joined. Gradually and over time, the IFL's work became accepted as the reform model for the district. As one Saint Paul Public Schools staff member put it, "Now [we're] all on board with IFL — everyone talks the talk, and there is no doubt that this is the [district] reform."

As a rule, at the beginning, the IFL provided five or six full days of training to elementary school principals and other key school-level personnel (such as assistant principals and lead teachers) over the course of a school year. Thereafter, the amount of IFL training provided to principals declined at all three sites. In one district, this was the result of a funding cutback. The reduction also reflected new IFL priorities; the institute had developed a new instructional approach known as "Disciplinary Literacy," for high school teachers, the IFL shifted much of its professional development to this new initiative.[17]

As in other districts with which the IFL works, principals at the study sites have been expected to relay what they have learned at the IFL training sessions to their faculties.[18] District

[16]The IFL liaison's work has involved training a core group of individuals from the district who could train others and ultimately take over from the IFL. Thus, in Region 10, for instance, instructional coaches received training on the Principles of Learning from district staff rather than from the IFL liaison.

[17]The key premise of Disciplinary Literacy is that instruction should help students develop the "habits of mind" and practice the forms of inquiry that are exhibited by mathematicians, scientists, historians, and professionals in other fields.

[18]In Austin, the IFL liaison recognized a need to work with teachers — especially teachers new to the district and bilingual teachers who initially did not see the IFL's work as relevant to their own. The liaison also

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officials and IFL staff recognized that, as one district-level informant put it, "This only worked as well as the principal." Another official acknowledged that the principal's lack of capacity as a teacher of teachers could be a "stumbling block" but added that new principal candidates were now being interviewed about their abilities in this area and about their adherence to the Principles of Learning.

Neither district officials nor IFL staff wanted or expected the institute's professional development to be the sole kind of training offered to principals and teachers. Rather, because IFL personnel believed that it was essential to ground the Principles of Learning in actual subject-matter content, both district and IFL personnel envisioned the IFL's work as providing an "umbrella" — a set of overarching ideas about what constitutes high-quality teaching and learning and a vocabulary for discussing those ideas — under which other professional development efforts could be fitted. In all three sites, subject-specific professional development directed toward teachers rather than principals occurred simultaneously with IFL-provided professional development. All three districts have adopted approaches to teaching literacy and math that are seen as consistent with the IFL Principles of Learning — and have contracted for subject-specific professional development that utilizes these approaches. Thus, from the outset, teachers in the Saint Paul schools who were engaging with the IFL simultaneously received separate training in writing instruction, and later in reading instruction as well, from outside consultants. In Austin and Region 10, teachers have received training in reading and in math from other organizations; in Austin, training in science and in the use of formative assessments to guide instruction have also been added to the mix. In general, both IFL staff and district personnel who were interviewed asserted that the professional development that teachers received complemented and mutually reinforced the IFL's messages.

The Contents of This Report

The remainder of this report consists of five chapters. Chapter 2 lays the foundations for the substantive findings in Chapters 3 through 5. It begins by reviewing the data collected for the study and the analytic constructs created using these data. It then considers the regression analysis methodology used to describe in quantitative terms the relationships between constructs at the various steps of the theory of action. The chapter's final section discusses the limitations of the analyses and the conclusions that the analyses support.

Chapters 3 through 5 cover successive steps in the IFL theory of action. Chapter 3 focuses on Steps 1 to 3 of that theory; its subject is the professional development that principals

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had more time available in her contract to undertake professional development for teachers than did her counterparts at the other two study sites.

receive and transmit to teachers in their schools and the professional development that teachers report receiving. First, for each step of the theory, it describes the behavior of principals who received higher, medium, and lower ratings as instructional leaders from teachers at their schools; then it employs regression analysis to link quantitatively the behaviors of principals and teachers with respect to professional development.

Chapter 4 deals with Steps 2 to 4 of the theory. It delves deeply into classroom observation data to determine the extent to which the instruction that was observed conforms to IFL principles. It also makes use of multiple regression analysis applied to data from the teacher survey to relate instructional practices to the professional development that the teachers reported receiving and to the involvement of principals in the professional development of their teachers.

Chapter 5 covers Steps 3 to 5 of the theory of action. It examines the ultimate outcome of interest — student achievement — and its relationship to the quality of classroom instruction. The chapter also considers whether more professional development resulted in higher achievement.

Chapter 6 discusses the overall findings of the study and their implications for efforts to improve schools.

Chapter 2

The Report's Data, Key Constructs, and Analysis Strategy

This chapter first discusses the quantitative and qualitative data collected for the Instructional Leadership Study. It then presents the key constructs and measures that are associated with each step of the theory of action developed by the Institute for Learning (IFL) and describes the general strategy that is used in Chapters 3 through 5 to analyze these data. These methodological sections of the report may be of interest to researchers and others, but readers who elect to skip them are strongly encouraged to turn to the final section of the chapter, which considers the limitations of the analyses and of the conclusions that can be drawn.

The Data and Their Sources

Table 2.1 displays the quantitative data sources used in the study. These data, along with the qualitative data used to provide additional meaning and context to the statistics, are described below.

Principal and Teacher Surveys

Surveys were administered during the spring of 2006 to principals and to participating third- and fourth-grade teachers in the 49 elementary schools in the study.[1] Three districts, or "sites," were involved: Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City.[2] The surveys were self-administered and took about 45 minutes to complete. At each school, a staff member was appointed as a survey liaison whose main responsibility was to collect the completed surveys (which respondents had sealed into envelopes) and send them to the firm contracted by MDRC to handle survey administration. The process yielded response rates

[1]The surveys used in this study are based on surveys developed by RAND Corporation for a study of the IFL's work with three urban school districts (Marsh et al., 2005). An earlier round of surveys was administered in the fall of 2005, asking principals and teachers to reflect on the 2004-2005 school year. Because of resource constraints, these surveys were not analyzed.

[2]For convenience, Region 10 is referred to as a "district" in this report, although this is obviously a misnomer. During the period of the study, New York City schools were organized into geographical regions, each headed by a regional superintendent. Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced the geographical regions.

Table 2.1

Quantitative Data Associated with Steps in the Theory of Action Guiding the Instructional Leadership Study

Step in Theory of Action	Data Source	Comment
Principal's receipt of PD	Principal surveys	Surveys were administered to principals of the 49 study schools in the spring of 2006 tapping their experiences during the 2005-2006 school year and the summer of 2005. Surveys were received from 44 principals, for a response rate of 89.8 percent.
Principal's involvement in PD for teachers	Principal surveys	See the comment above.
Teacher's receipt of PD	Teacher surveys	Surveys were administered to 285 third- and fourth-grade teachers in the 49 study schools in the spring of 2006 tapping their experiences during the 2005-2006 school year and the summer of 2005. Surveys were received from 274 teachers, for a response rate of 96 percent.
Characteristics of classroom instruction	Classroom observations, teacher surveys	Observations were conducted of 151 third-grade reading classes and 151 third-grade math classes during the 2005-2006 school year.
Student achievement	State achievement tests, New York City test	School-level third-grade reading and math scores on standardized assessments administered in 2003, 2004, 2005, and 2006 were collected.

NOTE: For an overview of the IFL's theory of action, see Figure 1.1 in Chapter 1 and the section entitled "The IFL's Philosophy of Instructional Change and the Professional Development That It Offers."

of 90 percent for the principals and 96 percent for the teachers — extraordinarily high rates for mail surveys.[3]

Box 2.1 shows the topic areas covered in each survey. While the scope of the surveys was broad, their primary purpose was to collect information about the instruction-related professional development that both groups had received and, in the case of principals, passed on to teachers at their schools. Thus, a number of survey items asked about the frequency of professional develop-

[3]Teachers who completed the survey received a $15 gift card from a national bookstore chain as a token of appreciation. The survey liaison received a $30 gift card.

ment activities that centered on IFL concepts and on other instruction-related concerns.[4] (Professional development is abbreviated as "PD" in many of the report's exhibits.)

Respondents were also asked to rate the value of the professional development that they had received on each topic.

All the questions asked about events and respondents' reactions during the 2005-2006 school year and the preceding summer.

Classroom Observations

Researchers conducted observations in third-grade classrooms to ascertain the extent to which practices that incorporated three key IFL Principles of Learning — Accountable Talk, Academic Rigor, and Clear Expectations (see Box 1.1 in Chapter 1) — were evident in the study schools.[5]

As mentioned in Chapter 1, two instruments that were developed by researchers at the Learning Research and Development Center (LRDC) of the University of Pittsburgh — the Reading Instructional Quality Assessment (IQA) and the Math IQA — were adapted for use in the study.[6]Before field research began, IFL staff members provided MDRC research team members with five days of training on the use of the instruments. Researchers using the IQA take a running record of a lesson and then use their notes to assign scores to specific rubrics measuring the extent to which the lesson reflects Accountable Talk, Academic Rigor, and Clear Expectations. The point range for each rubric is 1.0 to 4.0 (with 4.0 always

[4]The surveys asked about the IFL Principles of Learning — Accountable Talk, Academic Rigor, and Clear Expectations — but did not explicitly use these terms. Although one goal of the IFL's work with districts is for these terms to become part of a shared vocabulary for communicating about instructional quality, the researchers suspected — and, to some extent, the limited field research conducted for the study has confirmed — that familiarity with the *name* of a principle did not necessarily indicate familiarity with the underlying concept.

That said, the alternative language that the researchers developed for describing the Principles of Learning may not have fully captured the complex thinking associated with each principle. For example, instead of asking about professional development on Accountable Talk, the survey asked about professional development on "engaging students in whole-group discussions to promote learning." Teachers may have interpreted this question as tapping professional development on increasing students' participation and engagement in classroom discussions — necessary but not sufficient for the successful implementation of Accountable Talk.

[5]As Box 2.1 indicates, several items in the teacher survey also asked respondents to describe their classroom practices; Chapter 4 discusses how well teachers' views of their instruction corresponded with observers' ratings.

[6]Both the Reading and Math IQAs were adapted for this study in an attempt to achieve greater reliability across raters. The versions of the Reading and Math IQAs that were used in this study are presented in Appendix A.

Box 2.1

Key Topic Areas Covered in the Principal and Teacher Surveys

Principal survey

- Frequency with which the school or district offered teachers professional development on specific topics involving specific types of activities
- Principal's role in professional development that the school or district offered to teachers
- Proportion of teachers who typically participated in professional development on specific topics/ involving specific types of activities
- Frequency with which the district offered the principal professional development on specific topics/involving specific types of activities
- How valuable each topic or type of professional development received was for the principal's practice as a school leader
- Value of IFL-related professional development
- Importance of observing specific kinds of instructional activities, methods, and materials in classroom visits
- Opinions about the reading and math curricula
- Time spent on school leadership activities
- Opinions about the principal's supervisor and about the district's practices in evaluating and supporting principals
- Perceived challenges to the principal's efforts to improve teaching and learning
- Length of experience as a principal in the study school and in total

Teacher survey

- Frequency with which the teacher participated in district- or school-sponsored professional development on specific topics/involving specific types of activities
- How valuable each topic or type of professional development received was for the teacher's professional growth
- Features of the teacher's instructional practice during a typical reading or math lesson
- Opinions about the reading and math curricula
- Actions of the principal as a school leader and attitudes toward the principal
- Perceived challenges to improving teaching and learning in the classroom
- Opinions about district administrators' practices and priorities
- Length of experience as a teacher in the study school and in total
- Teaching credentials (highest degree received, type of certification held)

indicating greater prevalence of the Principle of Learning), except for the rubric measuring student participation in classroom discussions, which has a range of 1.0 to 5.0. Subscores are calculated for each Principle of Learning, based on the scores that teachers received on the relevant rubrics, and the overall IQA score is calculated as the mean of the subscores for each Principle of Learning.[7] Details regarding the individual rubrics and how each subscore is calculated from these rubrics are discussed in Chapter 4.[8] The versions of the Reading and Math IQAs employed in the study appear in Appendix A.

Almost all third-grade teachers in the study were observed twice during the 2005-2006 school year — once during a reading lesson and once during a math lesson — for a total of 151 reading observations and 151 math observations (97 percent of the observations that were scheduled for fielding).[9] The observations were spread across the school year so that, to the extent possible, teachers who were observed earlier in the year in one subject would be observed later in the year in the other subject. The same purposeful scheduling of observations happened at the school level, so that any given school was likely to have some earlier and some later observations in each subject area.[10] Each observation generally lasted between 45 and 90 minutes.

Student Achievement Data

In all three sites, the percentage of each school's third-grade students who met the standard on the statewide standardized test was downloaded from the state or local education agency's Web site and was used to measure student achievement in 2006. Test score data from

[7]If a subscore is missing for any Principle of Learning, an overall IQA score is not calculated.

[8]As noted above, research staff members received common training on the use of the IQA. In an effort to achieve reliability across raters, staff also discussed — in lengthy weekly telephone conferences — general scoring practices as well as how to score specific problem cases. In the end, however, it proved impossible to attain the requisite degree of consistency among the four observers. Reliability was achieved because one member of the research team, on the basis of the running record, rescored all observations from Austin and St. Paul to be consistent with scoring standards developed by the two researchers conducting observations in New York City Region 10.

[9]Since 155 third-grade teachers participated in the study, in theory, 310 observations could have been completed (155 each in math and reading). However, some teachers could not be observed twice, for such logistical reasons as scheduling conflicts, maternity leave, or having left the school. In addition, a few teachers were observed twice in one subject area because they did not teach the other subject area.

As discussed below, some observations were missing so much data — generally because key activities called for by the IQA did not take place during the lesson — that they could not be used in analyses.

[10]Such scheduling was intended to ensure that not all observations for a particular school would be completed early or late during the year, given the changes in classroom dynamics that can be expected to take place over time. Although MDRC is based in New York City and Oakland, California, the study employed field researchers in Austin and Saint Paul so that observations could be conducted over the course of the school year in these districts.

the three previous years were also downloaded for use as control variables in the analyses of the relationships between student achievement and other variables.

In Texas, the statewide achievement test is the Texas Assessment of Knowledge and Skills (TAKS). Since the TAKS has been in use since 2003, third-grade TAKS scores were downloaded from the Texas Education Agency's Web site for the 2005-2006 school year and for the three preceding school years (2002-2003, 2003-2004, and 2004-2005).[11]

In New York City Region 10, third-grade student achievement for the 2005-2006 school year was measured using the New York State Test; the data were downloaded as school grade-level files from the New York State Education Department.[12] Since the New York State Test was not administered to third-grade students prior to the spring of 2006, student achievement for school years 2002-2003 through 2004-2005 was measured using New York City CTB-Reading and CTB-Mathematics test data available from the New York City Department of Education.[13]

In Saint Paul, third-grade student achievement in the 2005-2006 school year was measured using the Minnesota Comprehensive Assessment, Series II (MCA-II). For school years 2002-2003 through 2004-2005, student achievement was measured using an earlier (and non-comparable) version of the test, simply called the Minnesota Comprehensive Assessment (MCA). Data from both the MCA-II and the MCA were downloaded as school grade-level files from the Minnesota Department of Education.[14]

Qualitative Data

To gain a better understanding of the IFL's work and its influence on sites and schools, MDRC researchers interviewed high-level officials and the IFL liaisons for the three study districts. Further, case studies involving daylong visits to eight schools across the three sites helped illuminate the findings from close-ended surveys. During these site visits, researchers interviewed and job-shadowed the principal and generally conducted a focus group with teachers. Finally, MDRC researchers in Austin and Region 10 observed several training sessions for principals and teachers at which IFL concepts were presented and discussed.

[11]Texas Education Agency, Student Assessment Division (2006).

[12]New York State Education Department; Elementary, Middle, Secondary and Continuing Education; Information and Reporting Services (2006).

[13]New York City Department of Education, Department of Assessment and Accountability (2006).

[14]Minnesota Department of Education (2006).

Constructs and Measures Used in the Report

Box 2.2 presents a list of the key constructs and measures used in this report; Appendix Table B.1 reports the salient statistical properties of these variables. The measures related to professional development are all drawn from the principal and teacher surveys. Some measures consist of a single survey item; others involve scales created from multiple items.[15] Appendix C presents the constructs and measures that are derived from the surveys and the specific items that compose these measures, which are referred to repeatedly in the chapters that follow.

The Data Analysis Strategy

Originally, the research team had intended to conduct analyses in which the statistical relationships among constructs at all five steps in the IFL theory of action could be simultaneously linked (see Figure 1.1 in Chapter 1). In such analyses, every construct (except those at Step 1) would be considered to be dependent on constructs at the preceding step(s), and every construct (except those at Step 5) would be considered to be a potential predictor of constructs at subsequent steps.

Complex five-step models, however — especially those that include more than one construct at each step — require data from many more schools than were available in the study. For this reason, the theory is divided into four separate sets of analyses, one for each step in the theory that could be influenced by preceding steps in the theory. In each set of analyses, *direct* relationships are examined between the outcome of interest and the one or two steps in the theory that immediately precede that outcome.[16]

[15]To derive the scales, researchers first identified survey items that they hypothesized to be associated with certain constructs. Factor analysis was then used to refine and improve the scales. The scales vary widely in the number of items they contain, from a minimum of 2 to a maximum of 37; the average number of items per scale across the 23 scales is 10. With respect to missing data, the researchers, with some exceptions, followed a decision rule to suppress the computation of a scale score for a respondent if more than 25 percent of the items making up the scale had missing data. Only survey constructs with alphas of 0.65 or higher were included in the analyses.

[16]The research team also sought to explore the *indirect* relationships among variables, using path analyses in which constructs representing three consecutive steps are included in the same model. In this way, it would be possible to examine, for example, how constructs at Step 1 affected outcomes at Step 3 both directly and *indirectly* by affecting outcomes at Step 2 that then affected the Step 3 outcomes. However, because of the small sample size, these three-step models proved unstable, and the results are not reported here.

Box 2.2

Key Constructs and Measures Used in This Report, by Data Source and Step in the Theory of Action

Principal survey

Principal's receipt of professional development

Frequency of principal's receipt of instruction-related PD
Value principal places on instruction-related PD
Frequency of principal's receipt of PD on Principles of Learning
Value principal places on PD on the Principles of Learning
Frequency of principal's receipt of PD on Accountable Talk
Value principal places on PD on Accountable Talk
Frequency of principal's receipt of PD on Academic Rigor
Value principal places on PD on Academic Rigor
Frequency of principal's receipt of PD on Clear Expectations
Value principal places on PD on Clear Expectations

Principal's involvement in professional development for teachers

Role principal plays in PD offered to teachers
Time principal spends with teachers on instructional improvement
Role principal plays in PD on the Principles of Learning offered to teachers
Frequency of principal's giving teachers suggestions on implementing the Principles of Learning
Role principal plays in PD on Accountable Talk
Frequency of principal's giving teachers suggestions on Accountable Talk
Role principal plays in PD on Academic Rigor
Frequency of principal's giving teachers suggestions on Academic Rigor
Role principal plays in PD on Clear Expectations
Frequency of principal's giving teachers suggestions on Clear Expectation

Other measures

Principal's assessment of the school's PD environment for teachers

(continued)

Box 2.2 (continued)

Teacher survey

Teacher's receipt of professional development

Frequency of teacher's receipt of instruction-related PD
Value teacher places on instruction-related PD
Frequency of teacher's receipt of PD related to the Principles of Learning
Value teacher places on PD related to the Principles of Learning
Frequency of teacher's receipt of PD related to Accountable Talk
Value teacher places on PD related to Accountable Talk
Frequency of teacher's receipt of PD related to Accountable Talk in math
Value teacher places on PD related to Accountable Talk in math
Frequency of teacher's receipt of PD related to Academic Rigor in math
Value teacher places on PD related to Academic Rigor in math
Frequency of teacher's receipt of PD related to Academic Rigor in reading
Value teacher places on PD related to Academic Rigor in reading
Frequency of teacher's receipt of PD related to Clear Expectations
Value teacher places on PD related to Clear Expectations

Other measures

Teacher's assessment of the principal as instructional leader
Teacher's assessment of the principal as organizational leader

Instructional Quality Assessment (IQA)

Reading IQA score

Accountable Talk
Academic Rigor
Clear Expectations

Math IQA score

Accountable Talk
Rigor of the Task
Clarity and Detail of Expectations

Student achievement

Percentage of third-grade students meeting the state standard in reading
Percentage of third-grade students meeting the state standard in math

There are thus four sets of analysis in the evaluation:

- Step 1 to Step 2, linking principals' reported involvement in teacher professional development and their receipt of their own professional development related to instructional improvement (Chapter 3)
- Steps 1 and 2 to Step 3, tying teachers' professional development back first to their principal's involvement and then to the professional development that principals themselves received (Chapter 3)
- Steps 2 and 3 to Step 4, tracing instructional quality back first to teachers' professional development and then to their principal's involvement in that professional development (Chapter 4)
- Steps 3 and 4 to Step 5, linking student achievement back first to instructional quality and then to the professional development that teachers received (Chapter 5)

The data from teacher surveys and classroom observations at individual schools are aggregated so that, in the regression analyses, the school is the unit of analysis.[17] In addition, each set of analyses is conducted at two or three different levels of specificity. The measures of instructional quality are analyzed both as overall IQA scores and as subscores measuring each Principle of Learning. Professional development is considered first with regard to all professional development related to improving instructional quality at the school. Then the analysis is narrowed to professional development related specifically to the Principles of Learning, first combining survey data relating to the three Principles of Learning into one measure and then independently analyzing the available data on each Principle of Learning.

Although it would have been preferable to use a consistent sample across all analyses in order to strengthen conclusions about relationships that span the various analyses, missing data issues made this approach untenable.[18] Therefore, the researchers decided to sacrifice a uniform, but too small, sample in the interest of enhancing the meaningfulness of the findings. Consequently, the analyses discussed in this report are generally based on the largest number of schools for which in-

[17]School means for teacher survey measures were not assigned where fewer than two teachers at the school had valid values for the measure, and school means for IQA scores were not assigned where fewer than 50 percent of the participating third-grade teachers had valid scores.

[18]In a test of the consistent-sample approach, the sample size was reduced to a point at which the research team judged that estimates of the size and significance of the relationships were highly unstable (that is, were dependent on the exact composition of the sample) and that meaningful relationships were likely to be obscured by the lack of statistical power.

formation relevant to the analysis is complete.[19] This means that the sample size changes from one chapter to another and even from one analysis to another within the same chapter.

Since the goal of the analyses is to examine the nature of the relationships between the steps in the theory of action *independent* of other factors that may be expected to influence the outcomes, the effects of background characteristics must be accounted for in order to measure more accurately the relationships between the variables of interest. For this reason, additional covariate measures were included in every analysis, in order to control for certain measurable characteristics of principals and teachers and for nonmeasured characteristics of districts. These include principals' length of experience, the average experience of the teachers at the school, and indicators for the three school districts in the study.[20] In addition, for the analyses on student achievement, a measure of prior school-level third-grade student achievement was included. Box 2.3 presents the rationale for including each of these covariates.

In the following chapters, the findings from the regression analyses are presented in two ways. First, check boxes summarize which relationships are statistically significant and which are not, at each level of the analysis (for example, the relationships between principals' receipt of and behaviors regarding all instruction-related professional development, professional development on the Principles of Learning, and professional development on each Principle of Learning considered separately). Second, bar graphs illustrate the size of certain key relationships; the bars represent the score on the dependent variable that would be predicted for an individual who received a low, medium, or high score on the independent variable of interest, holding constant all other measures that were included in the model. Appendix D presents the full results of each regression analysis discussed in this report, including the standardized regression coefficient and p-value for each variable included in the model.

Limitations of the Analysis

The analyses in this report represent an effort to explore an interesting and suggestive theory of change. Understanding the limitations of these analyses helps to make clear the limitations of the conclusions that can be drawn from them.

[19]There are a few exceptions to this rule: Analyses of Steps 1 through 3 that test the associations of the same set of independent variables with two different outcomes (for example, *frequency* and *value* of teacher professional development) use the same sample for both models.

[20]In order to limit the number of variables included in the regression models, total years of experience as a principal was used rather than years of experience as a principal at the study school. The partial correlation between a principal's total experience and the number of years he or she had been at the school (controlling for district and average teacher experience) is 0.53.

Box 2.3

Background Characteristics Included and Their Rationale as Covariates in the Regression Analyses

The following control variables are included in all analyses:

- **Principals' experience**
  The number of years of experience that principals have in their position is included as a control variable because this may influence their actions as instructional leaders. For example, more experienced principals may have greater confidence in themselves as leaders, and they may tend to hold different beliefs about good teaching practices and the role that principals should play in their schools than principals who are newer to the job. In addition, more experienced principals may be assigned to schools with different characteristics from schools to which less experienced principals are assigned (for example, experienced principals may be assigned to more challenging schools). Finally, a principal's experience was found to be moderately correlated with the number of years that the principal reported having been at the same school, which may be expected to influence his or her interactions with teachers.

- **Teachers' experience**
  The average experience of the teachers at each school is included as a control variable because less experienced teachers may require (or be open to) different kinds of assistance from their principals than would more experienced teachers. In addition, teachers' experience may influence their teaching practices and as well as the achievement of their students on standardized exams.

- **District**
  Indicators for the three study districts are included in each analysis in order to control for any district-level factors that may shape the behavior of principals, the professional development that principals and teachers receive, teaching practices, and student achievement levels.

In addition to the variables listed above, the analyses on student achievement control for one additional factor:

- **Prior student achievement**
  To account for the school's history of student achievement, the analyses include the percentage of third-grade students at each school who met the third-grade performance standard on the state or city assessment for the three years prior to the study year (2003, 2004, and 2005).

No Counterfactual

As noted in Chapter 1, no data from non-IFL sites were collected to establish a *counterfactual* (that is, an estimate of what would have happened without the IFL's presence). Because of the absence of such a counterfactual, this report cannot be taken as measuring the impact of the IFL's work.

Limited Time Frame

Ideally, the study would have collected data over time, so that principals' behavior could be linked to *changes* in instructional quality and student achievement at their schools. But because of resource constraints, with the exception of retrospective data on student test scores, all the information used in the study was collected during and pertains to the 2005-2006 school year. The fact that the data are cross-sectional rather than longitudinal has three major consequences.

First, the theory of action informing the report assumes that behaviors will unfold in sequences that have an implicit causal as well as temporal order. But because all the data collected for the study are concurrent, it is not possible to determine which actions come first and which follow. For this reason, this analysis can provide no empirical evidence as to whether one action *caused* another. For example, the theory postulates that principals will receive professional development on a specific topic and then transmit what they have learned to their teachers (in other words, that receipt of professional development *causes* principals to give their teachers professional development on the topic). But the relationship could also be the reverse: Teachers' new knowledge about an instructional approach may make it imperative for principals to learn more about that approach. Similarly, the theory suggests that teachers who receive professional development on, for example, Accountable Talk and who find it to be valuable will be more likely to try out instructional strategies that involve Accountable Talk in their classrooms. But it is also possible that teachers will value professional development on a topic because it affirms the "rightness" of what they have already been doing in their classes, or that they will value it "after the fact" because they observe positive results after implementing in their classrooms the teaching practices that they learned in their professional development. While the analyses presented in the chapters that follow generally assume the order implied by the theory of action, there is no way to be sure that this is correct.

Furthermore, because the surveys asked only about activities during the 2005-2006 school year, they do not capture either principals' or teachers' full exposure to IFL-related professional development, which antedated the study by several years in Austin and Saint Paul and by at least one year in Region 10. One might expect principals who received IFL professional development over many years to be in a better position to pass it on to their teachers. One would

also expect teachers who received IFL professional development over many years to be in a better position to put IFL-recommended practices in place in their classrooms. But the data that would permit tests of these propositions are not available.[21]

Finally, the theory of action describes a process that unfolds over *time*. The data available for the study compress that process into a one-year time frame that may be too short a period for the changed behaviors predicted by the theory to take effect. For example, a principal with strong leadership skills may be assigned to a school where district officials perceive teaching and learning to be inadequate. In the first year, that principal may bring in expert professional development and may improve the instructional climate in other ways. But it would be unreasonable to expect an instant turnaround in instructional practices and test scores. In this respect, it is notable that, in a review of the effectiveness of comprehensive school reforms (CSRs) in improving student achievement, the authors concluded that schools implementing such models for five years or more had stronger effects than those with briefer periods of implementation.[22]

Limited Sample Size

Another major limitation concerns the small number of principal surveys and the relatively small numbers of teacher surveys and classroom observations on which the study is based. Missing data on particular items or constructs constrain the analyses still further.[23]

As previously noted, the analyses examine schools as the unit of analysis. Most analyses use the largest sample available to address the key questions, in order to maximize what can be learned; the maximum number of schools in any analysis is only 42, while the minimum is 30. These small overall sample sizes limit the number of variables that can be used to explain outcomes in the analyses that follow. Even using the maximum sample available for each analysis, the results are not very stable; that is, they are greatly influenced by the specific schools included in the analyses, with outliers having considerably more importance than would be true in a larger sample. Aside from instability of the estimates, another consequence of the small sample size is that relationships between measures that in a larger sample might well be

[21]While, as noted above, principals' and teachers' experiences are included in the analyses, these are not very good proxies for the amount of IFL training.

[22]Borman, Hewes, Overman, and Brown (2003).

[23]As noted in Chapter 1, the researchers' interest in testing the general theory of action led them to adopt a cross-district approach to the analysis. The small sample size is an additional factor in support of that decision.

"statistically significant" — that is, not likely to have arisen by chance — are not statistically significant in these analyses.[24]

The small number of schools, and of teachers within each school, that were sampled further limits the generalizability of the findings. It is impossible to know whether the same patterns would be observed in other districts where the IFL is working, in other schools in the same districts as the study schools, or even in grades other than third grade within the study schools.

Limitations of Specific Measures

Finally, there are limitations associated with specific constructs or measures. For example, in order to draw the link between instructional practice and student achievement as tightly as possible, it would be ideal to have achievement data available for students within particular classrooms within a school, rather than for the school's entire third grade. The problem of linking achievement to instructional practice is further complicated by the fact that, as noted in Chapter 1, a school was counted as participating in the study if two of its third-grade teachers agreed to participate. This means that some schools' third-grade achievement scores reflect the results of instruction delivered by teachers who did not participate in the study and, therefore, whose classroom practices could not be observed.

Similarly, it would have been ideal to base the measures of principals' instructional leadership actions on the survey responses of all teachers in the school, rather than on the responses of only the third- and fourth-grade teachers who chose to participate in the study; but this was infeasible. Other measurement issues receive attention as they arise in the chapters that follow.

Despite these issues, the Instructional Leadership Study offers a rich lode of data for exploration. The analyses in the ensuing chapters take advantage of multiple opportunities to link principal surveys, teacher surveys, classroom observations, and achievement data in examining a multifaceted and promising theory of how schools improve.

[24]Because the sample size is so small, the researchers have opted to denote as "statistically significant" those differences or relationships that have a 1 in 10 probability or less of occurring by chance. (In statistical notation, $p \leq 0.10$ [probability is equal to or less than 10 percent].) While it is more conventional to designate differences or relationships with a 1 in 20 probability of occurring by chance as statistically significant ($p = 0.05$ [5 percent]), it is not obligatory to do so, and a more relaxed standard seems appropriate, given the small samples that make it more difficult to identify *any* relationships as being statistically significant.

Chapter 3

Principals, Teachers, and Professional Development

This chapter examines the professional development received by principals and teachers at 44 elementary schools that participated in the Instructional Leadership Study and the connection of that professional development to instructional leadership (see Box 3.1 for the chapter's key findings).[1] The analysis proceeds on the assumption that instructional leaders are made, not born, and that an understanding of the factors that contribute to strong leadership can guide districts in training and supervising principals to be more effective heads of schools.

The areas of Figure 3.1 that are enclosed by a dashed box represent the chapter's subject matter: Steps 1 to 3 of the theory of action developed by the Institute for Learning (IFL) — an arm of the Learning Research and Development Center (LRDC) at the University of Pittsburgh — and the survey constructs that are associated with each step. (Chapter 1 describes the theory of action, and Appendix C presents the items that make up the survey constructs used in the analyses.) Thus, this chapter considers the instruction-oriented professional development activities in which principals themselves engaged, as well as principals' actions in arranging and delivering instruction-centered professional development for teachers in their schools and teachers' take-up and reception of it. (As shown in Figure 3.1, many of the report's exhibits abbreviate "professional development" as "PD.")

The discussion takes an expansive view of what constitutes "professional development." The definition encompasses formal training sessions, to be sure. But it also includes informal instruction-centered interactions between principals and teachers and among members of each group, opportunities for teachers to observe their colleagues either live or on videotape, discussions of tests results and student work, and both informal and formal coaching and mentoring. The major focus, however, is on those activities that are organized and promoted by district and school administrators, not on self-development efforts that principals or teachers undertake on their own.

The chapter also discusses two additional constructs: *teacher's assessment of the principal as an instructional leader and teacher's assessment of the principal as an organizational*

[1] Although there are 49 elementary schools in the study, the analyses in this chapter exclude five schools whose principals did not complete the survey (see Chapter 2). Three districts were involved: Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City. For convenience, the report refers to Region 10 as a "district." Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced the organization of schools into geographical regions. The study schools served large proportions of students who were economically and educationally disadvantaged.

Box 3.1

Key Findings on Instructional Leadership

- Teachers perceived stronger instructional leaders as stronger organizational leaders as well.
- Principals and teachers provided consistent responses about the professional development environments offered by their schools.
- Principals who were rated higher by their teachers reported spending more time with their teachers on instructional improvement; their schools also provided richer learning opportunities for teachers.
- Both principals and teachers especially valued opportunities to learn from their peers.
- Greater receipt of instruction-related professional development on the part of principals and a greater value attached to that professional development are both significantly and positively associated with the principals' involvement in professional development for their teachers.
- Greater principal involvement in professional development for teachers is significantly and positively associated with the frequency with which teachers reported receiving professional development.

leader. The first of these, while not part of the theory of action per se, provides a prism through which the remaining constructs are examined.

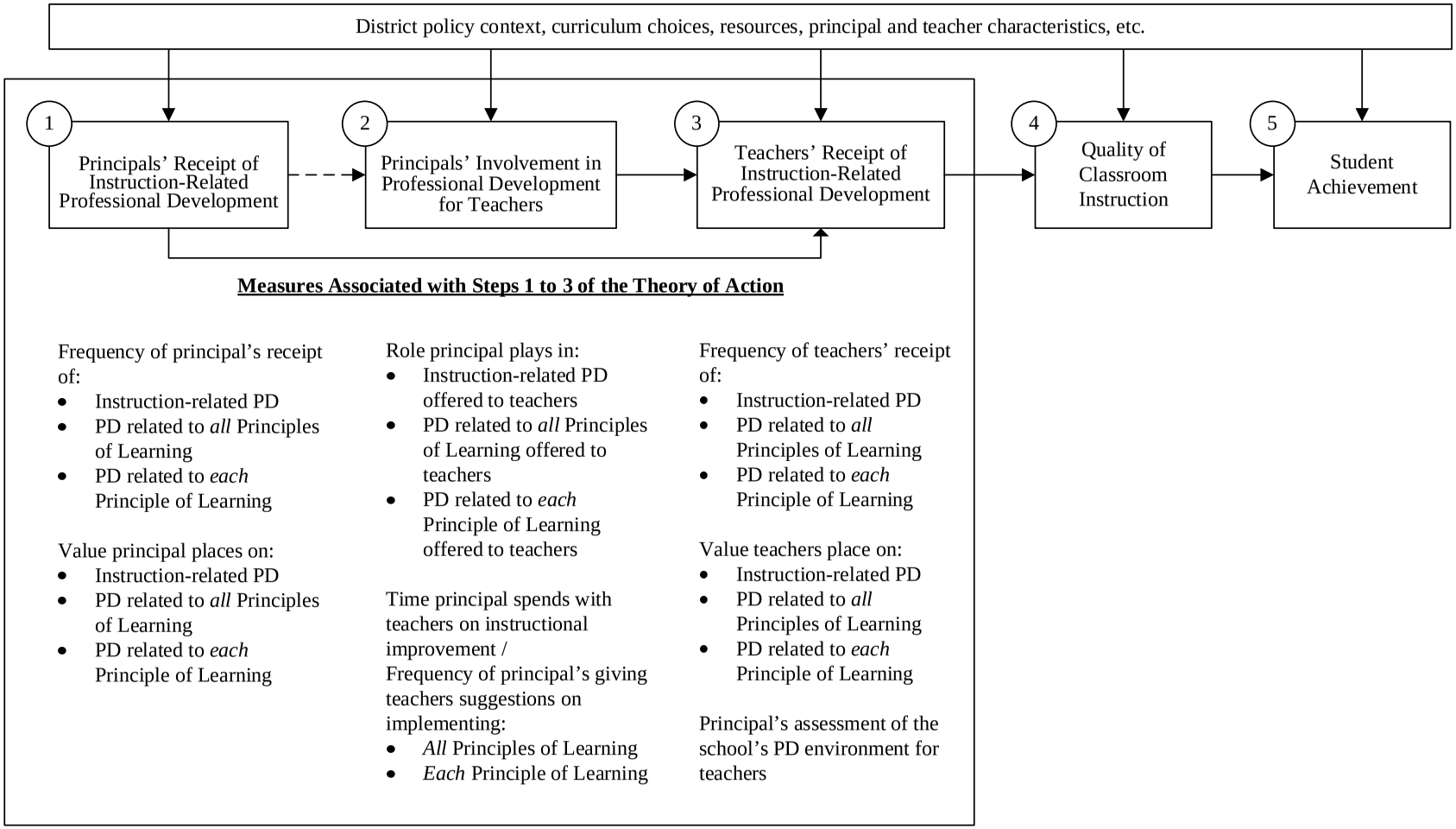
The analysis relies on surveys completed by principals and teachers at the study schools to address three main questions:

- How often did principals and teachers receive various kinds of professional development, and what did they most value?
- What did principals who received higher ratings as instructional leaders from their teachers do differently than those who received lower ratings?
- How can the relationships among the steps in the theory of action be expressed in quantitative terms?

The Instructional Leadership Study

Figure 3.1

Steps 1 to 3 in the Theory of Action and Measures Associated with Each Step



NOTE: Constructs referring to professional development on "all Principles of Learning" refer to the Principles of Accountable Talk, Academic Rigor, and Clear Expectations, which are the principles that are focused on in this report.

The next section of the chapter describes findings on the constructs associated with Steps 1 to 3 of the theory of action. The subsequent section discusses the process used to arrive at an operational definition of instructional leadership and the use of that definition to distinguish three groups of instructional leaders: those who received higher, medium, and lower ratings from their teachers. The chapter then examines the scores on constructs at each step of the theory of action that were achieved by principals in the three leadership categories and by teachers at the schools headed by these principals. Collectively, these findings provide an intuitive model of how the theory of action may unfold. That model is then examined formally in a section that employs multiple regression analysis to provide quantitative estimates of the linkages among the constructs at the various steps. A discussion of the broader implications of these findings for policymakers and administrators is reserved for Chapter 6.

Box 3.1 summarizes the chapter's key findings. It is intended to serve as a guidepost for readers as they make their way through the discussion that follows.

The Constructs in Steps 1 to 3 of the Theory of Action

Table 3.1 shows the mean score, as well as the possible range of scores, on the scale measuring each construct associated with Steps 1 to 3. Full statistics on all constructs used in the analyses appear in Appendix Table B.1. These constructs are discussed below.

Principals' Receipt of Professional Development

It is an IFL tenet that principals need to be knowledgeable about the instructional practices that they want their teachers to adopt. They must know what needs to change as well as how to bring about that change in order to organize professional development for their teachers and to oversee instruction most effectively. District and IFL staff organized formal training sessions and other kinds of assistance for principals to promote their ability to be instructional leaders for their teachers and, in so doing, to improve teaching and learning in their schools.

The principal survey included questions about the frequency with which various topics were covered in professional development opportunities during the summer of 2005 and the 2005-2006 school year and questions about how valuable the professional development on these topics had been. These questions yielded two scales measuring the *frequency* and *value* of the principal's professional development.[2]

[2]A third scale measured principals' views of the support that they received from their direct supervisor or from their district as a whole. The 16-item scale had a reliability (standardized alpha) of 0.919. In theory, a principal's score on this scale can range from 1.0 to 4.0; in actuality, the mean score is 3.03, indicating that principals were more likely than not to report that their supervisors and other district administrators were supportive. No variables (including principal leadership category or district) were associated with principals' responses on the scale, nor did the scale prove useful in further analyses.

The Instructional Leadership Study

Table 3.1

Selected Constructs Measuring Steps 1 to 3 of the Theory of Action

Step and Construct	Mean Score	Possible Range and Interpretation of Anchor Points
Step 1: Principal's receipt of professional development		
Frequency of principal's receipt of instruction-related professional development	1.71	0 = No instruction-related professional development of any type was received. 4 = Each type of instruction-related professional development was received at least once per week.
Value principal places on instruction-related professional development	3.16	1 = None of the instruction-related professional development received was at all valuable. 4 = All the instruction-related professional development received was very valuable.
Step 2: Principal's involvement in professional development for teachers		
Role principal plays in instruction-related professional development offered to teachers	2.09	0 = Principal played no role in any instruction-related professional development offered to teachers. 4.3 = Principal conceptualized, presented, attended, and arranged professional development on each *topic* and attended and arranged each *type* of professional development offered to teachers.
Time principal spends with teachers on instructional improvement	2.91	1 = Principal rarely or never spent time informally observing teachers, reviewing student work or achievement data with them, or giving them suggestions on instructional practices. 4.6 = Principal spent a lot of time (15 or more hours in a typical week or at least once a day during a typical school year) on each activity.
Step 3: Teacher's receipt of professional development		
Frequency of teacher's receipt of instruction-related professional development	1.45	0 = No instruction-related professional development of any type was received. 4 = Each type of instruction-related professional development was received at least once per week.
Value teacher places on instruction-related professional development	3.05	1 = None of the instruction-related professional development received was at all valuable. 4 = Each kind instruction-related professional development received was very valuable.
Principal's assessment of the school's professional development environment for teachers	2.31	0 = No instruction-related professional development was offered to teachers, and none of the school's teachers typically participated in any topic or type of professional development. 4 = Each topic or type of professional development was offered to teachers at least once a week, and all the school's teachers typically participated in each topic or type of professional development.

NOTE: Mean scores were calculated across the 42 schools that are included in the majority of analyses discussed in this chapter.

Frequency of Principal's Receipt of Instruction-Related Professional Development

In general, principals reported that they often received professional development related to instructional improvement.[3] The mean score of 1.71 on the scale measuring this construct suggests that, "on average," principals received each type of professional development between one and three times a year. With just one exception (professional development that involved Web-based courses or learning tools), at least 80 percent of the principals reported participating at least once or twice during the year in each of the professional development activities included in the scale.

As shown in Box 3.2, some professional development topics were delivered more frequently than others. It is especially notable that the majority of the principals reported having received a good deal of professional development on three of the key IFL Principles of Learning: Accountable Talk, Academic Rigor, and Clear Expectations.[4]

Value Principal Places on Instruction-Related Professional Development

Principals who responded to the survey appreciated the professional development that they received. Among those who reported having gotten professional development on the topics covered in the survey, some two-thirds or more found each of these activities to be "moderately valuable" or "very valuable." The mean score of 3.16 similarly indicates that principals found their professional development to be at least moderately valuable.

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[3]Specifically, the survey questions measuring frequency of participation asked: "How many times were the following topics included in professional development organized by your district for your professional growth and development?" and "How often were you offered the opportunity to engage in each of the following types of district-sponsored activities to support your own professional growth and development?" Although neither of these questions asked directly how often the respondent had received professional development on a particular topic or of a particular type, principals' responses to other survey questions strongly indicate that all but a handful of principals interpreted the questions about frequency in terms of activities in which they had themselves participated

[4]Chapter 1 and Box 1.1 present the IFL Principles of Learning and describe "Learning Walks" as a professional development tool. During Learning Walks, participants spend five to ten minutes in each of several classrooms, looking at student work and talking with students and teachers. At the end of the Learning Walk, participants work with the leader (generally the principal) to refine observations, look for patterns within the school, and identify professional development needs and next steps. Some two-thirds of the principals reported that they or their staff members conducted Learning Walks in their own schools at least three times a year. The principals were much less likely to be part of Learning Walks in other schools or to report that district staff or other principals accompanied them on Learning Walks in their own schools — probably because of the substantial advance planning and coordination that Learning Walks require.

According to interviews with principals and observations of IFL-led professional development sessions, Learning Walks aroused considerable trepidation among teachers, who sometimes did not understand that the purpose of the activity was not to evaluate their individual teaching practices.

Box 3.2

Most and Least Frequently Included Topics and Types of Principals' Instruction-Related Professional Development

Most frequently included types/topics[*]

- Using school-based reading and math curricula to guide instruction
- Using state and district assessments to guide instruction
- *Helping teachers understand how to communicate their expectations for quality work to students*
- *Helping teachers understand how to engage students in active reasoning about and analysis of challenging content*
- *Helping teachers understand how to engage students in whole-group discussions to promote learning*
- Helping teachers analyze student performance against the standards
- Determining what features of student performance need to be improved and how

Least frequently included types/topics[†]

- Participating in Learning Walks that district administrative staff and/or other principals conduct at your school
- Participating in Learning walks at other schools
- Accessing Web-based courses or learning tools

SOURCES: MDRC calculations from survey responses of 44 principals in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: Italicized topics relate to the IFL Principles of Learning.

[*]Topics or types of professional development that 70 percent or more of the principals reported receiving at least three times a year.

[†]Topics or types of professional development that 40 percent or fewer of the principals reported receiving at least three times a year.

Box 3.3 shows the professional development topics and/or activities included in the scale that principals found most and least valuable. Principals responded especially positively to opportunities to learn informally from one another. Over 60 percent of the principals who participated in informal study groups or other types of informal collaboration found these activities to be "very valuable." Principals also highly valued their professional development related to the principle of Academic Rigor; their ratings for the professional development related to the principles of Clear Expectations and Accountable Talk are somewhat lower.

Principal's Involvement in Professional Development for Teachers

Having received professional development, a major part of what principals must do as instructional leaders is to communicate what they have learned to the teachers in their schools. The principal survey yielded two scales that measure principals' involvement in professional development for their teachers: *role principal plays in professional development offered to teachers* and *time principal spends with teachers on instructional improvement.*

Role Principal Plays in Professional Development Offered to Teachers

The principal survey asked about various kinds of actions that principals took with respect to professional development offered to their teachers during the 2005-2006 school year and the summer of 2005. With regard to various topics that professional development could cover, respondents were asked whether they typically had *conceptualized* (that is, designed) the sessions, *presented* them, *attended* sessions presented by someone else, and/or *arranged* for the time, venue, or presenter or whether, alternatively, they had *not participated* in any way. With respect to various *forms* that the professional development could take, principals were asked whether they had *attended, arranged,* or *not participated.* In general, the more professional development topics that were covered, the more roles a principal checked off with respect to these topics; and the more demanding the roles, the higher the principal's scale score.[5]

The vast majority of principals reported participating in some way in the professional development activities offered to their teachers. As expected, this participation was more likely to involve arranging for professional development sessions or attending them than conceptualizing or presenting them. Thus, between 52 percent and 83 percent of the principals reported that depending on the particular topic or type of activity. In contrast, only 21 percent to 36 percent reported that they had conceptualized the sessions. There was one exception: 58 percent of the

[5]Researchers reasoned that conceptualizing or presenting professional development requires more effort than arranging or attending it; accordingly, the scale measuring principal's role was scored so that the first two responses received two points each, while the latter two received only one point each. Thus, a principal could receive as many points for participating in one "harder" activity as in two "easier" ones.

Box 3.3

Topics and Types of Instruction-Related Professional Development That Principals Found Most and Least Valuable

Most valuable types/topics[*]

- *Helping teachers understand how to engage students in active reasoning about and analysis of challenging content*
- Helping teachers analyze student performance against the standards
- Being coached by another principal
- Coaching another principal
- Participating in Learning Walks that district administrative staff and/or other principals conduct at your school
- Informally collaborating or sharing ideas with other principals
- Participating in an informal study group with other principals

Least valuable types/topics[†]

- Understanding proper implementation of district, state, and federal policies and procedures (for example, accountability, attendance, student promotion)
- Attending district-sponsored/supported university-based programs
- Attending district-sponsored/supported conferences
- Accessing Web-based courses or learning tools

SOURCES: MDRC calculations from survey responses of 44 principals in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: Italicized topics relate to the IFL Principles of Learning.

[*]Topics or types of professional development that 50 percent or more of the principals reported to be "very valuable."

[†]Topics or types of professional development that 30 percent or fewer of the principals reported to be "very valuable."

principals reported that they had conceptualized professional development on using students' test results to improve instruction, and 65 percent said that they had presented training on this topic. At a time when using data to inform instruction has received much attention — and when test results matter greatly for accountability purposes — principals in the study schools have heard and responded to the call.

Time Principal Spends with Teachers on Instructional Improvement

Other survey questions asked principals to estimate the frequency with which they interacted with teachers by observing their classes, reviewing student work and achievement data with teachers, and giving them suggestions about how to improve instruction. The mean score is 2.91, indicating that the principal engaged in the "average" activity measured monthly or more often.

Principals spent much more time on some activities than on others. Almost one-third of the principals, for example, reported that they spent more than 15 hours a week dropping in on teachers to see what was happening in terms of instruction, whereas only 5 percent said that they spent a comparable amount of time reviewing student work with teachers. Similarly, half of the principals said that they offered teachers general suggestions regarding curriculum and instruction several times a week or daily, whereas only 11 percent said that they reviewed student achievement data with teachers this often.

Teachers' Receipt of Professional Development

Professional development is widely viewed as a key mechanism for improving instructional practice. This section examines the professional development that teachers received from the vantage points of both the teachers and their principals. The teacher survey yields data on the *frequency* and *value* of the professional development that teachers in the study schools reported receiving. The principal survey contains questions about the frequency with which teachers were offered various kinds of professional development and the proportion of teachers who participated in professional development activities; together, these questions comprise an additional construct: *principal's assessment of the school's professional development environment for teachers.*

Frequency of Teachers' Receipt of Instruction-Related Professional Development

Like their principals, teachers reported receiving professional development that covered a range of subjects and was delivered in different ways. On the whole, however, teachers' participation in professional development activities was less intense than that of their principals, as

reflected by lower mean scores on the scale measuring frequency of receipt of instruction-related professional development (1.45 for teachers versus 1.71 for principals).[6] The majority of teachers reported receiving some professional development on each of the topics included in the scale, but generally only once or twice a year. The professional development that teachers received was more likely to be delivered in formal training sessions and workshops than by less conventional means, such as observing other teachers or participating in study groups. Box 3.4 shows the topics and types of professional development that were most frequently included. Notably, teachers reported receiving a good deal of professional development on establishing Clear Expectations, one of the three IFL Principles of Learning.

Value Teacher Places on Instruction-Related Professional Development

Like principals, teachers believed that the professional development that they received was at least moderately valuable, and they rated it almost as highly as the principals rated their own professional development (3.05, on average, for teachers, versus 3.16 for principals). Teachers rated a few topics or types of professional development as especially valuable or, conversely, as of minimal or no value; these are shown in Box 3.5. Again, it is evident that teachers, like principals, especially valued opportunities to work together and learn from one another. They also appreciated the professional development that they received on setting clear expectations for the quality of student work. On the other hand, a substantial minority (43 percent) of teachers who participated in Learning Walks rated them as "minimally valuable" or "not valuable."

Principal's Assessment of the School's Professional Development Environment for Teachers

This construct combines questions about the frequency with which teachers received professional development and the proportion of teachers who participated in these activities. As such, it measures the extent to which principals assessed their schools as offering an array of professional development opportunities of which teachers took advantage. In theory, scores on the scale could range from 0.0 to 4.0; in fact, the mean score across all the schools is 2.31.

* * *

The encouraging news of these analyses is that the principals and teachers had similar perceptions of their schools' professional development environments. Schools whose principals

[6] As with the analogous measure for principals, scores on the scale measuring this construct could range between 0.0 (indicating that no professional development of any type was received) and 4.0 (indicating that each kind of professional development was received at least once a week).

Box 3.4

Most and Least Frequently Included Topics and Types of Teachers' Instruction-Related Professional Development

Most frequently included types/topics[*]

- Aligning curricula and instruction with state and/or district content standards
- *Communicating explicitly to students the expectations for quality work*
- Implementing the reading curriculum
- Implementing the math curriculum
- Using student test results to improve/refine instruction
- Collaborating with other teachers (for example, planning lessons, discussing common challenges, analyzing student work)[†]
- Participating in school-based workshops/courses led by an instructional coach or other knowledgeable professional[†]

Least frequently included types/topics[‡]

- Receiving feedback from another teacher who observed your class
- Participating in content-area study groups in your school
- Studying video clips to find evidence of effective teaching and learning taking place in classrooms
- Accessing Web-based courses or learning tools

SOURCES: MDRC calculations from survey responses of 274 third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: Italicized topics relate to the IFL Principles of Learning.

[*]Topics or types of professional development that 85 percent or more of the teachers reported receiving at least once a year.

[†]Topics or types of professional development that 40 percent or more of the teachers reported never receiving during the year.

[‡]Topics or types of professional development that 60 percent or more of the teachers reported receiving at least three times a year.

Box 3.5

Topics and Types of Instruction-Related Professional Development That Teachers Found Most and Least Valuable

Most valuable types/topics[*]

- Collaborating with other teachers (for example, planning lessons, discussing common challenges, analyzing student work)
- *Communicating explicitly to students the expectation for quality work*

Least valuable types/topics[†]

- Participating in Learning Walks in the teacher's school
- Studying video clips to find evidence of effective teaching and learning taking place in classrooms

SOURCES: MDRC calculations from survey responses of 274 third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: Italicized topics relate to the IFL Principles of Learning.

[*]Topics or types of professional development that 40 percent or more of the teachers who received the professional development reported to be "very valuable."

[†]Topics or types of professional development that 40 percent or more of the teachers who received the professional development reported to be "minimally valuable" or "not valuable."

reported that more teachers participated in professional development activities and did so more frequently were, in fact, schools where teachers reported engaging in more frequent professional development activities. This similarity of perspectives is, of course, to be hoped for but is by no means assured. The surveys administered to principals and to teachers appear to have captured aspects of the school environment with reasonable fidelity.

Steps 1 to 3 Through the Lens of Instructional Leadership

Defining and Categorizing Instructional Leadership

One approach to examining the Institute for Learning (IFL) theory of action is to identify groups of more or less effective instructional leaders and then to consider the behavior of each group with respect to key steps of the theory: receiving professional development and passing it along to teachers in their schools. To identify the different leadership groups, the researchers turned to the teachers, assuming that the latter would be a more accurate source of

information about the instructional leadership abilities of their principals than would be the principals themselves. The research team developed an instructional leadership scale that reflects the IFL perspective on the behaviors that characterize instructional leaders.[7] The skills these items tap fall into four general categories. Good instructional leaders are expected to:

1. Be generally knowledgeable about and have high expectations of students and instruction.

2. Organize, lead, and attend professional development sessions for teachers in their schools.

3. Conduct Learning Walks and other classroom visits, and provide teachers with helpful feedback to improve teaching.

4. Work with individual teachers and groups of teachers to improve instruction in other ways.

Examples of specific questions that make up the scale derived from the teacher survey are shown in Box 3.6; the scale in its entirety is presented in Appendix C.2. Although a few items tapped more general attributes of principals, the questions mostly asked teachers about specific actions that their principal had performed during the school year. Moreover, while a number of questions asked for teachers' opinions (for example, the extent to which they agreed or disagreed with certain statements), the majority of items asked about the frequency with which the principal had performed these actions.

The responses of teachers at a given school to questions about their principal were compiled, and an average scale score was calculated for each school.[8] In theory, the mean score for a given school could range from 0.45 to 3.91; the mean score across all the schools is 1.97.[9] Two breaks in the distribution of these scores divided the principals into three groups: 15 prin-

[7]The teacher survey items that constitute the scale were drawn from an unpublished IFL document entitled "Hypothesized Effective Leadership Actions of Principals and Supervisors" as well as from a teacher survey used in an earlier study of the IFL's work (see Marsh et al., 2005).

[8]The analyses presented in this section and in the rest of the chapter include 42 schools. As previously noted, five of the original 49 schools were excluded because their principals did not respond to the survey. In addition, the following analyses exclude one school where only one teacher completed the survey and another school whose principal did not answer a background question that is used as a covariate in the analyses.

[9]The scale's theoretical high point is, however, unrealistic, requiring that principals perform all the specified behaviors at least once a week. A more reasonable high score — requiring that principals perform all the behaviors monthly — would be 3.36. In actuality, scale scores range from 0.76 to 2.82.

Box 3.6

Examples of Teacher Survey Items Measuring the Principal's Leadership

Please indicate the extent to which you agree or disagree with the following statements:

The principal at my school

… sets high standards for teaching and learning.

… understands what students at different grade levels are expected to know and be able to do.

… provides feedback to the faculty on Learning Walks that occur in my school.

… arranges for support when I need it (such as access to coaches, outside consultants, district curriculum staff).

Please indicate the frequency with which your principal has

… led professional development sessions in which you participated.

… attended professional development sessions alongside the staff.

… given you useful feedback and/or suggestions on your teaching.

ciples received higher ratings from the teachers in their schools; 20 received medium ratings; and 8 received lower ratings.[10]

[10]Higher-rated principals had scores of 2.34 or higher; medium-rated principals had scores between 1.61 and 2.17; and lower-rated principals had scores of 1.48 or lower.

A school whose principal had a lower rating as an instructional leader was not necessarily devoid of instructional leadership. In some schools, assistant principals and/or coaches undertake some of the instructional leadership functions that principals might otherwise handle; in Region 10, assistant principals received much the same IFL training as principals, in order to create a leadership team at each school. The study did not collect data on the activities of individuals other than the principal. However, as discussed below, it appears that the principal's leadership is important in establishing a climate that encourages professional growth: Teachers at schools with lower-rated principals reported receiving professional development less frequently than teachers at schools with higher-rated leaders.

Multiple regression analysis was used to explore the extent to which various characteristics of principals and teachers are associated with leadership category, independent of the other characteristics. The analysis indicated that once other variables had been controlled for, only a school's location in Austin is significantly associated with leadership score: 11 of the 15 schools with stronger leaders are located in that district.

(continued)

The more that teachers reported that their principals adopted the practices comprising the measure of instructional leadership, the higher the principal's leadership score, so it was expected that higher-rated principals would be more active than lower-rated ones and would differ in other respects as well. That said, the differences among the groups of leaders are sometimes sizable, indicating that the scale may effectively distinguish among principals whose behavior was, in fact, very different. For example, the bars on the left of Figure 3.2 show that 65 percent of teachers at schools with higher-rated leaders — compared with 37 percent of teachers at schools with medium-rated leaders and 22 percent of teachers at schools with lower-rated leaders — strongly agreed that their principal set high standards for teaching and learning. The middle bars indicate that 64 percent of the teachers at schools with higher-rated instructional leaders, 33 percent of the teachers at schools with medium-rated principals, and only 5 percent of the teachers at schools with lower-rated principals said that their principal had arranged for monthly or more frequent professional development sessions that were relevant to their teaching assignments. Finally, the bars on the right show that 35 percent of the teachers at schools with higher-rated leadership said that their principal gave useful feedback and/or suggestions on their teaching at least once a month, compared with 16 percent of teachers at schools with medium-rated leadership and 5 percent of teachers at schools with lower-rated principals.

Box 3.7 describes in greater detail the leadership behaviors of "Ms. Smith" and "Mr. Jones," two principals (one higher-rated, one lower-rated) whose schools are included in the case-study research.

How Principals in the Three Leadership Groups Scored on the Constructs

The instructional leadership scale was developed using items on the *teacher* survey. But, as it happened, principals in the different leadership categories responded differently to items on the *principal* survey. As Table 3.2 makes clear, the scores of principals in the three leadership categories lined up as would be predicted on constructs associated with the first two steps in the theory of action. Principals whom teachers rated as stronger instructional leaders

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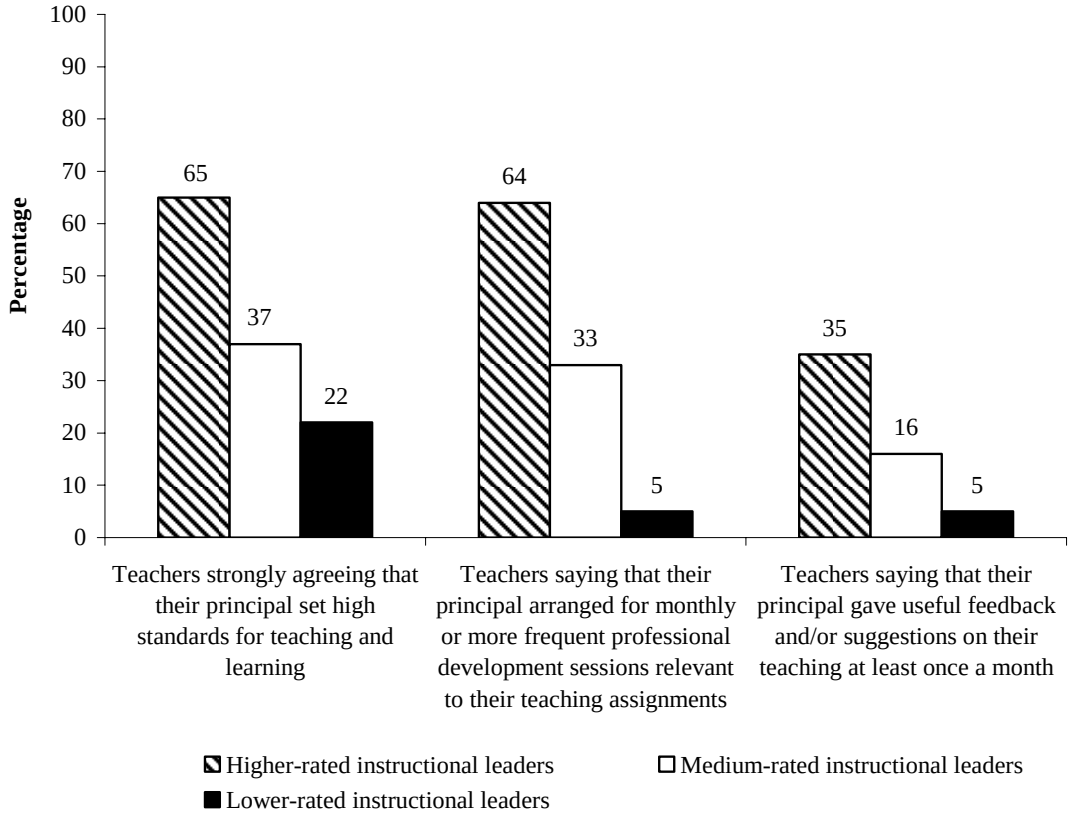
The data at hand do not explain why Austin principals were more likely to receive higher leadership ratings than principals at the other two sites. Austin administrators sought to provide school leaders with strong instructional leadership skills and encouraged these leaders to transfer what they had learned to their teachers — but so did administrators at the other districts in the study. In any case, as noted in Chapter 1, the focus of this report is on a theory of action that is intended to describe the experiences of principals and teachers *across* districts. Here, the discussion examines differences among principals in the three leadership categories across all three districts, not on the factors that distinguish Austin principals from their colleagues in other sites. Thus, in analyses that examine the relationships between leadership rating and other phenomena, district (along with principal's experience and teacher's experience) is used as a control variable. That is, the role of leadership rating is considered net of these other variables that could affect the relationships.

The Instructional Leadership Study

Figure 3.2

Teachers' Perceptions of Activities of Principals in the Three Instructional Leadership Categories



SOURCE: MDRC calculations from survey responses of 235 teachers in Austin, New York City Region 10, and St. Paul.

NOTE: Percentages are regression-adjusted for principals' experience, teachers' experience, and school district.

Box 3.7

Two Case Studies: How a Higher-Rated and a Lower-Rated Principal Lead Their Schools

Ms. Smith and Mr. Jones have both been principals at their schools for three or four years.* Ms. Smith's school has more than twice as many classroom teachers as does Mr. Jones's school, but both have high proportions of economically disadvantaged and nonwhite students. Neither school is experiencing teacher turnover problems (fewer than 10 percent of the teachers at each school are new this year), but the third- and fourth-grade teachers at Ms. Smith's school are generally more experienced than those at Mr. Jones's school (an average of four years versus two years as a full-time teacher), and they have generally been at the school longer (an average of roughly three years versus two years).

Ms. Smith received a relatively high instructional leadership scale score from the third- and fourth-grade teachers at her school who completed the teacher survey; she was the fifth-highest-rated principal in the study. Mr. Jones, on the other hand, received a lower rating on the scale from his third- and fourth-grade teachers, which placed him sixth from the bottom of the "medium-rated" category discussed in this chapter (nearly two standard deviations below Ms. Smith's rating). But what distinguishes these two principals as instructional leaders? A detailed look at the data from the teacher surveys, as well as from principal job-shadows and interviews and teacher focus groups conducted at each school, helps to answer this question.

Looking at the individual teacher survey questions that make up the instructional leadership scale, it is immediately apparent that Ms. Smith was consistently reported to engage in a great variety of instructional leadership activities (including informally observing her teachers, conducting Learning Walks, attending grade-level or content-area meetings, and leading professional development sessions) more frequently than Mr. Jones. A roughly two-and-a-half-hour job-shadowing of each principal also revealed impressive differences: Ms. Smith spent a total of two hours conducting classroom observations (one hour in each of two classrooms), whereas Mr. Jones spent only ten minutes in a classroom during the same time frame.

Across both the teacher survey and the focus group data, some of the most salient differences between the two principals revolve around the nature of their relationships with their teachers and in the degree to which they support their teachers in implementing the Principles of Learning. Ms. Smith sees herself as a "leader of leaders"; she admits that she cannot be an expert in instruction for every grade level and that she depends on experts within the grade levels (although it should be noted that all of the teacher survey respondents at her school reported that she "understands what students at different grade levels are expected to know and

(continued)

Box 3.7 (continued)

be able to do," suggesting that her own assessment may be modest). Teachers at her school are encouraged to present professional development and to learn from each other by participating in Learning Walks in the school, which the teachers reported to be exceptionally useful for their professional learning. She also expects her teachers to work together in weekly team meetings to determine what professional development they need and to agree on modifications that should be made to the curriculum to make it better suited to their students' needs. (On the teacher survey, teachers agree that she "engages school staff in developing the school's instructional program.") She sees one of her primary roles as an instructional leader as being to listen to and observe her teachers in order to understand and help meet their needs. All the teacher survey respondents agreed that she "arranges for support when [they] need it," and in the focus group each teacher mentioned the supportive and open administration as being one of the strengths of the school. However, this does not in any way mean that Ms. Smith has a completely hands-off approach to instructional matters in her school. In fact, the majority of the teachers responding to the survey at Ms. Smith's school reported that she gave them useful suggestions on how to implement Accountable Talk, Academic Rigor, and Clear Expectations in their classrooms at least once a month (which is much more frequently than the average principal in the study). Thus, while giving teachers the freedom that they need to individualize their own learning and instruction to some extent, she is also highly involved in making sure that they are using the best instructional practices as defined by the IFL. Her teachers clearly hold Ms. Smith in great esteem.

In contrast to Ms. Smith's open and supportive relationship with her teachers, Mr. Jones reported that he does not feel that he can trust his teachers to make decisions about instructional practice. This could be in part a result of the fact that he has less experienced teachers who may not be ready to take on decision-making roles. However, it also appears that Mr. Jones is not well aware of his teachers' needs and is not highly personally involved in their professional development.[†] Only one-third of the teachers who are surveyed reported that he "arranges for support when [they] need it," and in the focus group they commented that they needed more professional development in a variety of areas and more support in implementing the curricula. (On the survey, the majority of his teachers reported that he had not helped them with the implementation of the reading or math curricula.) Strikingly, Mr. Jones's teachers also reported in the focus group that the Principles of Learning were never fully explained to them (about half of the teachers reported on the survey that Mr. Jones *never* gave them suggestions on how to implement these teaching practices), and they complained that they got little feedback from the Learning Walks. Mr. Jones stated that he used the Learning

(continued)

Box 3.7 (continued)

Walks to help in planning professional development for his teachers, but apparently the teachers were not directly included in the learning process. In addition, Mr. Jones admitted that he does not work directly with his teachers on the Principles of Learning; rather, he transfers what he has learned to his coaches and expects them to communicate this information to the teachers. Thus, Mr. Jones feels that his teachers are not capable of making instructional decisions for themselves, but he also does not spend much time working directly with them to help them improve their teaching practices, and he does not spend enough time listening to and observing them to leave his teachers feeling that he understands their needs.

NOTES: *These principals' names have been changed in order to maintain anonymity.

†Although Mr. Jones reported on the principal survey that he spends a great deal of time working with his teachers on instructional improvement, the teachers who were surveyed at his school did not agree. In contrast, Ms. Smith was much more modest (or perhaps realistic) in her own reports of how much time she spent working with her teachers.

scored higher (although not necessarily statistically significantly so) than their lower-rated counterparts on three of the four constructs measuring their own receipt of professional development and their involvement in professional development for their teachers.[11] (The sole exception concerns the extent to which the principals valued the professional development that they received: Higher-rated instructional leaders expressed enthusiasm about their professional development — but so did those who received medium or lower ratings.) It is especially notable that higher-rated instructional leaders reported spending significantly more time with their teachers on instructional improvement than did their lower-rated counterparts.[12]

One possibility is that higher-rated principals are naturally enthusiastic and that their higher scores on these self-reported constructs merely reflect that enthusiasm. Box 3.8 considers this potential explanation for the findings.

[11]While differences that are not statistically significant could have arisen by chance, the consistency of the findings suggests that these differences are real but cannot be determined to be statistically significant using the small samples involved. The means shown in the table are regression-adjusted to control for the effects of district and of principal's and teachers' experience. Regression analysis further indicates that principals in Region 10 received significantly more professional development than their counterparts in the other study districts. The length of principals' leadership experience and the average length of experience of teachers in their schools are not significantly associated with the amount of professional development that principals received.

[12]Sometimes these differences are stark. For example, all but one of the higher-rated instructional leaders but only three of the eight lower-rated ones said that they gave suggestions at least several times a month to teachers about how to communicate their expectations that students perform high-quality work. There is no significant difference between the average scores of higher-rated and medium-rated leaders.

The Instructional Leadership Study

Table 3.2

Scores on Principal and Teacher Survey Constructs, by Step in the Theory of Action and Principal's Leadership Category

Survey Construct	Instructional Leadership Category and Mean Scale Score: Higher-Rated Instructional Leaders	Medium-Rated Instructional Leaders	Lower-Rated Instructional Leaders	Difference[a]
Step 1: Principal's receipt of PD				
Frequency of principal's receipt of instruction-related PD	2.12	1.66	1.44	--
Value principal places on instruction-related PD	3.06	3.27	3.02	--
Step 2: Principal's involvement in PD for teachers				
Role principal plays in PD offered to teachers	2.37	2.02	1.73	--
Time principal spends with teachers on instructional improvement	3.16	2.87	2.63	H/L (0.076*)
Step 3: Teacher's receipt of PD				
Frequency of teacher's receipt of instruction-related PD	1.90	1.34	1.01	H/L (0.000***) H/M (0.000***) M/L (0.021**)
Value teacher places on instruction-related PD	3.23	2.90	2.98	H/M (0.005***)
Principal's assessment of the school's PD environment for teachers	2.63	2.37	2.05	--

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in 42 schools in Austin, New York City Region 10, and St. Paul.

NOTES: This sample excludes five schools whose principals did not respond to the survey and two additional schools with incomplete data.

Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]H/L indicates a statistically significant difference between higher-rated and lower-rated leaders. H/M indicates a difference between higher-rated and medium-rated leaders. M/L indicates a difference between medium-rated and lower-rated leaders. The significance levels are shown in parentheses.

-- indicates that there are no statistically significant differences among the leadership categories.

Mean scale scores for each leadership category are regression-adjusted for effects of principal's experience, teachers' experience, and school district.

Box 3.8

Instructional Leadership, "Exuberance," and Challenge

It is possible, at least in theory, that principals who receive higher ratings as instructional leaders from their teachers overestimate their own receipt of professional development and their involvement in professional development for their teachers because they are naturally positive and enthusiastic people. In their "exuberance," they give all positive phenomena a high rating and minimize the problems they face.

The data do not suggest that this is the case. The survey asked principals about the extent to which they viewed various factors as challenges to their efforts to improve teaching and learning in their schools, and they appear to have responded in a forthright manner. For example, two-thirds of the principals reported that having inadequate time to prepare before implementing new reforms was a moderate or a great challenge to their efforts to be effective instructional leaders, and more than half said that unstable funding and the inability to fire or reassign personnel posed similar issues.

However, instructional leadership category is not significantly associated with the extent to which principals perceived themselves as facing the challenges asked about in the survey. Higher-rated principals may have been more positive about their receipt and provision of professional development, but they were not Pollyanna-like in discounting the issues they faced. What may differentiate these higher-rated principals from their counterparts is not that they recognized fewer problems than others but that they were all the more determined to do something about these problems.

Table 3.2 also shows the mean scores of teachers in schools headed by higher-rated, medium-rated, and lower-rated principals on constructs measuring the teachers' own professional development. By definition, stronger instructional leaders are those whom their teachers perceived as personally involved in helping them develop as teachers. It is not surprising, then, that teachers in schools headed by higher-rated leaders reported receiving professional development more frequently than teachers in other schools.[13] Less predictable is the fact that teachers at schools headed by higher-rated principals valued that professional development more

[13]When teacher survey responses are aggregated to the school level, the scale measuring the teachers' assessment of the principal as an instructional leader is highly correlated with the scale measuring the frequency of teachers' receipt of instruction-related professional development, controlling for school district, principal experience, and teacher experience ($r = 0.723$). The two scales contain entirely different items, however.

highly than teachers at other schools. Perhaps they appreciated such assistance because they knew that their principal cared about their professional growth.

The focus of this chapter is on *instructional* leadership. Principals' roles as *organizational* leaders cannot be discounted, however, as the discussion in Box 3.9 makes clear.

Grouping principals into three categories has the virtue of simplicity and makes for a relatively straightforward story. But sorting all principals into one of just three groups and ignoring more subtle differences among them may also make it more difficult to identify the ways in which their behavior is associated with the outcomes of interest. For this reason, in the remainder of this chapter, Steps 1 to 3 of the theory of action are reexamined using more formal statistical procedures to trace the connections between the professional development experiences of principals and teachers. In Chapters 4 and 5, these same procedures examine the connections among professional development, teaching, and learning.

Steps 1 to 3 from the Perspective of Multiple Regression Analysis

This section uses regression analysis to draw the links connecting Step 1 to Step 2 and Steps 1 and 2 to Step 3 in the theory of action. The section is divided into three parts. The first part examines whether there is an association between constructs related to the principal's receipt of professional development and constructs related to the principal's involvement in professional development for his or her teachers. The last two parts investigate whether the principal's involvement in professional development for teachers and his or her receipt of professional development are associated with teachers' reports of the professional development they received.

In each section, the discussion starts with an analysis of overall instruction-related professional development and then proceeds to analyses focused specifically on professional development related to the Principles of Learning, considered collectively and individually.

Step 1 to Step 2: The Relationship Between Principals' Receipt of Professional Development and Their Involvement in Professional Development for Teachers

This analysis examines the relationships between Steps 1 and 2 in the theory of action. The following question is addressed:

- Are principals who receive more professional development themselves, and are those who value that professional development more highly, also more actively involved in formal and informal professional development opportunities for their teachers?

Box 3.9

Instructional Leadership and Organizational Leadership

In addition to assessing *instructional* leadership, the teacher survey also included five questions that together measure teachers' assessments of their principal as an *organizational* leader. These questions asked teachers the extent to which they agreed or disagreed that their principal enforced student conduct rules, provided adequate classroom resources, built staff unity, and knew about the strengths and needs of students and their families — or, conversely, spent too much time out of the school building (considered to be a negative behavior).

Perhaps not surprisingly, there is a high correlation ($r = 0.747$) between teachers' ratings of their principals as instructional and organizational leaders. One interpretation of this finding is simply that many teachers who like their principals give them high ratings across the board. But several hours spent interviewing and job-shadowing Ms. Lopez (a pseudonym) provide insight into the mix of organizational and instructional leadership skills that good leaders provide and suggest that these kinds of leadership are connected in important ways.

Ms. Lopez recalled that when she took over the principalship of her school half a dozen or so years ago, it was one of the worst schools in the district. Disciplinary incidents took place almost daily, and students were more likely to be found in the corridors than in their classrooms. "This was not a school," she commented. One of the first things she did after taking charge was to post detailed schedules for the entire day for every classroom; even bathroom breaks were scheduled (and remain so to this day). The scheduling, along with her constant presence in the hallways — "The principal must be visible" is one of her core beliefs — helped put an end to misbehavior. Teachers also responded well to her no-nonsense manner.

Six years later, Ms. Lopez still spends little time attending to paperwork during the school day. Instead, she is in and out of classrooms, observing teachers and students. (The fact that students ignored her when, accompanied by a researcher, she visited several classes is testimony to the familiarity of her presence.) Part of her purpose in visiting classrooms is to determine what support teachers need, and numerous professional development events are posted on the wall of the main office. Ms. Lopez also pointed with pride to the school library and her school's implementation of a special reading program for students.

Over the course of the morning of the researcher's visit, several students ran up to Ms. Lopez and hugged her, and one even nestled in her lap for a minute. But the principal also talked sternly with another student about a discipline issue, reminding him to count to 12 to control his temper. And she inspected the fingernails of a child who had been using them to claw at other children; the school had called the child's mother to ask her to trim her child's nails. A

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Box 3.9 (continued)

group of students was in the hallway with a paraprofessional, who was having a hard time getting them to listen to her. Ms. Lopez went over to the students and said, "That's enough now, sit down!" The students settled down immediately.

This case exemplifies the fact that while teaching and learning are the core business of schools, these activities cannot take place in a chaotic environment. Ms. Lopez is highly regarded by her teachers as both an organizational and an instructional leader because of her ability to create a setting that is both orderly and supportive to adults and to children. Within that environment, both teachers and students can take advantage of initiatives to help them succeed in their respective roles.

The general model used in the analysis is shown in Figure 3.3.

Table 3.3 summarizes the relationships that were found; the regression tables appear in Appendix D (see Appendix Tables D.1.a through D.1.e). As the top panel of Table 3.3 shows, principals who reported receiving instruction-related professional development more often were also more likely to play a more active role in the professional development offered to teachers at their schools. In contrast, the *value* that they attached to this professional development is not similarly associated with their role in professional development for their teachers.

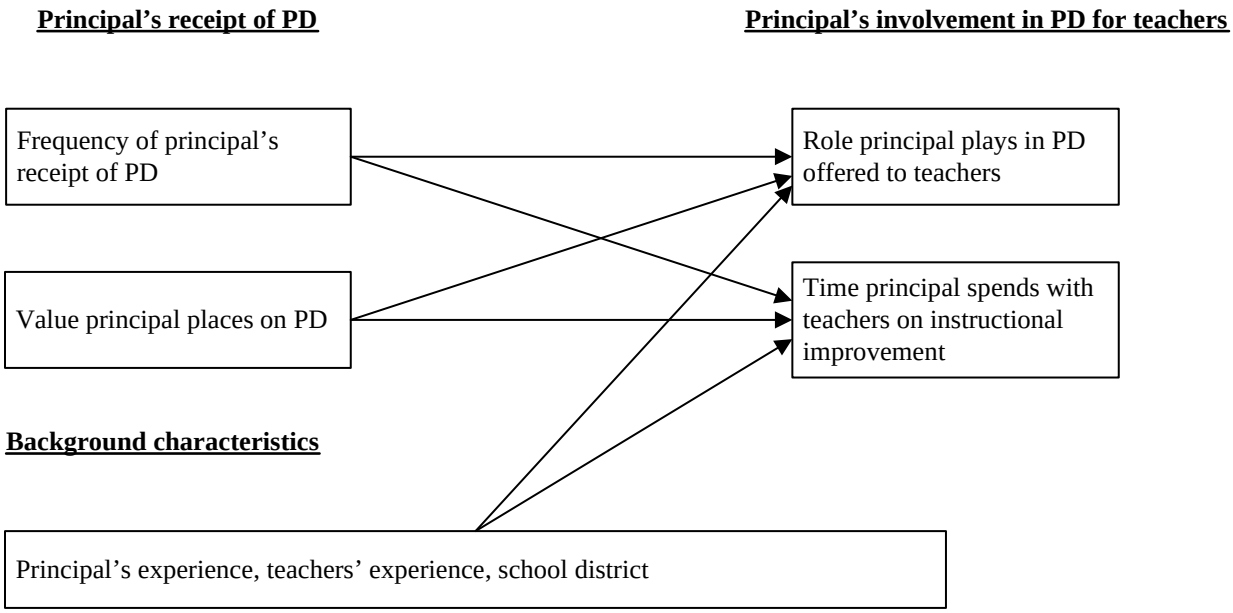
The size of the former relationship is particularly strong and is illustrated in Figure 3.4. In this figure, the bars represent the score on *role principal plays in professional development offered to teachers* that would be predicted by the regression model for a hypothetical principal who receives a low, medium, or high score on *frequency of principal's receipt of instruction-related professional development* and is "average" on every other measure included in the model.[14] Principals with a score of 1.0 on the construct measuring the frequency of their professional development would be predicted to have a score of 1.7 on the construct measuring their role in professional development for teachers, whereas principals with a score of 3.0 on the con-

[14]The differences between the bars in this graph represent the magnitude of the regression coefficient calculated for the parameter representing the frequency of principals' professional development. To calculate the value of each bar, a given value (for example, 1.0) is substituted for this parameter, and all other variables in the model are set to equal their observed mean value (that is, they are "held constant").

The Instructional Leadership Study

Figure 3.3

General Model for Analyses on Step 1 to Step 2 of the Theory of Action



struct measuring frequency of professional development would be predicted to have a score of 2.8 on the construct measuring role in professional development for teachers.[15]

Returning to Table 3.3, both the frequency with which principals received instruction-related professional development and the value they attached to it are positively associated with the time they spent with teachers on instructional improvement.

The relationships were reexamined considering professional development on the Principles of Learning, collectively and individually, rather than all instruction-related professional development. Understanding principals' involvement in communicating the Principles of Learning to their teachers is of particular interest because the Principles of Learning are central

[15]Table 3.1 provides a point of reference for understanding these predicted values. It shows that the mean score on the construct measuring the frequency of the principal's professional development is 1.71, while the mean score on the construct measuring the principal's role in professional development for teachers is 2.09.

The Instructional Leadership Study

Table 3.3

Step 1 to Step 2: Summary of Regression Analysis Findings

Instruction-related professional development

	Principals' Involvement in PD for Teachers	
Principals' Receipt of PD	Role Played in PD	Time Spent with Teachers on Instructional Improvement
Frequency	✓	✓
Value	--	✓
Sample (number of schools)	42	42

Professional development related to the Principles of Learning, collectively

	Principals' Involvement in PD for Teachers	
Principals' Receipt of PD	Role Played in PD Related to the Principles of Learning	Frequency of Suggestions to Teachers on Implementing the Principles of Learning
Frequency	--	--
Value	--	✓
Sample (number of schools)	38	38

Professional development related to each Principle of Learning

	Principals' Involvement in PD for Teachers					
	Accountable Talk		Academic Rigor		Clear Expectations	
Principals' Receipt of PD	Role in PD	Suggestions to Teachers	Role in PD	Suggestions to Teachers	Role in PD	Suggestions to Teachers
Frequency	--	--	--	--	--	--
Value	--	--	--	✓	--	✓
Sample (number of schools)	36	36	37	37	37	37

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

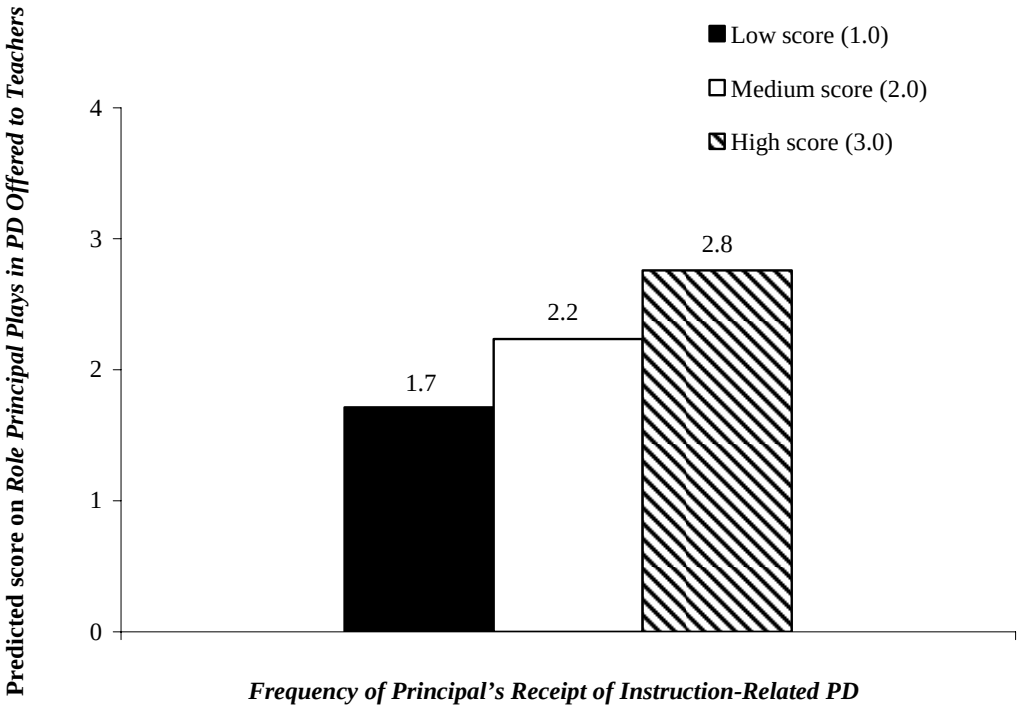
NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of less than 10 percent are considered statistically significant.

Each model includes principals' experience, teachers' experience, and school district as covariates.

The Instructional Leadership Study

Figure 3.4

Predicted Scores on *Role Principal Plays in Professional Development Offered to Teachers* for Low, Medium, and High Scores on *Frequency of Principal's Receipt of Instruction-Related Professional Development*



SOURCES: MDRC calculations from survey responses of 42 principals in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: The predicted scores on *role principal plays in professional development offered to teachers* result from a school-level regression analysis in which scores on this construct were regressed on *frequency of principal's receipt of instruction-related professional development,* holding constant *value principal places on instruction-related professional development,* principal's experience, teachers' experience, and school district.

to the IFL's concept of instructional improvement, as well as to the measures of instructional quality used in this study.

The middle and bottom panels of Table 3.3 show the findings. The degree of *value* that principals attached to professional development on the Principles of Learning, considered together, is positively associated with the frequency with which they reported giving suggestions to their teachers on implementing these principles in their classrooms. It appears that this effect is driven primarily by the value that principals placed on professional development on the principles of Academic Rigor and Clear Expectations, since the same general pattern of association was found when professional development on each of these two principles was analyzed separately.

Neither the *frequency* of principals' receipt of professional development on the Principles of Learning, collectively or individually, nor the *value* that they placed on it is significantly related to their *role* in professional development for teachers on these principles. The frequency of principals' professional development on the Principles of Learning also did not predict the frequency with which they reported giving their teachers suggestions on implementing these principles.

A limitation of these analyses is that both the predictor and the outcome variables come from principals' self-reports. One promising indication that these self-reports are valid is that principals' reports of the frequency with which they gave their teachers suggestions on implementing the Principles of Learning are moderately correlated with the reports of teachers at their schools on how frequently their principals gave them such suggestions.[16] The next section of this chapter indirectly addresses the question of the validity of principals' reports by examining the relationship between principals' reports of their actions with regard to teacher professional development and teachers' reports of the professional development environment that they experienced.

Step 2 to Step 3: The Relationship Between Principals' Involvement in Professional Development for Teachers and Teachers' Receipt of Professional Development

This section examines Steps 2 and 3 of the theory of action in order to answer the following question:

- Do teachers whose principals are more actively involved in teacher professional development report receiving more professional development and valuing their professional development more highly?

[16]Pearson's correlation coefficient = 0.405; p = 0.007.

The general models that were used for these analyses are shown in Figure 3.5.

As this figure illustrates, the two constructs measuring principals' involvement in professional development for teachers — *time principal spends with teachers on instructional improvement* and *role principal plays in professional development offered to teachers* — are examined in separate models.[17] Table 3.4 makes clear that both measures of principals' behavior are significantly and positively associated with the frequency with which teachers reported receiving instruction-related professional development.

The size of the relationship between *time principal spends with teachers on instructional improvement* and teachers' reports of the frequency of their professional development is illustrated in Figure 3.6, which shows the score on the construct measuring the frequency of teacher professional development that would be predicted for a hypothetical school where the principal receives a low, medium, or high score on *time principal spends with teachers on professional development* and is "average" on every other measure included in the model. The analyses did not reveal any significant relationships between either measure of principals' involvement in instruction-related teacher professional development and the *value* teachers place on instruction-related professional development.

When these same relationships were examined for professional development related to the Principles of Learning rather than for all instruction-related professional development, a slightly different pattern emerged. Only the *role* that the principal plays in professional development related to the Principles of Learning is associated with the *frequency* of teachers' receipt of professional development on the Principles of Learning.[18]

Breaking down the analyses by Principle of Learning, two relationships emerge as statistically significant: the relationships between principal's *role* in professional development related to Academic Rigor and both the *frequency* with which teachers reported receiving professional development related to Academic Rigor in Mathematics and the *value* they attached to

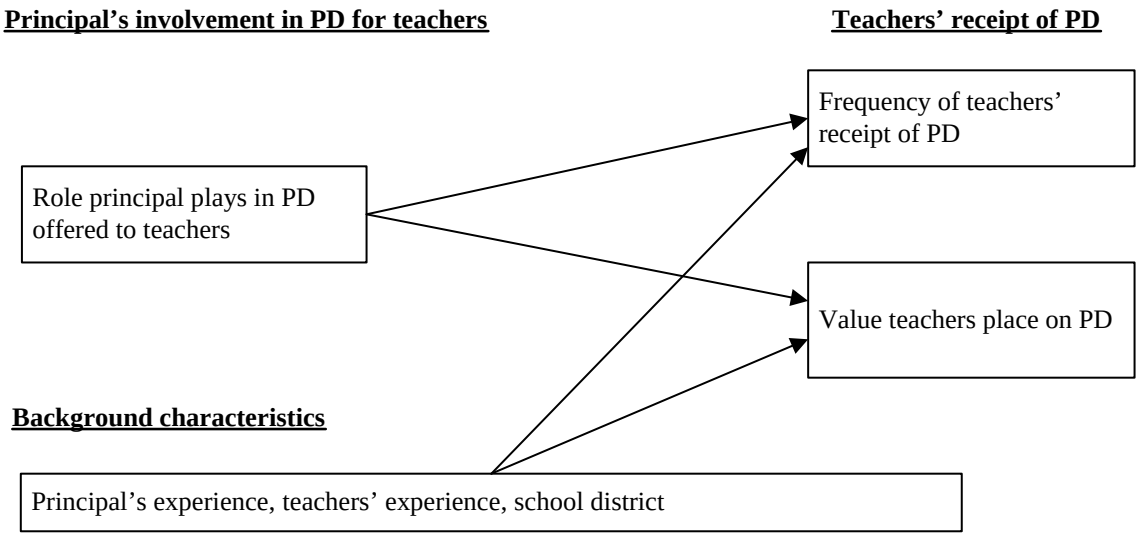
[17]When the two independent variables are included in the same model, neither is significantly associated with either the *frequency* or the *value* of teachers' professional development, probably because the two independent variables are so similar to one another that it is impossible to distinguish the separate contribution of each. Including the independent variables in separate models makes it possible to establish the connections between principals' actions and teachers' receipt of professional development. However, the separate analyses presented here cannot take into account any overlap or interaction between the effects of the two independent variables, and the relative importance of one type of behavior vis-à-vis the other cannot be assessed.

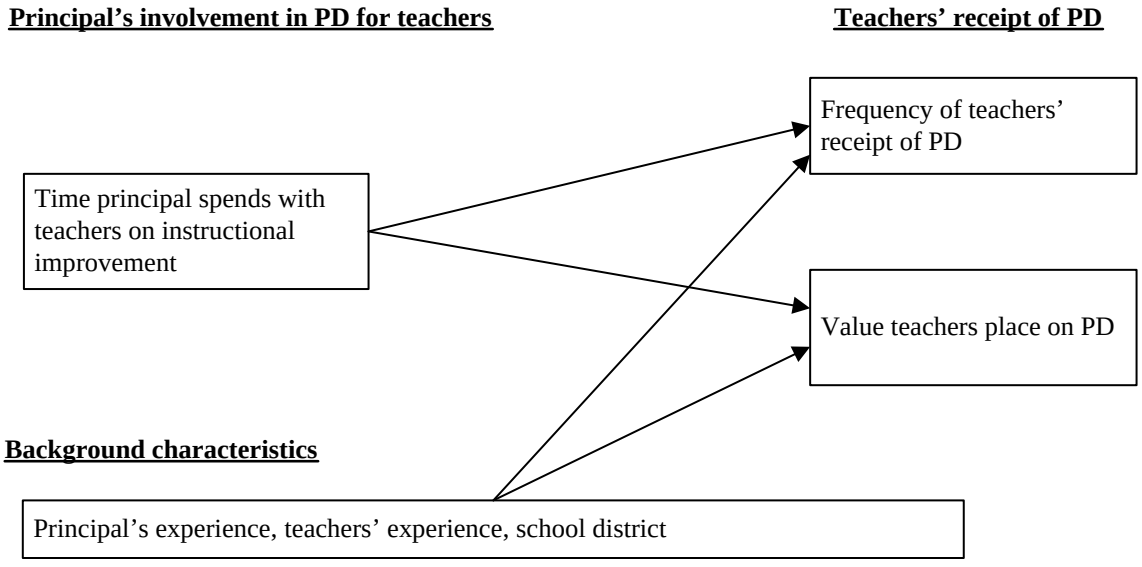
[18]The fact that the *frequency of principal's giving suggestions to teachers on the Principles of Learning* is not associated with teachers' reports of the frequency of their professional development on the Principles of Learning is not necessarily surprising, since the survey questions contributing to the latter construct referred to professional development "sessions" or "activities," and it is likely that the responding teachers did not consider suggestions that they received from their principal to be professional development "sessions." As reported above, teachers' reports of the frequency of receiving suggestions from their principals on the Principles of Learning are correlated with principals' reports of the frequency with which they gave these suggestions.

The Instructional Leadership Study

Figure 3.5

General Models for Analyses on Step 2 to Step 3 of the Theory of Action





The Instructional Leadership Study

Table 3.4

Step 2 to Step 3: Summary of Regression Analysis Findings

Instruction-related professional development

	Teachers' Receipt of PD	
Principals' Involvement in PD for Teachers	Frequency	Value
Role played in PD offered to teachers	✓	--
Time spent with teachers on instructional improvement	✓	--
Sample (number of schools)	42	42

Professional development related to the Principles of Learning, collectively

	Teachers' Receipt of PD	
Principals' Involvement in PD for Teachers	Frequency	Value
Role played in PD related to the Principles of Learning	✓	--
Frequency of suggestions to teachers on implementing the Principles of Learning	--	--
Sample (number of schools)	42	42

Professional development related to each Principle of Learning

	Teachers' Receipt of PD							
	Accountable Talk		Academic Rigor in Reading		Academic Rigor in Math		Clear Expectations	
Principals' Involvement in PD for Teachers	Frequency	Value	Frequency	Value	Frequency	Value	Frequency	Value
Role played in PD on the specific Principle of Learning	--	--	--	--	✓	✓	--	--
Frequency of suggestions to teachers on implementing the specific Principle of Learning	--	--	--	--	--	--	--	--
Sample (number of schools)	42	42	39	39	40	40	42	42

(continued)

Table 3.4 (continued)

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Each predictor variable displayed in the table was run in a separate model (for example, principals' role in professional development for teachers and the time they spent with teachers on instructional improvement were run in two separate models predicting the frequency of teachers' professional development). When both predictor variables were includes in the same model, neither significantly predicted the outcome *over and above* the effects of the other.

Each model included principals' experience, teachers' experience, and school district as covariates.

that professional development. No other statistically significant relationships were found between principals' behaviors regarding each Principle of Learning and either the frequency or the value of teachers' professional development on each principle.

Step 1 to Step 3: The Relationship Between Principals' Receipt of Professional Development for Teachers and Teachers' Reported Receipt of Professional Development

The final set of analyses in this chapter explores this question:

- Are there any direct relationships between what principals reported about the frequency and value of the professional development they received and what teachers reported about the frequency and value of their own professional development?

The general model illustrated in Figure 3.7 was used to estimate the relationship between principals' receipt of instruction-related professional development and teachers' reported receipt of instruction-related professional development.

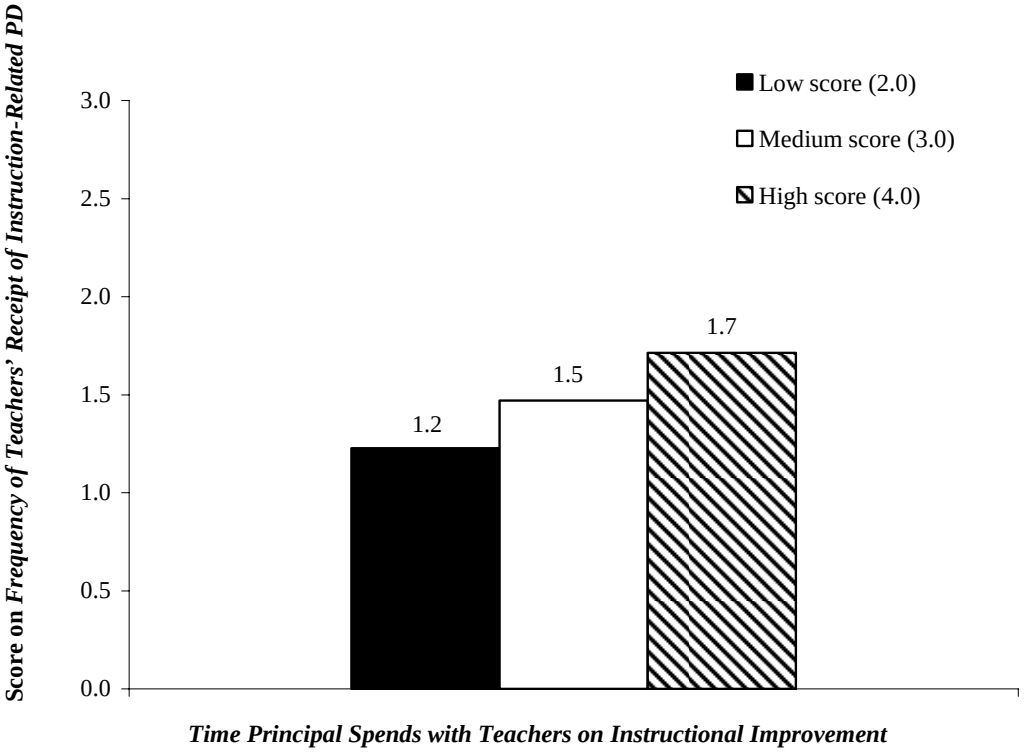
While a direct relationship between principals' and teachers' reports of the frequency and value of their professional development is possible, at least in theory, the analysis does not point to any significant relationships between principals' and teachers' professional development. (See Table 3.5.) The absence of a relationship holds, whether the professional development under consideration is more general or is related to the Principles of Learning.

The analyses reported here have focused on variables associated with steps in the theory of action. However, the experience levels of principals and teachers are also significantly related to outcomes at several steps, as discussed in Box 3.10 and shown in Appendix Tables D.1.a through D.1.e.

The Instructional Leadership Study

Figure 3.6

Predicted Scores on *Frequency of Teachers' Receipt of Instruction-Related Professional Development* for Low, Medium, and High Scores on *Time Principal Spends with Teachers on Instructional Improvement*



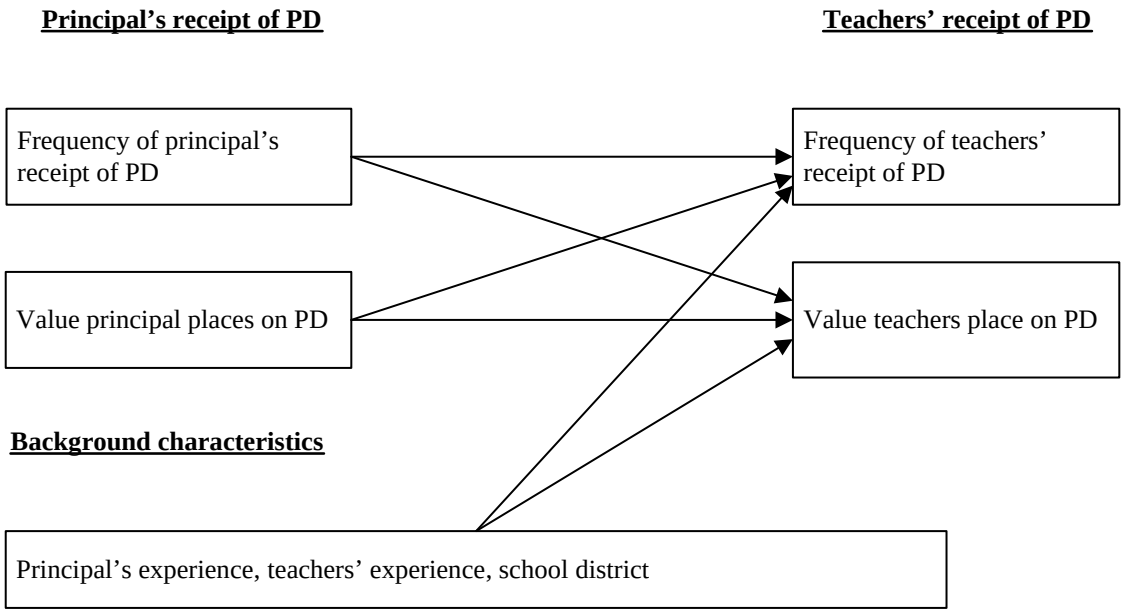
SOURCE: MDRC calculations from survey responses of 42 principals in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: The predicted scores on *frequency of teachers' receipt of instruction-related PD* result from a school-level regression analysis in which scores on this construct were regressed on *time principal spends with teachers on instructional improvement,* holding constant principals' experience, teachers' experience, and school district.

The Instructional Leadership Study

Figure 3.7

General Model for Analyses on Step 1 to Step 3 of the Theory of Action



An Emergent Model of Instructional Leadership

The two modes of analysis that are employed in this chapter produce quite similar results.[19] According to teacher reports, principals differed in the amount of instructional leadership that they provided. It turns out that the principals whom teachers rated as stronger instructional leaders themselves reported receiving more professional development than did lower-rated principals. They also reported being more actively engaged in their teachers' professional development — that is, they appear to have done a better job of transmitting what they had learned to teachers in their schools. And teachers in schools with higher-rated instructional leaders received more professional development and valued it more than did their colleagues at schools

[19]It should be noted that the categorical approach to instructional leadership considers only *instruction-related* professional development, not professional development that specifically covered the Principles of Learning, either collectively or individually.

with lower-rated leaders. While differences among the groups are not consistently statistically significant, almost all are in the expected direction, with higher-rated principals scoring highest on the variable of interest and lowest-rated principals scoring lowest.

The regression analyses yield a similar picture. They indicate that principals who reported getting more professional development also reported providing more to their teachers. And principals who reported being more involved in their teachers' professional development headed schools where teachers reported getting professional development more often. These findings are essentially consistent with the IFL theory of action, which holds that principals play a critical role in improving the instructional climate in their schools. The findings suggest a mechanism through which such improvement occurs: Principals lead by taking what they have learned and turning it into lessons for the teachers in their schools.[20]

But what happens next? Do teachers in schools with higher-rated leaders make use of these professional development lessons to provide higher-quality instruction? And do higher-rated principals head schools where students register higher academic achievement? While the focus so far has been on the early steps of the theory of action, a preview of the later steps of that theory through the instructional leadership lens does not offer encouragement. Neither the Reading and Math Instructional Quality Assessment (IQA) scores nor the percentage of students meeting the state standard in reading or math differed significantly in schools that were headed by higher-, medium-, and lower-rated principals.[21]

One possible explanation, as discussed in Chapter 2, may be the cross-sectional nature of the study data. Another is that the instructional leadership lens itself may blur the linkages that could be discerned using other methodological approaches — that grouping all principals into just three categories may obscure patterns that arise when all data are taken into account. Chapters 4 and 5 make use of continuous rather than categorical data to explore the connections among principals' leadership actions, teachers' professional development, classroom instruction, and student achievement.

[20]One difference is that teachers in schools with higher-rated principals — principals who were themselves more active in professional development for their teachers — reported valuing the instruction-related professional development that they received more than teachers in schools with lower-rated leaders. The regression analyses do not indicate that the principal's involvement is associated with teachers' valuing their professional development.

[21]Chapter 2 discusses the Reading and the Math IQAs, and Appendix A presents the versions that were used in this study.

The Instructional Leadership Study

Table 3.5

Step 1 to Step 3: Summary of Regression Analysis Findings

Instruction-related professional development

	Teachers' Receipt of PD	
Principals' Receipt of PD	Frequency	Value
Frequency	--	--
Value	--	--
Sample (number of schools)	42	42

Professional development related to the Principles of Learning, collectively

	Teachers' Receipt of PD	
Principals' Receipt of PD	Frequency	Value
Frequency	--	--
Value	--	--
Sample (number of schools)	38	38

Professional Development related to each Principle of Learning

	Teachers' Receipt of PD							
	Accountable Talk		Academic Rigor in Reading		Academic Rigor in Math		Clear Expectations	
Principals' Receipt of PD	Frequency	Value	Frequency	Value	Frequency	Value	Frequency	Value
Frequency	--	--	--	--	--	--	--	--
Value	--	--	--	--	--	--	--	--
Sample (number of schools)	36	36	36	36	36	36	37	37

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Each model includes principals' experience, teachers' experience, and school district as covariates.

Box 3.10

How Principals' and Teachers' Experience May Shape Principals' Involvement in Professional Development for the Teachers at Their Schools

Although the effects of principal and teacher experience on principals' instructional leadership behaviors are not of primary interest in this report, the analyses that were conducted revealed some interesting relationships between these characteristics and principals' involvement in professional development for the teachers at their schools.

Teachers' experience

An inverse relationship was observed between the average experience of the teachers at a school and the principal's score on the survey construct measuring the *role* that the principal plays in professional development offered to teachers.* Thus, principals at schools with less experienced teachers reported playing a more active role in formal professional development sessions for their teachers than did principals at schools with more experienced teachers. Since average teacher experience was not associated with teachers' reports of the frequency of their professional development (controlling for district and principal's experience), it does not seem to be the case that schools with more experienced teachers had less teacher professional development. Rather, it seems that principals who had more experienced teachers generally felt free to take a more "hands-off" approach to teacher professional development, allowing others (perhaps assistant principals, instructional coaches, or "master" teachers) to play a greater role.

In the analyses on professional development related to the Principles of Learning, this inverse relationship between teachers' experience and the principal's role in teacher professional development is generally not statistically significant, except with regard to the Principle of Clear Expectations, where a relatively large negative relationship is observed. Perhaps principals see "communicating explicitly to students the expectations for quality work" as a basic skill that more experienced teachers should be expected to have mastered already, and thus principals with more experienced teachers do not feel the need to be personally involved in teacher professional development on this practice. Academic Rigor and Accountable Talk, on the other hand, may be practices for which the principal believes teachers of any experience level could use some additional guidance.

(continued)

Box 3.10 (continued)

Principals' experience

The length of principals' experience played a small, but highly robust, role in predicting the time that principals spent working in person with their teachers to improve instruction. Principals' experience is positively associated both with the construct measuring the *time principal spends with teachers on instructional improvement* and with the constructs measuring the *frequency of principal's giving suggestions to teachers on implementing the Principles of Learning*, considered collectively and individually (as the reader will recall, these constructs are a subset of the construct measuring a principal's time with teachers).† There are a number of reasonable explanations for why this may be the case. It may be that principals with more experience tend to have more confidence in themselves as school leaders and, thus, are more comfortable working directly with their teachers in what teachers might consider a more intrusive manner. Alternatively, perhaps principals with more experience have become more adept at managing their time so that they can dedicate the time necessary to visit classrooms and work with their teachers while still fulfilling myriad necessary duties as school administrators.

Importantly, principals' reports of their total years of experience are moderately correlated with their reports of the number of years they had been working at the same school.‡ It would not be at all surprising that principals who have been at a school longer should feel more comfortable working closely with their teachers than would principals who are relatively new to their school.

NOTES: *The standardized regression coefficient for this relationship is –0.296 and is statistically significant at the 10 percent level.

†The standardized regression coefficient for this relationship in all five analyses ranges from 0.124 to 0.176, and, in each analysis, the relationship is significant at the 1 percent level.

‡The partial Pearson's correlation coefficient between principals' total experience and the number of years they had been at the school (controlling for district and average teacher experience) is 0.53.

Chapter 4

Instructional Quality

This chapter uses survey and classroom observation data to examine instructional quality in third-grade reading and math classes in the schools that participated in the Instructional Leadership Study, which examines the theory of action put forth by the Institute for Learning (IFL), an arm of the Learning Research and Development Center (LRDC) at the University of Pittsburgh (see Box 4.1 for the chapter's key findings).[1]

By considering which factors contribute to higher-quality teaching, the chapter aims to answer the following main questions:

- What is the relationship between the frequency and value of professional development received by teachers and instructional quality observed in the classroom?
- What is the relationship between principals' involvement in professional development for their teachers and instructional quality observed in the classroom?

In addition, two subsidiary questions are addressed:

- Does a teacher's instructional quality vary by subject matter?
- Do teachers do what they say they do in their classrooms?

The next section considers three Principles of Learning that the IFL regards as central to good instruction: Accountable Talk, Academic Rigor, and Clear Expectations. Attention then turns to what the classroom observations reveal about the extent to which teachers in the study schools incorporated instruction characterized by these three Principles of Learning into their teaching. The chapter's final section presents the results of multiple regression analyses that aim

[1]The study includes 49 elementary schools serving substantial proportions of students who were economically and educationally disadvantaged in three districts: Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City. (The report refers to Region 10 as a "district" for convenience. Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced the geographical regions.) Chapter 1 describes the IFL theory of action, and Appendix C presents the items making up the survey constructs used in the analyses.

Box 4.1

Key Findings on Instructional Quality in the Study Schools

- Instructional quality in third-grade reading and math classes — as measured by overall Instructional Quality Assessment (IQA) scores and by scores on the three Principles of Learning (Academic Rigor, Accountable Talk, and Clear Expectations) — was generally low. Students were rarely pushed to analyze their work, to provide evidence for their claims, or to hold each other accountable during class discussions.
- At schools where teachers reported that they received more instruction-related professional development, researchers were more likely to observe higher levels of instructional quality in reading lessons.
- Schools where teachers placed greater value on the professional development that they had received that related to the Principles of Learning had higher overall math IQA scores.
- A direct relationship was observed between the role that principals played in professional development for teachers that related to Academic Rigor and Clear Expectations and observed instructional quality in reading.
- Teachers' reports of what they do during reading and math lessons generally do not match what researchers observed teachers doing.
- Teachers' overall Reading IQA scores are moderately correlated with their Math IQA scores. Teachers' scores for Accountable Talk in Reading and Math are also moderately correlated.

to identify those factors that contribute to higher-quality teaching as measured by the Reading and Math Instructional Quality Assessment (IQA) scores.[2]

The area of Figure 4.1 that is enclosed by a dashed box represents the subject matter of this chapter: the relationships of Steps 2 and 3 with Step 4 of the IFL theory of action.[3] The analysis proceeds on the assumption that certain kinds of professional development for teachers can increase instructional quality and that an understanding of how teachers are affected by particular kinds of professional development can provide insights into the kinds of professional development that can be offered to teachers in order to improve instructional

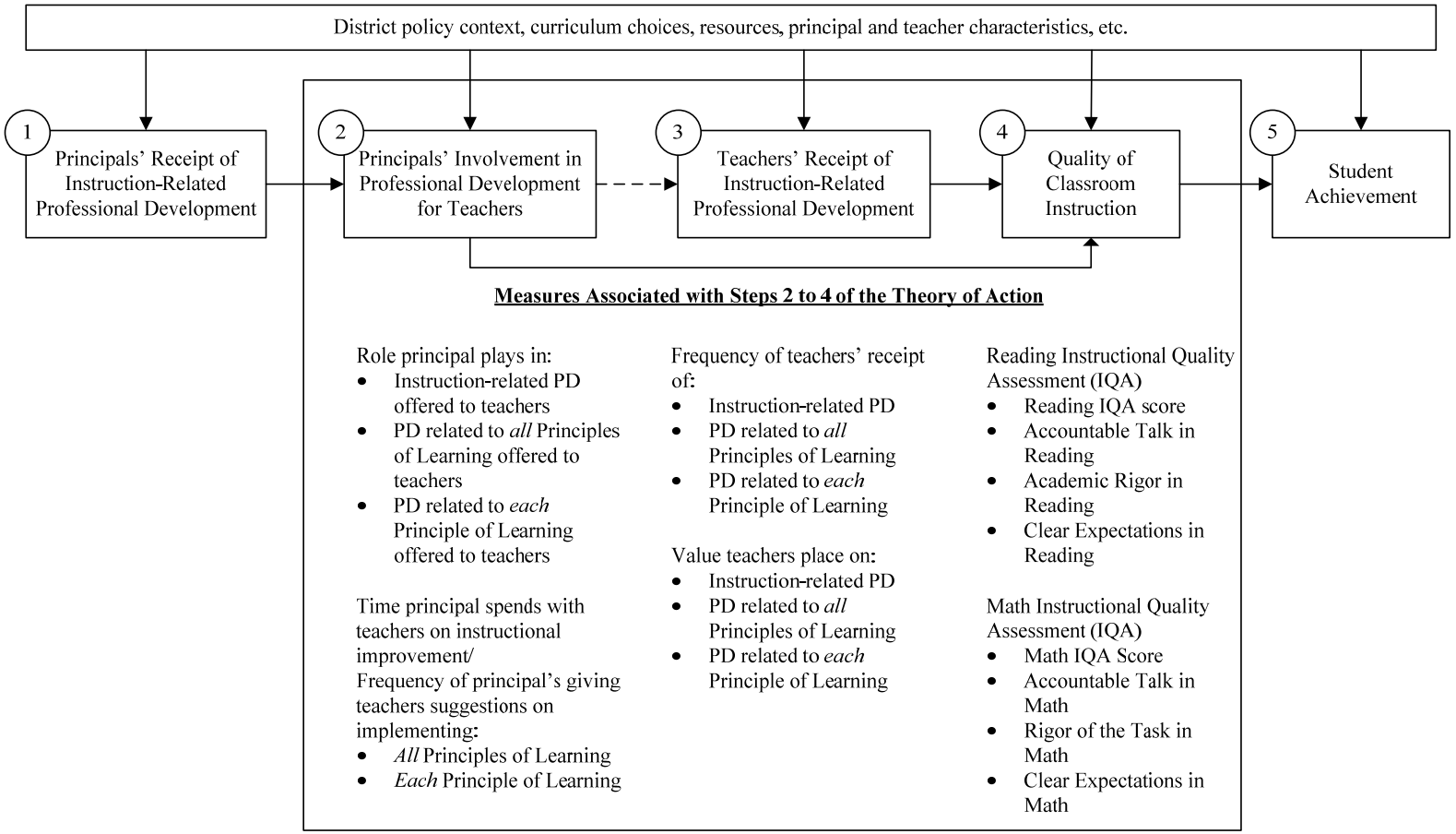
[2]Chapter 2 discusses the Reading and the Math IQAs, and Appendix A presents the versions that were used in this study.

[3]As shown in Figure 4.1, many of the report's exhibits abbreviate "professional development" as "PD."

The Instructional Leadership Study

Figure 4.1

Steps 2 and 3 to Step 4 in the Theory of Action and Measures Associated with Each Step



NOTE: Constructs referring to professional development on "all Principles of Learning" are in fact only referring to the Principles of Accountable Talk, Academic Rigor, and Clear Expectations, which are the principles that are focused on in this report.

quality. Box 4.1 summarizes the chapter's key findings and is intended to serve as a guide for readers during the discussion that follows.

Understanding and Measuring Accountable Talk, Academic Rigor, and Clear Expectations

As noted in Chapter 1, the IFL developed nine Principles of Learning to guide educators toward higher-quality instruction. Three of these — Accountable Talk, Academic Rigor, and Clear Expectations — are the focus of this study and are examined below. As described in Chapter 2, the extent to which these three Principles of Learning are incorporated into third-grade reading and math lessons can be measured using the Reading Instructional Quality Assessment (IQA) and the Math IQA. Below, each of the Principles of Learning is discussed, and examples taken from the observations are used to illustrate both strong and weak cases of using the Principles of Learning during math and reading lessons.

It is important to keep in mind that the IQA measures instructional quality as it is understood by the IFL. Other measures of instructional quality exist but are guided by different philosophies and interpretations of what quality teaching looks like. The decision was made to use the IQA because it specifically measures the behaviors that are thought to lead to higher student achievement according to the theory of action developed by the IFL.

Accountable Talk

In reading and math lessons where there is strong evidence of Accountable Talk during classroom discussions, both the teacher and the students actively listen to and build on students' contributions, and students are expected to consistently back up what they say with appropriate evidence or reasoning. The idea behind this Principle of Learning is that when students are pressed to defend their positions with evidence, and to listen and respond critically to their teacher and fellow students, they are forced to think at a higher level, and this increases achievement. This type of class discussion stands in sharp contrast to lessons in which students give their answers or opinions to the teacher and the teacher's only response is to inform them whether they are wrong or right. See Box 4.2 for examples of high- and low-scoring Accountable Talk lessons.

The Accountable Talk scores in both reading and math consist of five rubrics, each of which is measured separately by the IQA. The first rubric, Participation in the Learning Community, simply measures the proportion of students who participate in a class discussion. The second and third rubrics, Teacher's Linking and Revoicing Contributions ("Teacher's Linking and Revoicing" for short) and Students' Linking and Revoicing Contributions ("Students' Link-

Box 4.2

An Example of Accountable Talk

In this quick exchange among a teacher and three students, there is evidence of three of the Accountable Talk rubrics: Teacher Asking, Students Providing, and Student Linking.

> *Student 1:* [Reading] "'I'll drop in on my old friend Ananse,' thought Akai. 'I'm sure he'll share a bite with me.' Ananse was setting the table when he heard a knock. 'Whoever it is, they'll go away,' he thought. But the knocking wouldn't stop. He didn't want to share food with anyone, but when he saw his old friend Akai he couldn't bring himself to turn him away."
>
> *Teacher:* Who thinks that Ananse will share his feast with Akai, and why? I want to see you talk to your partner next to you. Look at the pictures too. Is there anything there that tells you? [Waits a few minutes]
>
> *Teacher:* Okay, I'll take three suggestions of what you think.
>
> *Student 2:* I think he will [share] because it says in the story — "When he saw his friend Akai he couldn't bring himself to turn him away."
>
> *Student 3:* I agree and disagree with him because earlier it says that he didn't want to share his food with anyone.
>
> *Student 4:* On the next page it shows his friend Akai is sitting at the table eating.
>
> *Teacher:* Let's see. He's sitting at the table but it doesn't show him eating, he's just sitting there. Let's read and see what happens.

The teacher in this very brief example expects students to delve deeply into the stories they read. In this case, the teacher wants the students to think about what motivates the main character, Ananse, to share or not share with a friend. When the teacher says, "Let's read and see what happens," it is easy to imagine that the students are eager to find out what Ananse will do. In addition, it seems, from the way that the students engage with each other, that the students are expected to listen critically to each other. In contrast, in the following typical exchange shown below, students are simply asked to recall facts from a story. They are not asked to think about how these facts fit in with the story nor to engage with their peers.

> *Teacher:* What were the other boys doing?
>
> *Student 1:* Fighting.
>
> *Student 2:* To go to war.
>
> *Teacher:* They were training to be warriors. What else?

(continued)

Box 4.2 (continued)

Student 3: They were training for hunting.

Teacher: Most were training for hunting buffalo. How was Little Gopher different?

Student 4: He couldn't run fast.

Teacher: He couldn't run fast so he couldn't keep up with the rest.

Student 5: They made toy soldiers.

Teacher: What did he love?

Student 6: He loved art and making things with his hands.

ing and Revoicing"), measure the extent to which teachers and students listen to each other and build on or connect to what others say. The last two rubrics, Teacher Asking for Evidence or Reasoning and Students Providing Evidence or Reasoning, measure the extent to which teachers press students to provide evidence or reasoning to back up their claims and the extent to which students are able to do that.

Academic Rigor

Reading classes where there is strong evidence of Academic Rigor are those in which students are engaged with the texts they read in rich and meaningful ways. The theory is that students who are expected to analyze texts and not just answer factual questions about them will have a deeper understanding of these texts and will thereby become insightful, critical readers. The idea behind Rigor of the Task in Math is very similar to the idea behind Academic Rigor in Reading. Students in academically rigorous math classes are expected to tackle complex mathematical problems and to be able to explain their thought processes to their teachers and peers rather than to memorize algorithms without thinking about how they work. Students who have the opportunity to think critically about mathematics will have a better understanding of mathematics, which should be reflected in their achievement.

The rubrics making up Academic Rigor in Reading and Academic Rigor in Math are not exactly the same (unlike the case for Accountable Talk, where the rubrics are the same for both the Reading IQA and the Math IQA). Therefore, they are described separately below.

Academic Rigor in Reading

Academic Rigor in Reading consists of three rubrics.[4] The first and second rubrics, Rigor of the Discussion and Potential of the Task, measure the richness of class discussions and tasks. Rigor of the Discussion is essentially measuring the same behaviors as two Accountable Talk rubrics — Teacher Asking for Evidence or Reasoning and Students Providing Evidence or Reasoning. All are focused on the types of questions and evidence that come up in class discussions. In fact, Rigor of the Discussion scores and the scores on these two Accountable Talk rubrics are moderately correlated (Teacher Asking: $r = 0.53$; Students Providing: $r = 0.54$). However, unlike any of the Accountable Talk rubrics, Academic Rigor also measures the complexity of tasks assigned to students and how students engage with the tasks. In reading classes that score high on Rigor of the Discussion and Potential of the Task, teachers guide students to analyze texts, and, as with Accountable Talk, teachers expect students to ground their statements in the text. For example, teachers may ask students to engage with the underlying meanings or literary characteristics of a text or to discuss the causes and effects of a character's actions during discussions or as part of a class or homework assignment. The third rubric, Implementation of the Task, measures the level of rigor with which students actually complete the tasks assigned to them.

Rigor of the Task in Math

The principle of Academic Rigor in Math is measured as Rigor of the Task.[5] Rigor of the Task in Math consists of two rubrics: Potential of the Task and Implementation of the Task. Potential of the Task measures the complexity of mathematics tasks assigned to students. Tasks that receive high scores must challenge students to engage with underlying mathematical concepts, and they must explicitly prompt students for evidence of their thinking. For example, students may be required to develop explanations for why formulas or procedures work; solve a genuine, challenging problem for which their reasoning is evident in their work on the task; identify patterns and form generalizations based on those patterns; or make conjectures and support their conclusions with mathematical evidence or reasoning. Implementation of the Task

[4]Originally, a fourth rubric, Rigor of the Text, was a part of Academic Rigor in Reading. However, as mentioned in Chapter 2, one member of the research team rescored all observations from Austin and Saint Paul on the basis of the running records. Unfortunately, the running records did not include sufficient information about the texts used in the lessons for this researcher to assign a valid score for Rigor of the Text. Therefore, this rubric is not included in the analyses.

[5]Originally, a third rubric, Discussion Following the Task, was a part of Academic Rigor in Math, but approximately 40 percent of the teachers observed during math did not include a discussion following a math task. Had this rubric remained a part of the Academic Rigor in Math score, the sample size would have been drastically reduced, and so a decision was made to exclude it.

measures with what level of rigor students complete the tasks assigned to them. For strong and weak examples of Rigor of the Task in Math, see Box 4.3.

Clear Expectations[6]

In reading and math lessons where there is strong evidence of Clear Expectations, students receive clear and detailed instructions from their teachers about what they must do and must include in their work in order for it to be considered high-quality. The idea behind this rubric is that students will have a better understanding of what they are expected to learn from the task when they know that they are expected to explain their thinking in addition to providing an answer and when they are given the tools to help them in their thinking.

In lessons that receive a high score for Clear Expectations, students are told explicitly that they are expected to show the reasoning or evidence behind their answers, and they are guided by their teachers in thinking about a way that they may explain or show how they did their work. During math lessons, the teacher may suggest that students use a graph, a drawing, or some other tool to help explain their solution; in reading lessons, the teacher may suggest that students use lots of examples from a story to support their writing. In addition, without showing the solution to the current problem, the teacher models what high-quality work looks like. For example, the teacher might prompt students to discuss an example of high-quality work by looking for evidence that the work was done according to district standards or that it includes references to a text. See Box 4.4 for an example of Clear Expectations.

Classroom Observations: What They Revealed

This section describes how well teachers did, on average, on the Reading and Math IQAs and on each Principle of Learning and the rubrics that make up each one. The mean IQA scores and the mean scores for each Principle of Learning and its component rubrics for the observations completed for this study are shown in Table 4.1. Throughout this report, Reading and Math IQA scores are analyzed separately. However, see Box 4.5 for an examination of the extent to which teachers' scores in reading and math are associated with each other.

[6]The principle of Clear Expectations is measured through a single rubric on the IQA known as "Clarity and Detail of Expectations." Originally, three additional rubrics were used to measure the principle. Scores on one of the other rubrics, Academic Rigor in the Teacher's Expectations, were not reliable. The scores on the other two rubrics did not vary much at all and, therefore, added virtually nothing to the analyses.

The Instructional Leadership Study

Table 4.1

Mean Instructional Quality Assessment Scores, by Principle of Learning and Rubric

	Reading Mean Score	Math Mean Score
Overall IQA score	1.74	1.91
Accountable Talk	2.01	2.05
Participation in the Learning Community	3.94	3.79
Teacher's Linking and Revoicing Contributions	1.43	1.49
Students' Linking and Revoicing Contributions	1.36	1.20
Teacher Asking for Evidence or Reasoning	1.92	1.92
Students Providing Evidence or Reasoning	1.64	1.84
Academic Rigor[a]	1.89	NA
Rigor of the Discussion in Reading	1.90	NA
Student Discussion Following the Task in Math	NA	1.76
Rigor of the Task	1.89	2.17
Potential of the Task	1.95	2.26
Implementation of the Task	1.86	2.10
Clear Expectations	1.31	1.50

SOURCES: MDRC calculations from classroom observations of 91 third-grade reading teachers in 46 schools and 132 third-grade math teachers in 49 schools in Austin, New York City Region 10, and St. Paul.

NOTES: The overall Reading IQA score is the mean of the Accountable Talk, Academic Rigor, and Clear Expectations subscores. The overall Math IQA score is the mean of the Accountable Talk, Rigor of the Task, and Clear Expectations subscores.

The possible score range for Participation in the Learning Community is from 1 to 5. For all other rubrics, the possible score range is from 1 to 4.

The following rubrics have reduced sample sizes due to missing data:

Participation in the Learning Community in Reading: sample = 81 teachers
Implementation of the Task in Reading: sample = 77 teachers
Student Discussion Following the Task in Math: sample = 82 teachers
Implementation of the Task in Math: sample = 128 teachers

[a]The Academic Rigor subscore in reading is the mean of Rigor of the Discussion and Rigor of the Task. The principle of Academic Rigor in Math is represented only by the Rigor of the Task score. Scores for Student Discussion Following the Task were not included in the math rigor or overall IQA scores because of the large number of teachers who were not observed leading a discussion following a math task.

Box 4.3

Examples of Academic Rigor

The following problem is an example of a high-scoring task. The reason it earns a high score is that students must solve a genuine problem and explain their thinking.

> Four friends are getting together to celebrate the birthday of one of them. There are 25 chocolate cupcakes. They have to share, but don't know what to do so that every one of them gets the same amount of cupcakes. Help the four friends solve this problem.
>
> Work together.
>
> Show your work.
>
> Explain step by step what you did.

What makes this a challenging problem is that 25 cupcakes cannot be easily divided among four friends. In order to solve this problem correctly, students have to figure out what to do with the remaining cupcake, and this pushes them to deal with fractions, which is one of the more challenging mathematical concepts that young students must master. The discussion following this task is shown below.

> *Teacher:* Okay, next group share with us.
>
> *Student A:* [Draws solution on board] What we did was drew 25 cupcakes and drew 4 friends, and then I gave a cupcake to each friend, and we only got 24, so I split it [the remaining cupcake] in 4 so each person got 6 cupcakes, because 6 x 4 = 24, and the leftover we split it in 4 pieces so that each kid got 6 and 1/4.
>
> *Teacher:* B, did you agree? Because I saw you rolling your eyes. She said that she got 6 and 1/4.
>
> *Student B:* [Goes up to board and explains that you can't cut a cupcake that way evenly]
>
> *Student A:* I didn't cut it like that.
>
> *Student C:* I disagree, because that equals 29.
>
> *Teacher:* Can you respond to that and show how that is 25?

(continued)

Box 4.3 (continued)

Student A: It's not one extra cupcake but only a part of a cupcake.

Teacher: It's 1/4 extra.

Student A: If you have one whole cupcake, and then you have another that you split into 4 pieces, it's still one whole cupcake and another whole cupcake. If you have one whole cupcake and you have another that you split, the one you have one left over — it's still a whole.

In this discussion, Student A responds to Student B's concern that the remaining cupcake must be divided evenly if everyone is to get the same amount. Student A is also able to explain to Student C why splitting the last cupcake into 4 even pieces does not increase the number of cupcakes to 29. In explaining this, it is evident that Students A and B have grappled with a difficult idea in fractions and understood it and that the other students are thinking deeply about the problem.

Because it is clear from the discussion that students tried to think this problem through and back up their work, this class receives a high score for Implementation of the Task.

Challenging and complex tasks do not always lead to high scores for Implementation of the Task or to complex discussions. In the following example, another class is given the same task of dividing 25 items (balloons) among four friends. However, this class does not acknowledge the problem of dividing the remaining balloon, is not offered the opportunity to explore dividing an item that can be split into fourths, and never brings up the topic of fractions. The remaining item is dismissed and the problem is left at a much simpler division problem.

Student A: I know my answer is correct because I did 4 circles and 6 in each circle. To find my answer, I divided.

Teacher: Divided what?

Student A: Balloons.

Teacher: How many?

Student A: 24.

Teacher: 25.

Student A: 25. I did 24 divided by 4.

Teacher: Where'd you get 24 from?

(continued)

Box 4.3 (continued)

Student A: One is left over.

Teacher: You're confusing me.

Student A: There's 6 in one circle. 4 times 6 equals 24. Then you got 1 left over.

Teacher: Okay, so you really divided 25 by 4, and how many are left over?

Student A: 1.

Teacher: Each child has how many balloons?

Student A: 6.

Teacher: Give him a hand.

Box 4.4

An Example of Clear Expectations

The following is an example of directions given to students about how to complete a math task.

Teacher: Who can read the question?

Student: [Reading] "You baked 30 chocolate chip cookies in the oven. Your cookies are so good that you want to share them with other people. How many people could you share your cookies with? How many cookies would you be able to give to each person?"

Teacher: And who can read the "Remember"?

Student: [Reading] "1 – Draw a different solution in each box. 2 – Write one sentence in each box explaining your solution. 3 – Be neat. 4 – Be creative. Everyone needs to get an equal amount of cookies!"

In this example, students are told that they must explain their solutions to the problem in a neat and creative way. They teacher tells the students that they must use drawings and words. However, the teacher does not model what high-quality work should look like, so the directions cannot score a 4. These directions stand in sharp contrast to lessons in which the teacher simply says, "Do page 7."

Box 4.5

Does Instructional Quality Vary by Subject Matter?

Although Reading and Math IQA scores have not been equated, one might expect teachers who score higher in one subject to also score higher in the other, relative to other teachers, since both IQAs are measuring the same Principles of Learning.

Teacher-level analyses revealed that teachers' Reading IQA scores are moderately correlated with their Math IQA scores ($r = 0.437$).* That is, teachers who scored high (or low) on the IQA in one subject generally scored somewhat similarly on the IQA in the other subject. Teachers' scores for Accountable Talk in Reading and Math are also moderately correlated ($r = 0.558$). This may be explained by a teacher's general approach to a lesson. Teachers who are comfortable and confident enough to encourage participation and interaction among students in reading may also tend to feel the same way when teaching math. However, there is less of a correlation between Rigor of the Task in Reading and Math ($r = 0.251$). This may be because teachers might have a better grasp of the content in one subject than the other. Also, the curriculum in one subject may include more rigorous tasks than the curriculum in the other subject. It is unclear why the correlation is so low between Clear Expectations in Reading and Math ($r = 0.043$).

NOTE: *These analyses were conducted on a sample of 76 teachers who have an overall IQA score in both reading and math.

Overall IQA Scores

As shown in Table 4.1, the mean (average) score on the Reading IQA is 1.74, while the average score on the Math IQA is 1.91.[7] Given that the highest score possible is 4.1 and that the lowest score possible is 1.0, these average scores are closer to the low end of the scale and are not indicative of high instructional quality in math and reading lessons. Figures 4.2 and 4.3 show the distribution of scores on the Reading and Math IQAs. In reading, more than three-quarters of the teachers scored lower than a 2.0 on the IQA, and nobody scored a 3.0 or higher. In math, teachers scored slightly higher on the IQA, with 65 percent scoring lower than a 2.0, and 3 percent scoring a 3.0 or better.

[7]Bivariate analyses reveal that, in Austin, the mean score on the Reading IQA (1.57) is significantly lower than it is in New York City Region 10 (1.81) and in Saint Paul (1.92). In addition, the mean Austin Math IQA score (1.83) is significantly lower than the mean Math IQA score in New York City Region 10 (1.99)

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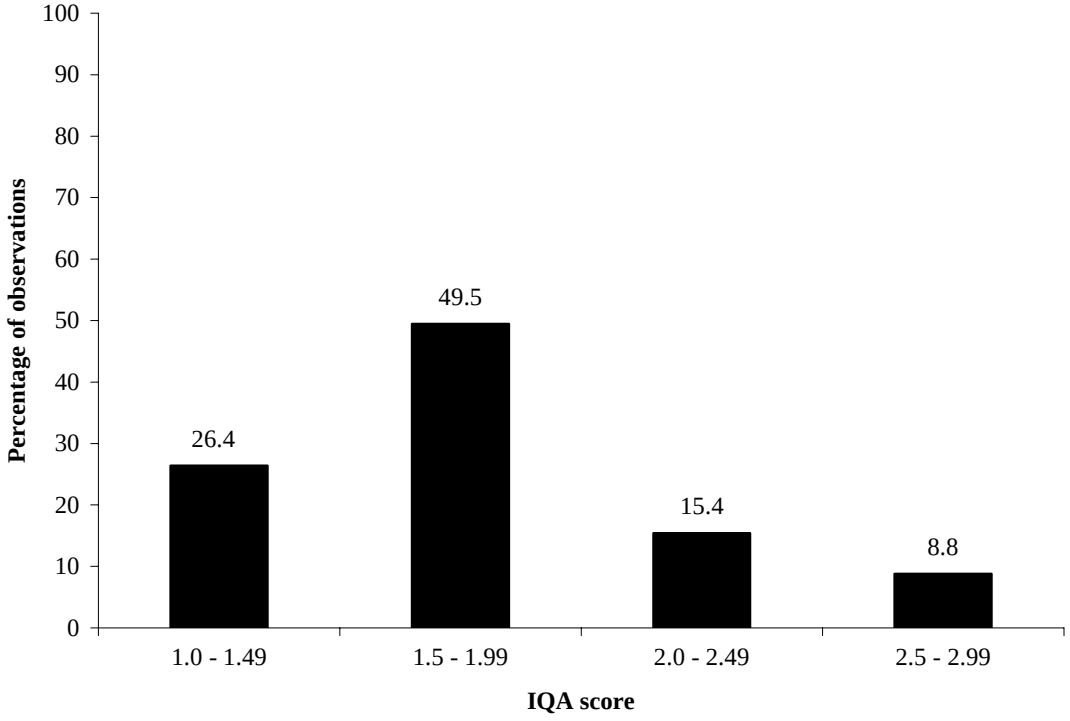
Figure 4.2

Distribution of Scores on the Reading Instructional Quality Assessment



SOURCES: MDRC calculations from classroom observations of 91 third-grade reading teachers in 46 schools in Austin, New York City Region 10, and St. Paul.

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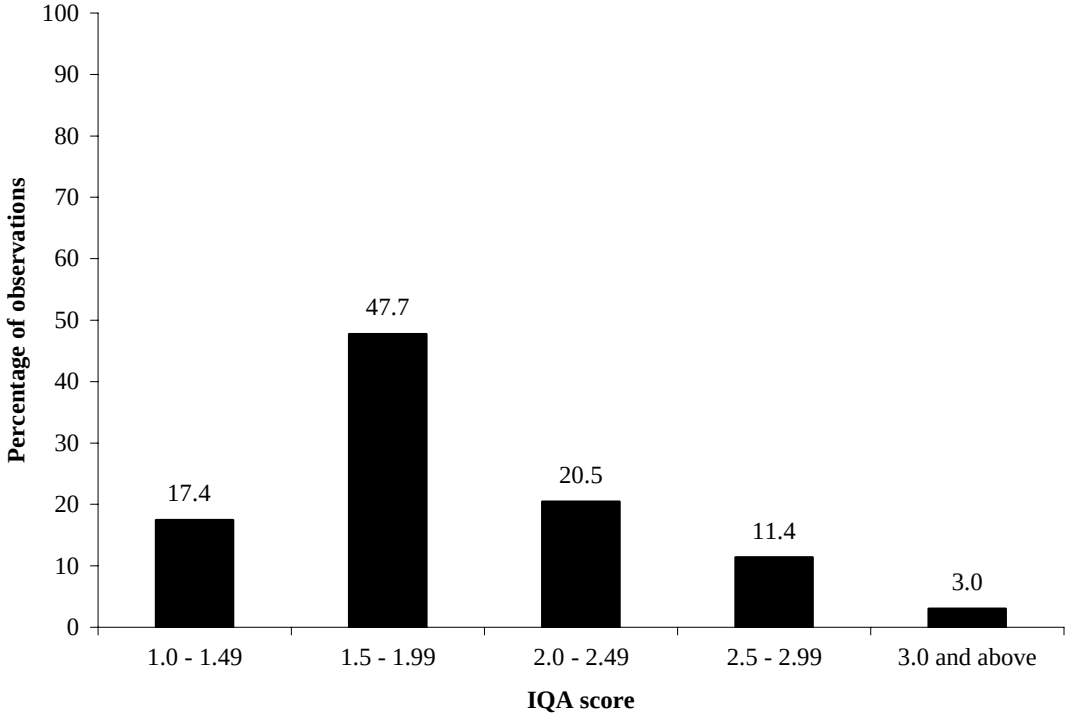
Figure 4.3

Distribution of Scores on the Math Instructional Quality Assessment



SOURCES: MDRC calculations from classroom observations of 132 third-grade math teachers in 49 schools in Austin, New York City Region 10, and St. Paul.

Accountable Talk Scores

As shown in Table 4.1, the average score for Accountable Talk in Reading is 2.01.[8] While the average score for the Participation rubric is high (3.94) and indicates that, in most classes observed, 50 percent to 75 percent of students participated in a whole-class discussion, the scores for the other four rubrics making up Accountable Talk in Reading are much lower. The average scores for Teacher Linking and Revoicing and Students Linking and Revoicing in Reading are 1.43 and 1.36, respectively. These scores indicate that, on average, teachers and students rarely built on each others' contributions and that when they did, they did not explain how their ideas were related. The scores for the last two rubrics of Accountable Talk in Reading are somewhat higher but still low (1.92 for Teacher Asking for Evidence or Reasoning and 1.64 for Students Providing Evidence or Reasoning).

The mean scores for Accountable Talk in Math closely parallel the mean scores for Accountable Talk in Reading. These scores indicate that, on average, teachers' attempts to ask students to explain their reasoning were superficial or formulaic. Students were rarely pressed to provide evidence and could often get away with providing an answer without explaining it. As in reading discussions, the teacher generally did not show how students' contributions related to each other, and the students did not respond to and build on their peers' contributions.

Although the mean scores for Accountable Talk in both subjects are low, teachers reported that Accountable Talk strategies were used frequently in their classrooms during math and reading discussions; see Box 4.6.

Academic Rigor Scores

The average score for Academic Rigor in Reading is 1.89. This score is based on the scores for Rigor of the Discussion (1.90) and the mean of the scores for Potential of the Task (1.95) and Implementation of the Task (1.86).[9] These scores indicate that, on average, student discussions about the texts they read were restricted to surface-level summaries or answers to

[8]The Accountable Talk score is calculated as the mean of the five rubrics that make up this Principle of Learning. If the score for more than one of these rubrics was missing, no Accountable Talk score was calculated for that teacher.

[9]The mean of the scores for Potential of the Task and Implementation of the Task represents the overall score for Rigor of the Task in Reading. If a score was available only for Potential of the Task or Implementation of the Task, but not for both, this score was assigned as the Rigor of the Task score. However, if a score was not available for both Rigor of the Discussion and Rigor of the Task, an Academic Rigor in Reading score was not calculated. In many cases, a score was not calculated even though a task was given to students, because the task was not related to reading comprehension. These tasks may have been focused on vocabulary, spelling, or some other language arts skill.

superficial questions in which students offered very little, if any, evidence to support their contributions. Similarly, the tasks that students were asked to perform provided little opportunity for students to delve beneath the surface of the texts they read and did not prompt students to provide evidence to support their ideas or opinions. The average score for Implementation of the Task indicates that students did not generally analyze the texts they read nor did they provide evidence to support their contributions.

Box 4.6

Do Teachers Do What They Say They Do?

Third-grade teachers were surveyed about the frequency with which they and their students used particular Accountable Talk strategies during math and reading lessons. Researchers looked for evidence of the frequency of these strategies during classroom observations.

The bottom line is that teachers reported much greater use of the strategies than researchers observed.

The following examples illustrate the difference between what teachers reported and what researchers found:*

- Over 30 percent of third-grade teachers reported that their students typically build on what other students say during most of a math or reading discussion, whereas researchers found this happening in only 4 percent of the reading classes and less than 1 percent of the math classes observed. In fact, researchers found that in 79 percent of the reading classes and 86 percent of the math classes observed, students made no effort or a very weak effort to build on what other students said.

- Although 63 percent of third-grade teachers reported that they revoice and build on what students contribute during most of a math or reading discussion, researchers observed this happening in only 2 percent of reading classes and less than 1 percent of math classes.

- Although 62 percent of third-grade teachers reported that they typically press students to provide evidence for their claims or explain their reasoning during most of a math or reading discussion, researchers observed this happening in only 6 percent of reading classes and 4 percent of math classes.

NOTE: *Each percentage is based on the sample of teachers who both answered the relevant survey question and received a score on the relevant rubric of the Instructional Quality Assessment (IQA).

The average score for Potential of the Task in Math is 2.26, and the average score for Implementation of the Task in Math is 2.10. This results in a score for Rigor of the Task in Math of 2.17.[10] The score for Potential of the Task indicates that students typically were asked to engage in rote tasks, such as plugging in a formula that they had been taught. Students were not expected to make connections to the concepts or the meaning underlying the procedures being used, and the focus was most likely on producing the correct answers. The mean score for Implementation of the Task shows that, on average, students did what was asked of them (that is, they engaged in low-level, procedural tasks).

As indicated above, the rubric Student Discussion Following the Task in Math is not included in the calculation of the overall Math IQA score and is not used to measure the principle of Academic Rigor in Math because many of the math lessons observed did not include a discussion following a task that students were assigned. However, for the lessons that did include such a discussion, the average score for Student Discussion Following the Task in Math is 1.76. This score indicates that, during discussions following their work in math, students typically shared their answers to assigned problems and, often, described the steps that they took to solve them, but they did not explain why their strategies for solving the problem worked or how the strategies were appropriate to the problems.

Clear Expectations Scores

The scores for Clear Expectations in Reading and in Math are 1.31 and 1.50, respectively. These scores indicate that teachers typically gave students procedural directions for completing tasks but that teachers did not guide their students in thinking about ways to explain or show their work, nor did teachers require students to provide evidence of their thinking. None of the teachers who were observed scored a 4.0 on the measure in reading or math. One possible reason is that teachers did not understand what it means to model high-quality work. Two assistant principals attending a professional development session given by the IFL each said that they had suggested to their teachers that they model "good work" but that the teachers responded that if they were to do that, the students would just copy it and not think on their own.

[10]The overall score for Rigor of the Task in Math is equal to the mean of the scores for Potential of the Task and Implementation of the Task. If a teacher had a score for either or both of these rubrics, a Rigor of the Task score was assigned.

Steps 2 to 4: Factors That Contribute to Higher- (or Lower-) Quality Teaching

As presented in Figure 4.1, this section examines the relationships of Steps 2 and 3 with Step 4 of the IFL theory of action. The analysis focuses first on how professional development received by teachers at a particular school is related to the quality of reading and math instruction observed at the school. Then the analysis moves a step backward in the theory of action and assesses whether the role that principals play in professional development for their teachers has any direct relationship with instructional quality.[11]

Step 3 to Step 4: The Relationship Between Teacher Professional Development and Instructional Quality

These analyses examine the link between professional development and instructional quality at the level of the individual school.

The following question is addressed:

- Is instructional quality associated with the frequency of professional development received by teachers and/or with how much teachers value that professional development?

The general model used in the analyses is shown in Figure 4.4.

The results of the analyses for this section are summarized in Table 4.2; the regression tables appear in Appendix D (see Appendix Tables D.4.a through D.4.e). The first of these analyses examines the relationships between measures of the frequency and value of all instruction-related professional development that teachers received and their Reading and Math IQA scores. One of these linkages is statistically significant: There is a moderate and positive relationship between the *frequency* of teachers' instruction-related professional development and their Reading IQA scores. Schools where teachers reported that they received more instruction-related professional development were more likely to have higher levels of instructional quality observed in their reading classrooms.

[11] As shown in Appendix D, each analysis controlled for school district, principal's experience, and teachers' experience. Of these covariates, only district had a significant (and large) effect on IQA scores.

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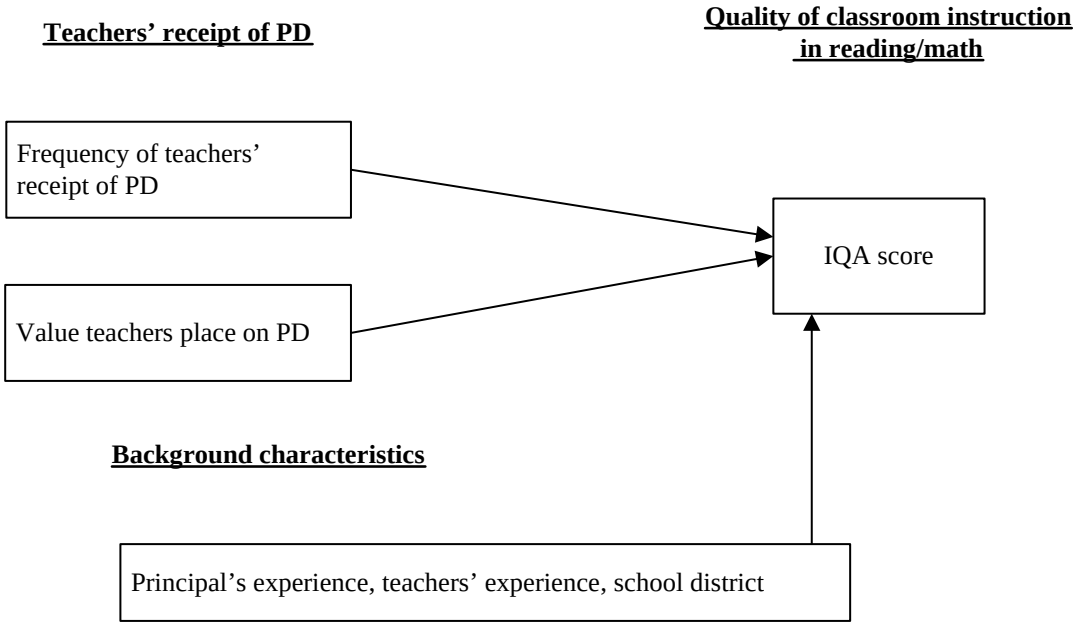
Figure 4.4

General Model for Analyses on Step 3 to Step 4 of the Theory of Action



The Instructional Leadership Study

Table 4.2

Step 3 to Step 4: Summary of Regression Analysis Findings

Instruction-related professional development

	IQA Score	
Teachers' PD	Reading	Math
Frequency	✓	--
Value	--	--
Sample (number of schools)	33	40

Professional development related to the Principles of Learning, collectively

	IQA Score	
Teachers' PD	Reading	Math
Frequency[a]	--	--
Value	--	✓
Sample (number of schools)	33	40

Professional development related to each Principle of Learning

	IQA Subscore					
	Accountable Talk		Academic Rigor		Clear Expectations	
Teachers' PD	Reading	Math	Reading	Math	Reading	Math
Frequency	✓	--	--	--	✓	--
Value	--	--	--	--	--	--
Sample (number of schools)	40	38	30	40	34	41

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Each model includes principals' experience, teachers' experience, and school district as covariates.

[a]The relationship between the frequency of teachers' receipt of professional development related to the Principles of Learning and school mean IQA scores in reading is just below the threshold for statistical significance ($p = 0.102$).

Figure 4.5 visually represents the size of this relationship. In this figure, the bars represent the Reading IQA score that would be predicted by the regression model for a hypothetical school that receives a low, medium, or high score on the frequency of instruction-related professional development for teachers and is "average" on every other measure included in the model.[12] A school that receives a low score of 1.0 on the frequency construct — indicating that teachers received relatively little instruction-related professional development — would be predicted to have a Reading IQA score of 1.5. In comparison, a school where teachers received a high level of such professional development would be predicted to increase the Reading IQA score to 2.5.[13] While this would be a significant increase and improvement, a score of 2.5 would still be a relatively low score and should not be regarded as denoting excellent instruction.

There is no statistically significant relationship between the extent to which teachers at a school reported that they *valued* the instruction-related professional development that they received and the instructional quality observed in reading classes at that school. In addition, neither the frequency nor the value of the instruction-related professional development that teachers received is associated with observed instructional quality in math.

Additional analyses examined the relationships between observed instructional quality and professional development for teachers that covered the IFL Principles of Learning, both considering the Principles of Learning in combination and treating Accountable Talk, Academic Rigor, and Clear Expectations separately. The *frequency* with which teachers received professional development related to Accountable Talk and Clear Expectations is significantly and positively associated with improved scores on these measures in reading lessons.[14] Figure 4.6 represents the size of these relationships. In this figure, the bars represent the IQA subscore (Accountable Talk in Reading or Clear Expectations in Reading) that would be predicted by the regression model for a hypothetical school that receives a low, medium, or high score on the frequency of professional development on the relevant Principle of Learning and is "average" on all other measures included in the model. A school where teachers receive relatively little

[12]The differences among the bars in Figure 4.5 represent the magnitude of the regression coefficient calculated for the parameter representing the frequency of teachers' professional development. To calculate the value of each bar, a given value (for example, 1.0) is substituted for this parameter, and all other variables in the model are set to equal their observed mean value (that is, they are "held constant").

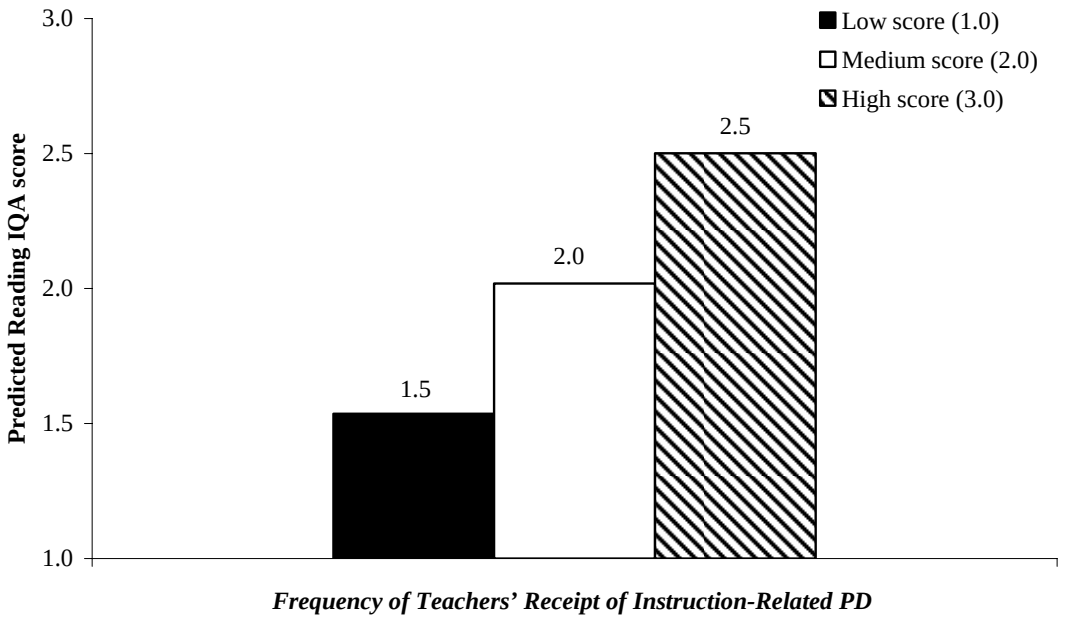
[13]To put this finding in context, it is useful to know that the mean score across all schools on the construct measuring frequency of instruction-related professional development is 1.47 on a 4-point scale and that the mean Reading IQA score is 1.76, also on a 4-point scale.

[14]As indicated in Chapter 3, teachers received a good deal of professional development on Clear Expectations, and yet it is on this measure that teachers received the lowest mean score. This may indicate that principals were targeting their professional development where it was most needed. Indeed, it seems that this strategy paid off, given the finding that the frequency with which teachers received professional development on Clear Expectations is significantly and positively associated with improved instructional quality in reading lessons.

The Instructional Leadership Study

Figure 4.5

Predicted Reading Instructional Quality Assessment Scores for Low, Medium, and High Scores on *Frequency of Teachers' Receipt of Instruction-Related Professional Development*



SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in 33 schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: The predicted reading IQA scores result from a school-level regression analysis in which reading IQA scores were regressed on *frequency of teachers' receipt of instruction-related PD,* holding constant *value teachers place on instruction-related PD,* principals' experience, teachers' experience, and school district.

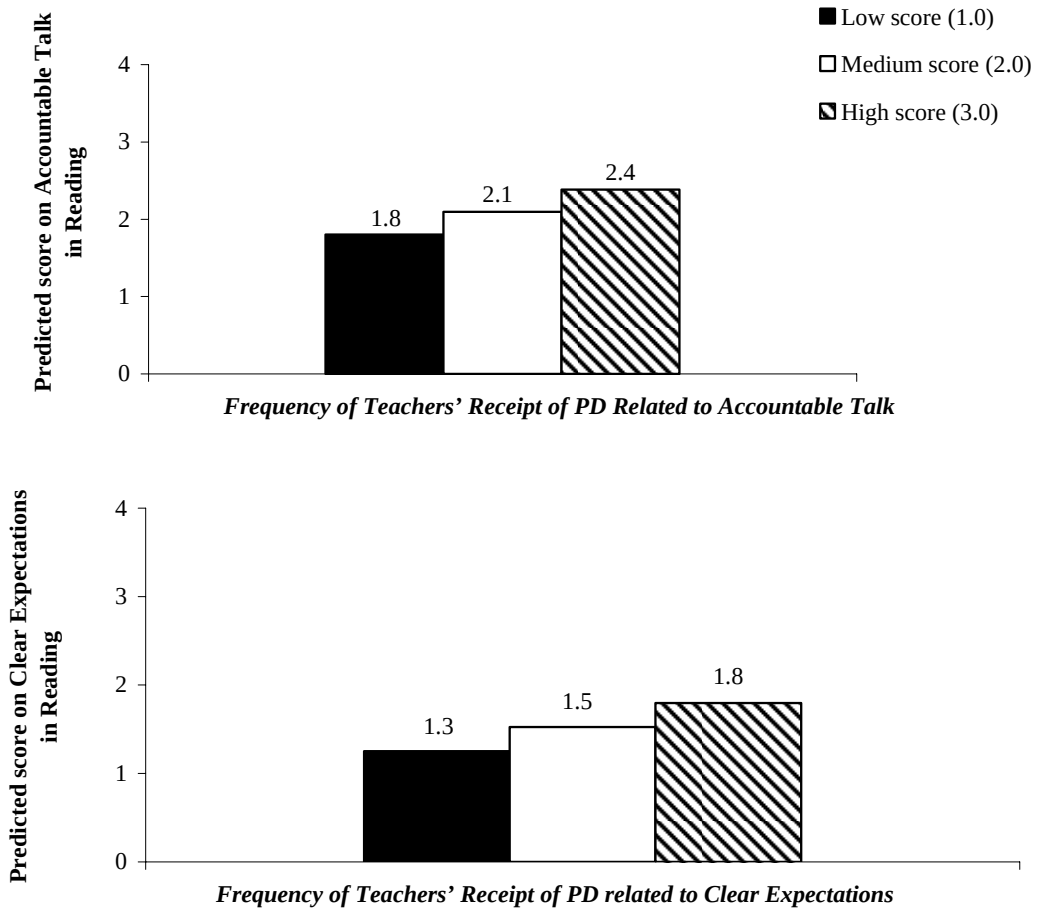
The average observed school-level Reading IQA score is 1.8 (the observed range is 1.2 to 2.7).

professional development related to Accountable Talk and Clear Expectations (that is, a school that receives a low score of 1.0 on the frequency construct) would be predicted to have an Accountable Talk in Reading score of 1.8 and a Clear Expectations in Reading score of 1.3. In comparison, a school where teachers receive a high level of such professional development would be predicted to increase the Accountable Talk in Reading score to 2.4 and the Clear Expectations in Reading score to 1.8. However, there is no statistically significant association between the frequency of professional development on the Principles of Learning collectively and

The Instructional Leadership Study

Figure 4.6

Predicted Reading IQA Subscores for Schools with Low, Medium, and High Scores on *Frequency of Teachers' Receipt of Professional Development Related to Accountable Talk / Clear Expectations*



SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: The predicted IQA subscores result from a school-level regression analysis in which IQA subscores were regressed on *frequency of teachers' receipt of professional development related to Accountable Talk / Clear Expectations,* holding constant *value teachers place on professional development related to Accountable Talk / Clear Expectations,* principals' experience, teachers' experience, and school district.

The sample size for the analysis on Accountable Talk is 40 schools. The sample size for the analysis on Clear Expectations is 34 schools.

Reading IQA scores or between the frequency of professional development on Academic Rigor and Reading IQA scores.[15] Nor is the frequency of receipt of professional development on the Principles of Learning — whether considered collectively or individually — significantly related to instructional quality in math.

There is a statistically significant relationship between the extent to which teachers *valued* professional development on the Principles of Learning, considered collectively, and instructional quality in math. This relationship did not hold up for reading.

The general pattern of these results suggests that if teachers receive more professional development on the principles and practices associated with high-quality instruction, they will be more likely to implement these practices in their reading classes. Other kinds of professional development may be needed in order to improve instructional quality in math, however. In particular, teachers may need a deeper understanding of mathematical concepts in order to guide rich student discussions of mathematical ideas and to assign students rigorous tasks that involve more than the rote application of procedures.

Step 2 to Step 4: The Relationship Between Principals' Involvement in Professional Development for Teachers and Instructional Quality

This analysis examines the relationship between instructional quality and two sets of constructs measuring the principal's involvement in professional development for teachers: (1) the principal's *role* with regard to such professional development and (2) the amount of *time* he or she spends with teachers in instructional improvement activities.

The following question is addressed:

- Is observed instructional quality associated with the principal's involvement in professional development for teachers?

The general model used in the analyses is shown in Figure 4.7.

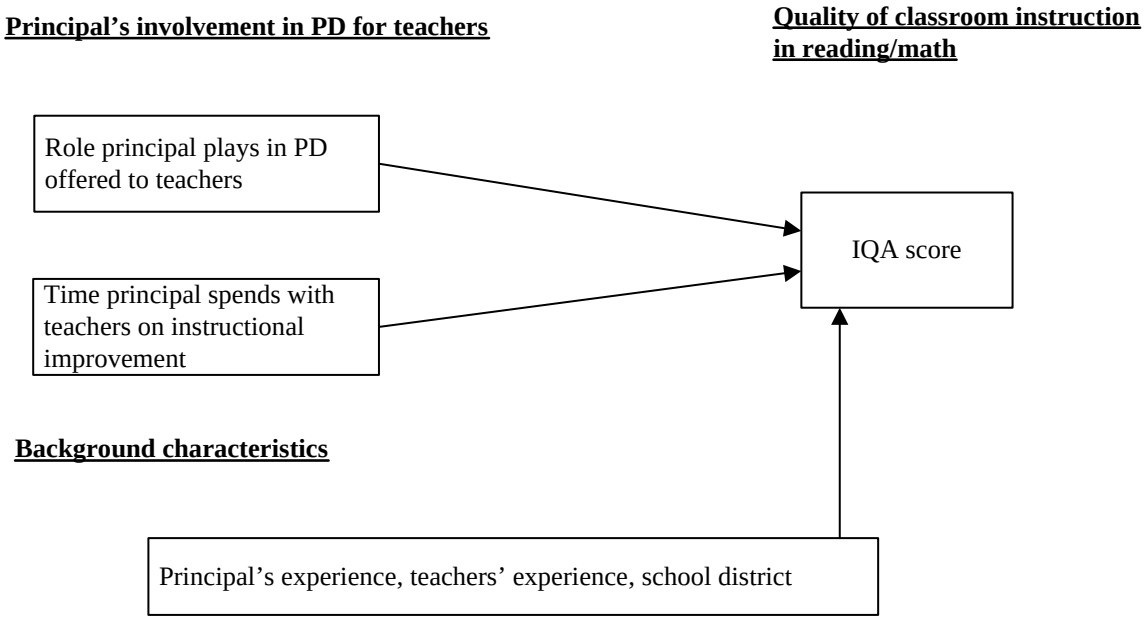
In the analysis on overall instruction-related professional development, *role principal plays in professional development offered to teachers* estimates the level of the principal's involvement in formal professional development sessions that were offered to teachers by the school or district. *Time principal spends with teachers on instructional improvement* focuses on the amount of time that the principal typically dedicates to working with or observing his or her teachers to help them improve their teaching practice (for example, by dropping in on teachers

[15]The association between the frequency of professional development on the Principles of Learning collectively and the Reading IQA score is just below the threshold for statistical significance ($p = 0.102$).

The Instructional Leadership Study

Figure 4.7

General Model for Analyses on Steps 2 to Step 4 of the Theory of Action



to see what is happening in terms of instruction or reviewing student achievement data with teachers to guide instruction). In the analyses on the Principles of Learning considered together and on each Principle of Learning considered independently, the independent variables were subsets of the constructs described above, containing only those items that relate to the Principles of Accountable Talk, Academic Rigor, and Clear Expectations (see Appendix C.2).

The results of all the analyses for this section are summarized in Table 4.3. The regression tables can be found in Appendix D (see Appendix Tables D.5.a through D.5.e). The role that principals played in the professional development related to Academic Rigor and Clear Expectations that was offered to teachers is significantly and positively associated with improved IQA scores for those measures in reading but not in math. No statistically significant relationship was found between either of these sets of constructs and instructional quality in either reading or math lessons when all instruction-related professional development was examined or when professional development on the Principles of Learning collectively was considered.

A path that principals can follow in order to improve scores on Clear Expectations in Reading appears to be emerging. Table 4.1 shows that the score on this rubric is very low (1.31). As indicated in Chapter 3, principals may have been responding to this: Teachers reported that they were receiving a good deal of professional development on Clear Expectations. Further analysis suggests that receiving this professional development pays off. The frequency with which teachers received professional development on Clear Expectations is significantly and positively associated with higher implementation of this principle in reading lessons. In addition, the role that the principal played in this professional development had a positive effect on Clear Expectations in Reading scores.[16]

[16]It bears noting, however, that only two of the 20 relationships between constructs measuring the principal's involvement in professional development, on the one hand, and IQA scores, on the other, have proved statistically significant. Since the critical level for reporting statistical significance in these analyses was set at 10 percent, it is possible that these two relationships could have been identified as statistically significant by chance.

The Instructional Leadership Study

Table 4.3

Step 2 to Step 4: Summary of Regression Analysis Findings

Instruction-related professional development

Principals' Involvement in Instruction-Related PD for Teachers	IQA Score	
	Reading	Math
Role played in PD offered to Teachers	--	--
Time spent with teachers on instructional improvement	--	--
Sample (number of schools)	33	40

Professional development related to the Principles of Learning, collectively

Principals' Involvement in PD for Teachers on the Principles of Learning	IQA Score	
	Reading	Math
Role played in PD related to the Principles of Learning	--	--
Frequency of suggestions to teachers on implementing the Principles of Learning	--	--
Sample (number of schools)	33	40

Professional development related to each Principle of Learning

Principals' Involvement in PD for Teachers on Each Principle of Learning	IQA Subscore					
	Accountable Talk		Academic Rigor		Clear Expectations	
	Reading	Math	Reading	Math	Reading	Math
Role played in PD on the specific Principle of Learning	--	--	✓	--	✓	--
Frequency of suggestions to teachers on implementing the specific Principle of Learning	--	--	--	--	--	--
Sample (number of schools)	40	41	33	42	34	41

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Each model includes principals' experience, teachers' experience, and school district as covariates.

Chapter 5

Student Achievement

Chapters 3 and 4 examine the relationships among the first four steps in the Institute for Learning (IFL) theory of action, which is being examined in the Instructional Leadership Study.[1] Chapter 3 reveals that the professional development that the teachers at a school receive can be traced back to their principal's actions, which, in turn, are associated with the amount of instruction-related professional development that the principal receives. Chapter 4 considers the next step in the theory, finding that the amount of professional development that teachers receive is positively associated with the quality of the reading comprehension lessons that they teach.

As illustrated at the far right in Figure 5.1, the present chapter deals with the outcome of ultimate interest to policymakers and practitioners alike: student achievement. The chapter examines the relationship of student achievement both with instructional quality, as measured by the Reading and Math Instructional Quality Assessments (IQAs), and with teachers' receipt of professional development.[2] Thus, the chapter addresses the following two research questions:

- Is a school's average IQA score associated with the percentage of students at that school who meet the standard on the reading and math state assessments?
- Is there a relationship between what teachers at a given school report about the frequency and value of their professional development and how students at that school score on the reading and math state assessments?

The sections below address these questions in turn. Box 5.1 presents the main findings of the analyses.

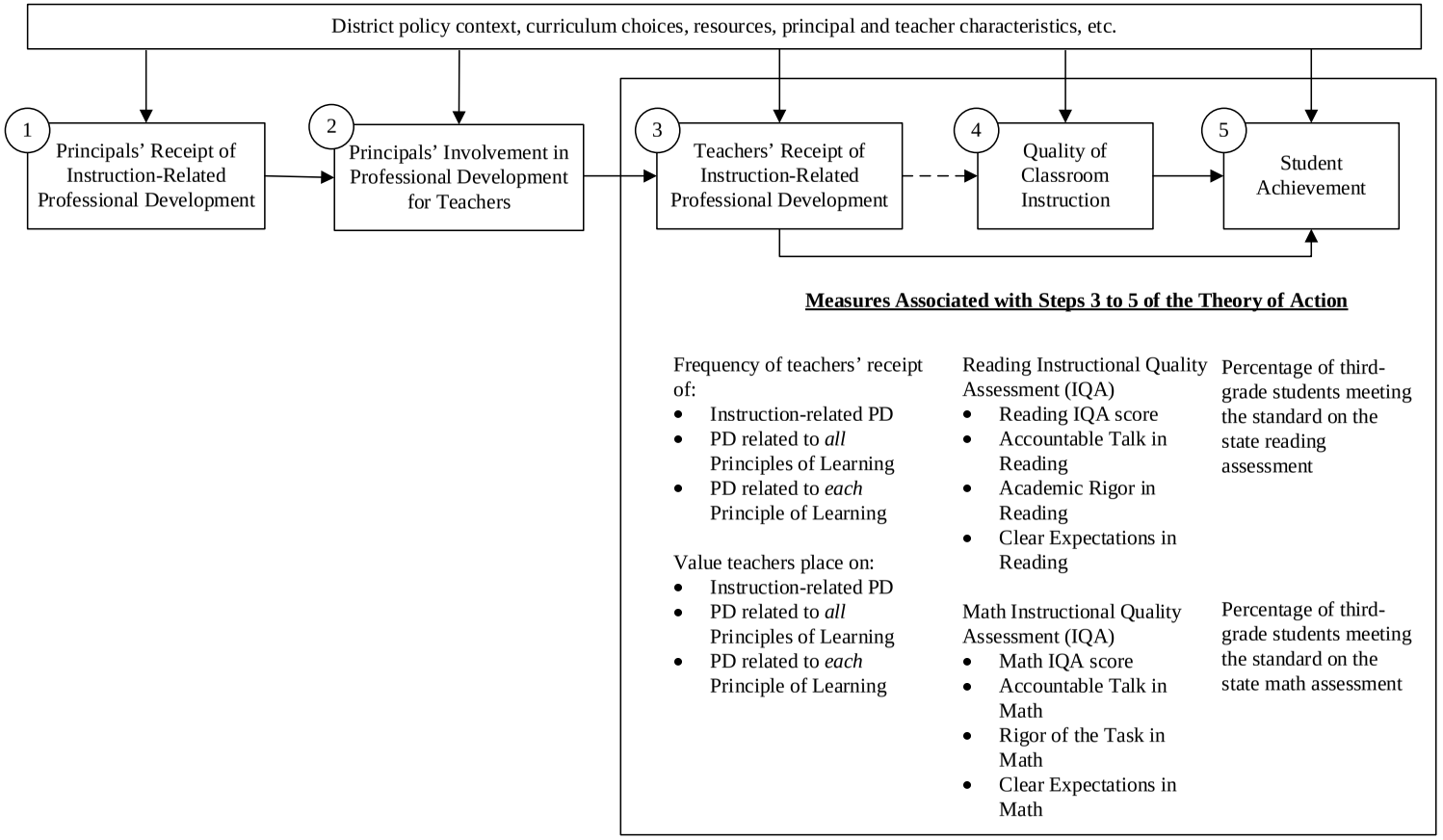
---

[1]The Instructional Leadership Study includes 49 elementary schools serving large proportions of students who were economically and educationally disadvantaged in three districts: Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City. (Region 10 is referred to as a "district" for convenience. Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced the geographical regions.) Chapter 1 describes the IFL theory of action, and Appendix C presents the items making up the survey constructs that are used in the analyses.

[2]Chapters 2 and 4 discuss the Reading and the Math IQAs, and Appendix A presents the versions that were used in this study. As mentioned in Chapter 2, the analyses control for prior third-grade school-level reading and mathematics achievement, school district, principal's experience, and the experience of teachers at the school. The level of prior achievement is estimated as the average percentage of third-grade students at the school meeting the standard on the reading or math standardized assessment over the past three years.

Figure 5.1

Steps 3 and 4 to Step 5 in the Theory of Action and Measures Associated with Each Step



NOTE: Constructs referring to professional development on "all Principles of Learning" refer to the Principles of Accountable Talk, Academic Rigor, and Clear Expectations, which are the principles that are focused on in this report.

Box 5.1

Key Findings on Student Achievement

- Higher school-level scores on the Reading and Math Instructional Quality Assessments (IQAs) are associated with a greater percentage of students meeting the standard on the reading and the math state assessments, respectively.
- In particular, higher implementation of the principles of Accountable Talk and Academic Rigor in reading lessons is associated with higher student achievement in reading, and higher implementation of the principle of Accountable Talk in math lessons is associated with higher student achievement in math.
- The value that teachers at a school placed on professional development that was related to Accountable Talk and Academic Rigor in Reading is associated with student achievement on state reading assessments.

Step 4 to Step 5: The Relationship Between IQA Scores and Student Achievement

This section discusses the association between a school's average IQA score and the achievement of its students on standardized assessments. The general model that was used in the analyses on Step 4 to Step 5 is illustrated in Figure 5.2.

The results of the analyses are summarized in Table 5.1; the regression tables appear in Appendix D (see Appendix Tables D.6.a through D.6.d). As Table 5.1 shows, positive relationships were observed between overall IQA scores and third-grade student achievement in both reading and mathematics. Since the IQA measures the degree to which the Principles of Learning are being implemented in the classroom, this implies that the higher the level of implementation of the Principles of Learning by teachers in their reading and math classes, the higher the percentage of students meeting the standard on the state reading and math assessments.[3] Thus, these results support the validity of the IQA as an observation tool for measuring the kinds of high-quality instructional practices that would be expected to improve student achievement.

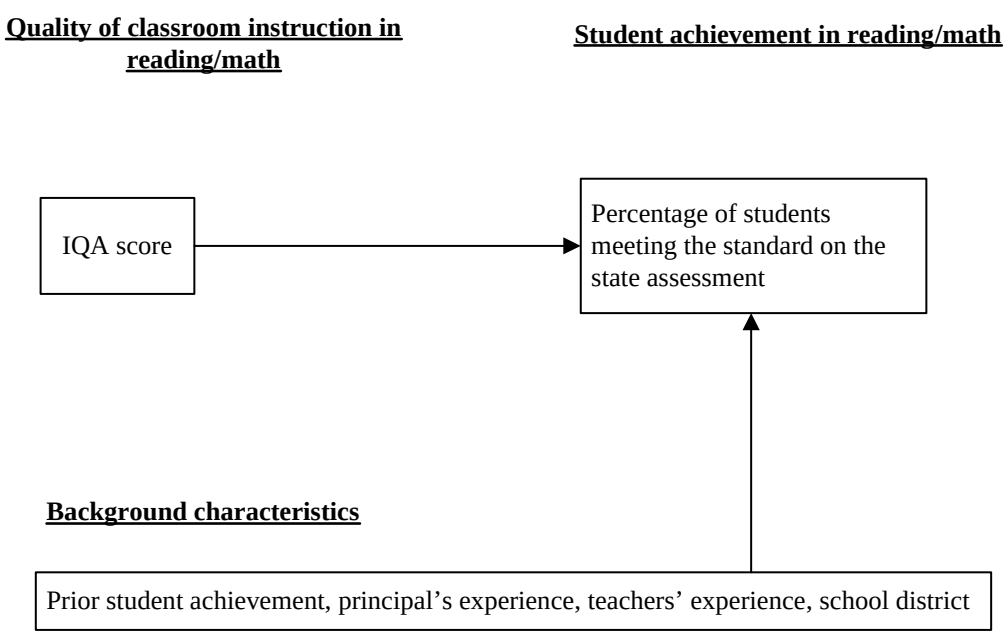
Figures 5.3 and 5.4 illustrate the relative sizes of the relationships that are observed between Reading and Math IQA scores and student achievement, controlling for the effects of prior student achievement, teachers' experience, principal's experience, and school district. In

[3]The Principles of Learning that are measured by the IQA are Accountable Talk, Academic Rigor, and Clear Expectations. For a description of these principles and how they are measured by the IQA, see Chapter 4.

The Instructional Leadership Study

Figure 5.2

General Model for Analyses on Step 4 to Step 5 of the Theory of Action



The Instructional Leadership Study

Table 5.1

Step 4 to Step 5: Summary of Regression Analysis Findings

IQA Score	Student Achievement	
	Reading	Math
Overall IQA score	✓	✓
Sample (number of schools)	33	40
Accountable Talk subscore	✓	✓
Sample (number of schools)	40	41
Academic Rigor subscore[a]	✓	--
Sample (number of schools)	33	42
Clear Expectations subscore[b]	--	--
Sample (number of schools)	34	41

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Student achievement is measured as the percentage of students meeting the standard on the statewide assessment. Each model includes prior student achievement, principals' experience, teachers' experience, and school district as covariates.

[a]Academic Rigor in Math is measured as Rigor of the Task only, while Academic Rigor in Reading is measured as the mean of Rigor of the Task and Rigor of the Discussion. The relationship between Rigor of the Task in Math and student achievement in math is just below the threshold for statistical significance ($p = 0.109$).

[b]The relationship between Clear Expectations in reading and student achievement in reading is just below the threshold for statistical significance ($p = 0.104$).

these figures, each bar represents the value of the standardized regression coefficient of the independent variable (that is, the strength of the relationship between that variable and the outcome variable).[4]

As Figure 5.3 illustrates, teachers' scores on the Reading IQA have the strongest relationship with students' performance on the reading assessment of any independent variable other than school district.[5] Figure 5.4 indicates that while the prior achievement of third-grade students on the state math assessments have by far the strongest association with the school's 2006 third-grade math scores, teachers' scores on the Math IQA are also significantly associated with student achievement.

In order to determine whether different Principles of Learning have differential effects on student achievement, separate models were run examining IQA subscores on each of the three Principles of Learning (Accountable Talk, Academic Rigor, and Clear Expectations). As summarized in Table 5.1, moderate, positive relationships are observed between school mean scores on Accountable Talk and Academic Rigor in Reading and student achievement in reading and between school mean scores on Accountable Talk in Math and student achievement in mathematics.[6] In general, these findings support the importance of requiring students to explain their reasoning and provide evidence to support their assertions, since these behaviors are integral to the implementation of both Accountable Talk and Academic Rigor.[7]

On the other hand, school-level scores for the measure of Clear Expectations do not exhibit statistically significant relationships with student achievement in reading or mathematics.[8]

---

[4]The standardized regression coefficient represents the change in the dependent variable (in this case, student achievement), measured in standard deviation units, that is associated with a change of one standard deviation in the independent variable (here, the IQA score).

[5]Since each school district uses a different standardized assessment, it is not surprising that district plays a large role in predicting the percentage of students who meet the standard on the assessment.

[6]The relationship between school mean scores on Rigor of the Task in Math and student achievement in mathematics is just below the threshold for statistical significance ($ß = 0.289$; $p = 0.109$).

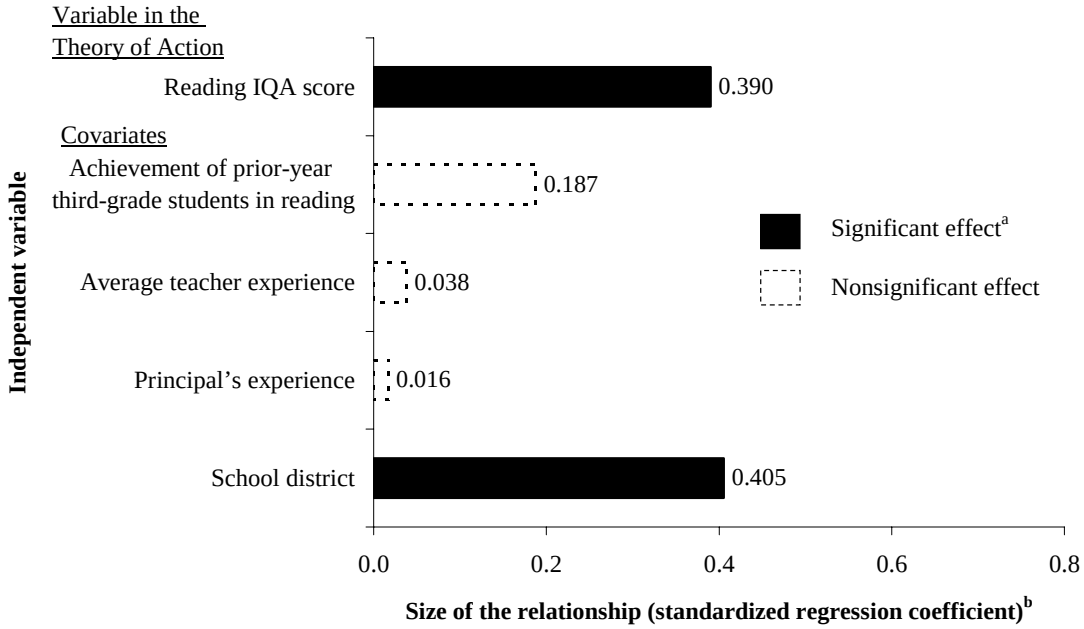
[7]The associations between student achievement and the observed level of Accountable Talk and Academic Rigor in classrooms also suggest that the state assessments do, in fact, assess students' higher-order thinking skills, which are at the root of these principles. However, it is important to remember that none of the relationships observed using these data can truly be interpreted as causal.

[8]The relationship between Clarity and Detail of Expectations in reading lessons and student achievement in reading is positive but relatively small ($ß = 0.186$) and is not quite statistically significant at the 10 percent level ($p = 0.104$).

The Instructional Leadership Study

Figure 5.3

Factors Associated with School-Level Student Achievement in Reading



SOURCES: MDRC calculations from classroom observations of third-grade teachers in 33 schools in Austin, New York City Region 10, and St. Paul; surveys administered to principals and third- and fourth-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading test (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: This figure represents the results of a school-level regression analysis in which the percentage of third-grade students meeting the standard on the state reading assessment in 2006 was regressed on school mean Reading IQA scores, controlling for the achievement of prior-year third-grade students in reading, average teacher experience, principal's experience, and school district. The bar for school district reflects the value of the largest standardized regression coefficient observed for any of the three school districts included in the study.

[a]Regression coefficients with p-values of 0.10 or less are considered significant.

[b]The standardized regression coefficients represent the change in student achievement, measured in standard deviations, that is associated with a change of one standard deviation in the independent variable.

The Instructional Leadership Study

Figure 5.4

Factors Associated with School-Level Student Achievement in Math

SOURCES: MDRC calculations from classroom observations of third-grade teachers in 40 schools in Austin, New York City Region 10, and St. Paul; surveys administered to principals and third- and fourth-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Math test (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: This figure represents the results of a school-level regression analysis in which the percentage of third-grade students meeting the standard on the state math assessment in 2006 was regressed on school mean Math IQA scores, controlling for the achievement of prior-year third-grade students in math, average teacher experience, principal's experience, and school district. The bar for school district reflects the value of the largest standardized regression coefficient observed for any of the three school districts in the study.

[a]Regression coefficients with p-values of of 0.10 or less are considered significant.

[b]The standardized regression coefficients represent the change in student achievement, measured in standard deviations, that is associated with a change of one standard deviation in the independent variable.

Step 3 to Step 5: The Relationship Between Teacher Professional Development and Student Achievement

This section examines whether teachers' professional development exhibits a direct association with student achievement at the school. The general analytic model used in these analyses is illustrated in Figure 5.5.

Table 5.2 summarizes the results of the analyses.[9] No statistically significant relationships are observed between any measure of teachers' receipt of instruction-related professional development (in general or specific to the Principles of Learning) and student achievement on the state assessment in mathematics.

In addition, no relationships are observed between the *frequency* of teachers' receipt of instruction-related professional development (in general or specific to the Principles of Learning) and student achievement in reading. Two relationships that emerged as statistically significant are those between student achievement in reading and the *value* that teachers place on professional development related to Accountable Talk and to Academic Rigor in Reading. This finding — in conjunction with the finding, discussed above, that Accountable Talk and Academic Rigor scores are positively associated with student achievement in reading — supports the argument that these two Principles of Learning are particularly relevant to improving student achievement on standardized assessments in reading.[10]

Although no *direct* relationship is observed between the frequency of teachers' receipt of professional development and student achievement, teachers' professional development would be expected to influence student achievement by improving the quality of instruction that the students are receiving. As discussed in Chapter 4, the amount of professional development that teachers reported receiving is associated with higher instructional quality in reading comprehension lessons (as measured by the IQA), and, as discussed above, a positive relationship was found between a school's mean IQA scores and student achievement on standardized exams. Thus, it seems that the frequency of teachers' professional development indirectly influences student achievement, at least in reading, by way of improving instructional quality.

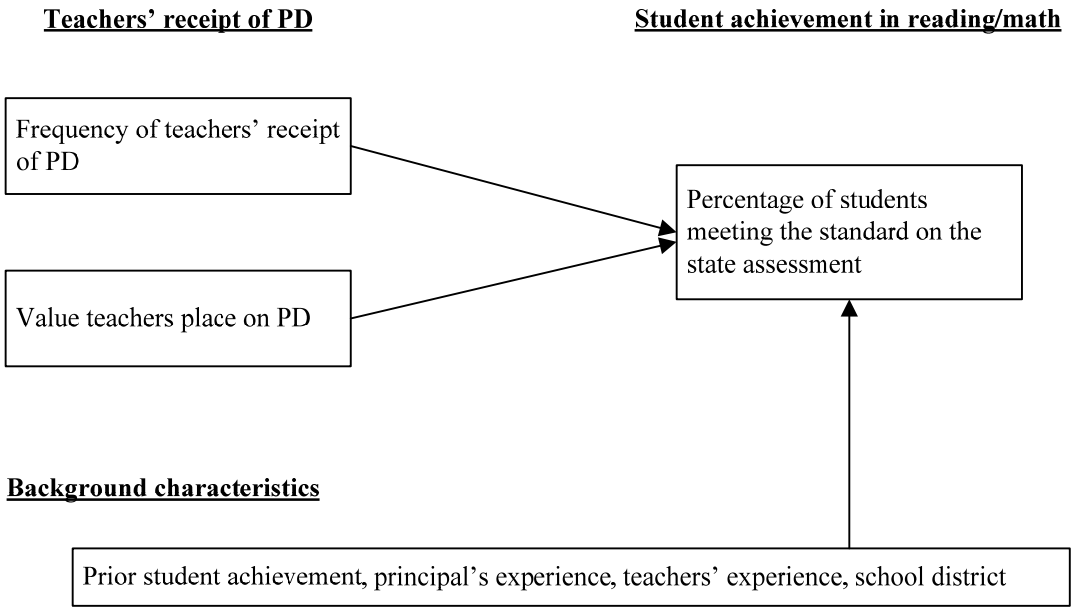
[9]The regression tables can be found in Appendix D (see Appendix Tables D.7.a through D.7.e).

[10]It should be noted, however, that with 20 relationships tested and a statistical significance criterion of 10 percent, two relationships could emerge as statistically significant by chance alone.

The Instructional Leadership Study

Figure 5.5

General Model for Analyses on Step 3 to Step 5 of the Theory of Action



The Instructional Leadership Study

Table 5.2

Step 3 to Step 5: Summary of Regression Analysis Findings

Instruction-related professional development

	Student Achievement	
Teachers' PD	Reading	Math
Frequency	--	--
Value	--	--
Sample (number of schools)	42	42

Professional development related to the Principles of Learning, collectively

	Student Achievement	
Teachers' PD	Reading	Math
Frequency	--	--
Value	--	--
Sample (number of schools)	42	42

Professional development related to each Principle of Learning

	Student Achievement	
Teachers' PD Related to Accountable Talk	Reading	Math
Frequency	--	--
Value	✓	--
Sample (number of schools)	42	39

	Student Achievement	
Teachers' PD Related to Academic Rigor	Reading	Math
Frequency	--	--
Value	✓	--
Sample (number of schools)	39	40

(continued)

Table 5.2 (continued)

Teachers' PD Related to Clear Expectations	Student Achievement	
	Reading	Math
Frequency	--	--
Value	--	--
Sample (number of schools)	42	42

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: A checkmark indicates that regression analyses revealed a statistically significant relationship between the two constructs. Dashes indicate that no statistically significant relationship was found. Relationships with p-values of 0.10 or less are considered statistically significant.

Student achievement is measured as the percentage of students meeting the standard on the statewide assessment. Each model includes prior student achievement, principals' experience, teachers' experience, and school district as covariates.

Chapter 6

The Difficulty of Translating Connections into Conclusions

The Principles of Learning and the theory of action that were developed by the Institute for Learning (IFL) — an arm of the Learning Research and Development Center (LRDC) at the University of Pittsburgh — are detailed in Chapter 1 (see Box 1.1 and Figure 1.1). Chapter 2 then presents the key constructs and measures associated with each step in the theory of action and describes the general strategy used in the Instructional Leadership Study to analyze these data. Chapters 3 to 5 examine the professional development received by principals and teachers at elementary schools that participated in the study and the connection of that professional development to instructional leadership, classroom practice, and, ultimately, student achievement.[1]

How is instructional leadership important? The analyses in this report suggest that in-service professional development for principals can set in motion positive changes in teaching and learning in the principals' schools. In Chapter 3, it appears that principals who received more professional development themselves were more likely to transmit what they had learned to their teachers — by being more involved in the planning and delivery of professional development sessions for their faculty and by spending more time with teachers on instructional improvement. Principals who valued the training that they received on the Principles of Learning — especially on Academic Rigor and on Clear Expectations — were more likely to suggest to their teachers ways to incorporate these principles into instruction. Finally, principals who reported being actively involved in the delivery of professional development to their teachers headed schools where teachers reported receiving more professional development.

The story continues in Chapters 4 and 5. It appears that at schools where teachers reported receiving more instruction-related professional development, instructional quality in reading classrooms was higher. In addition, at schools where teachers received more professional development on Accountable Talk and Clear Expectations, teachers were more likely to teach their reading classes in ways that exemplified these principles. Finally, at schools where instructional quality was higher (that is, where teachers implemented the Principles of Learning at higher levels), larger proportions of students met state standards both in reading and in math. In particular, higher student achievement is associated with higher levels of Accountable Talk

[1]The study includes 49 elementary schools in three districts: Austin, Texas; Saint Paul, Minnesota; and Region 10 in New York City. (Region 10 is referred to as a "district" for convenience. Beginning in the 2007-2008 school year, New York City adopted a new school organization plan that replaced geographical regions.)

and Academic Rigor in reading lessons and with higher levels of Accountable Talk in math lessons.

The findings of this report address both practice and theory. With respect to practice, they point to key operational lessons for district administrators and principals and for those who deliver professional development. First, district administrators need to "inspect what they expect" — that is, to follow up to ensure that principals pass on what they have learned to the teachers in their schools. The fact that there is no *direct* connection between the frequency with which principals reported receiving professional development and the frequency with which teachers reported such receipt — that the connection was mediated by the principal's subsequent actions in making professional development available to teachers — suggests that giving principals more professional development will not, in and of itself, ensure that their teachers learn more, teach better, and have higher-achieving students. Moreover, some principals may tell technical assistance providers how much they appreciate the professional development that they have received — how well-delivered it was, how useful it appears to be, and so on. But the study does not indicate that generally valuing the instruction-related professional development that they received led principals to play a more active role in the professional development of their teachers. Administrators need to follow up with seemingly enthusiastic principals just as assiduously as they would with any others to ensure that enthusiasm gets translated into action.

Similarly, principals and others (such as assistant principals and instructional coaches) need to spend time in teachers' classrooms to ensure that teachers are putting into practice what they have learned in their professional development sessions. They cannot take the teachers' word that this is happening. The study indicates that teachers' reports about the extent to which they put the Principles of Learning into practice in their classrooms bear little resemblance to observers' accounts of the frequency with which instruction reflecting these principles took place. This study confirms what other studies have shown: that teachers are an unreliable source of information about their own teaching.[2]

The surveys of principals and teachers (see Chapter 2 and Appendix C) indicate that both groups especially valued professional development sessions in which they felt that they could interact with and learn from their peers. Those responsible for planning and organizing professional development sessions may want to keep this finding in mind. It does not necessarily suggest that principals and teachers should have free rein to talk about whatever they want to talk about during these sessions; time together can all too easily degenerate into a gab session. But if professional development can be structured in such a way that school personnel learn

[2]See, for example, Good and Brophy (2003).

what they most need to learn at least in part from one another rather than from a trainer, they may be more likely to value their learning and to remember it.

With respect to theory, the findings provide evidence to support every link between one step and the next in the IFL theory of action. If these linkages are indeed causal — if professional development for principals can be a catalyst for improved teaching and student learning — then the theory offers an important perspective and program for improving low-performing schools, like those where the study took place, that serve large proportions of economically and educationally disadvantaged children. With some exceptions, classes that were observed in the study schools were not very intellectually engaging or demanding. If, through their own professional development, principals in low-performing schools can be instrumental in getting their teachers to adopt more rigorous instructional practices, then the result may be a narrowing of the achievement gap between low-income students and their more economically advantaged peers.[3]

The problem is that the evidence supporting the theory is suggestive, not definitive. The relatively small number of schools in the study makes it impossible to be certain that the same relationships would have been found if a somewhat different group of schools in the same districts had participated in the research. And the fact that the survey, classroom observation, and student achievement data were all collected during the 2005-2006 school year — along with the absence of a *counterfactual* (an estimate of what would have happened in similar schools had their principals *not* received IFL professional development) — makes it impossible to determine causality.

With respect to causality, events must unfold in a sequence in order to establish a causal relationship. If Event B follows Event A, then it *may* be a result of Event A, although that is not necessarily the case. But if Events A and B occur simultaneously, there is no way of knowing whether or not one causes the other. Thus, for nearly every relationship discussed above in this chapter, an alternative explanation to the one suggested by the IFL theory of action can be found. For example, from the finding that instructional quality is higher in schools where teachers receive more frequent professional development, one might infer that the professional development caused instructional quality to rise. But it is also possible that teachers in these

[3]It should be noted that this optimistic scenario is supported by the data only for reading instruction: Professional development focused on Accountable Talk and Academic Rigor is associated with improved instructional practices in reading classes but not in math classes. While the reason for this is not clear, it seems plausible that, especially in mathematics, teachers cannot impart greater rigor into their lessons or use more Accountable Talk unless they themselves understand their subject more fully. Professional development on the Principles of Learning largely emphasizes pedagogical strategies; improving math instruction might require a concomitant emphasis on substantive knowledge.

schools are good teachers who, as conscientious professionals, want to be even better ones and so continually seek out new professional development opportunities.

Similarly, valuing the professional development that they receive on the Principles of Learning may lead school leaders to want to pass on what they have learned to their teachers. But it could also work the other way around: Principals may come to see their own professional development as more valuable *in retrospect* if, having passed it on to their teachers, their teachers report that it has had positive effects. Or, again, a third unmeasured variable — for example, a principal's conviction that she must be actively, personally involved in improving instructional quality — may positively influence both the value that she places on professional development and the time that she spends working with teachers on instructional improvement.

In contrast, the existence of achievement data for students who were third-graders in three years prior to the 2005-2006 study year strengthens the argument that the link between instructional quality and student achievement is causal in nature. Whatever the prior achievement history of the school, 2006 test scores were higher in schools where teachers exhibited better instructional practices. Even here, however, higher instructional quality cannot be firmly established as a cause of higher achievement, because other factors may have entered into play.

In order to establish the causal nature of the relationships found in this report, an alternative research design mounted in a larger number of schools would be needed. As noted in Chapter 1, the key requirement for such a design is the presence of a counterfactual. The most scientifically valid way to establish a counterfactual in this case is to designate a group of eligible principals and then to select, at random, half of these principals and their schools to receive professional development consistent with the IFL theory of action; the remaining principals and schools would not receive this professional development and would constitute the control group for the research.[4] It would then be possible to collect survey, classroom observation, and student achievement data for both sets of schools over time. With a large enough sample (of, say, 60 to 70 schools, evenly divided between treatment and control conditions), any preexisting differences between the treatment and the control group principals and schools should be effectively eliminated. (For example, principals who are committed to their role as instructional leaders and teachers who are motivated to seek out professional development to improve their teaching should be evenly distributed across both the treatment and the control group schools.) As a re-

[4]It is worth noting that these schools need not be permanently barred from the IFL's professional development. Rather, they could be temporarily embargoed from services during the follow-up period and then permitted to receive assistance from the organization. In fact, if a district elects to phase schools into the professional development activities because of capacity limitations, as was the case in Saint Paul, then random selection would be a reasonable way of deciding how to allocate resources.

sult, differences between the two sets of schools could safely be attributed to their principals' having received professional development or not having done so.

Such an evaluation would require an investment of time and money. But it is worth noting that time and money are now being spent on professional development for which there is only suggestive evidence of effectiveness. It is precisely because the picture presented here, while highly preliminary, is a positive one that a more rigorous evaluation is now warranted; if the present study had not yielded findings that are consistent with the theory of action, there would be less reason to go forward. It is the authors' hope that the study constitutes an early step toward a careful and definitive study of the effectiveness of efforts to strengthen instructional leadership and, in so doing, improve teaching and learning in low-performing schools.

Appendix A

Instructional Quality Assessment (IQA) Rater Packets

Appendix A.1

Instructional Quality Assessment (IQA)

Mathematics
Elementary
Rater Packet

I. Checklists

Accountable Talk Function Reference List

Most of these moves will be made by the teacher, but in some cases, students might make them. In recording the actual moves, note T for Teacher move, S for Student move.

1. Accountability to the Learning Community

- Keeping everyone together so they can follow complex thinking
  - "What did she just say?"
  - "Can you repeat what Juan said in your own words?"

- Getting students to relate to one another's ideas
  - "Jay just said…and Susan, you're saying…"
  - "Who wants to add on to what Ana just said?"
  - "Who agrees and who disagrees with what Ana just said?"
  - "How does what you're saying relate to what Juan just said?"
  - "I agree with Sue, but I disagree with you, because…"
  - "I agree with Fulano because…"

- Revoicing/Recapping
  - "Can you repeat what Juan said in your own words?"
  - "So what I'm hearing you say is…"

- Marking
  - "That's a really important point."
  - "Jenna said something really interesting. We need to think about that."

2. Accountability to Knowledge and Rigorous Thinking

- Pressing for accuracy
  - "Where could we find more information about that?"
  - "Are we sure about that? How can we know for sure?"
  - "Where do you see that in the text?"
  - "What evidence is there?"
  - "How do you know?"

- Building on prior knowledge / recalling prior knowledge
  - "How does this connect with what we did last week?"
  - "Do you remember when we read another book by this author?"

- Pressing for reasoning
  - "What made you say that?"
  - "Why do you think that?"
  - "Can you explain that?"
  - "Why do you disagree?"
  - "Say more about that."
  - "What do you mean?"

Lesson Checklist:

A ↑ The Lesson provided **opportunities** for students **to engage** with the **high-level demands** of the task:	**B** ↓ During the Lesson, the high-level **demands of the task** were **removed or reduced**:
▫ Students engaged with the task in a way that addressed the teacher's goals for high-level thinking and reasoning. ▫ Students communicated mathematically with peers. ▫ Students had appropriate prior knowledge to engage with the task. ▫ Teacher supported students to engage with the high-level demands of the task while maintaining the challenge of the task ▫ Students had opportunities to serve as the mathematical authority in the classroom. ▫ Teacher provided sufficient time to grapple with the demanding aspects of the task and for expanded thinking and reasoning. ▫ Teacher held students accountable for high-level products and processes. ▫ Teacher provided consistent presses for explanation and meaning. ▫ Teacher provided students with sufficient modeling of high-level performance on the task. ▫ Teacher provided encouragement for students to make conceptual connections. ▫ Students had access to resources that supported their engagement with the task. ▫ Other:	▫ The task expectations were not clear enough to promote students' engagement with the high-level demands of the task. ▫ The task was not complex enough to sustain student engagement in high-level thinking. ▫ The task was too complex to sustain student engagement in high-level thinking (i.e., students did not have the prior knowledge necessary to engage with the task at a high level). ▫ Classroom management problems interfered with students' opportunities to engage in high-level thinking. ▫ Teacher provided a set procedure for solving the task ▫ The focus shifted to procedural aspects of the task or on correctness of the answer rather than on meaning and understanding. ▫ Feedback, modeling, or examples were too directive or did not leave any complex thinking for the student. ▫ Students were not pressed or held accountable for high-level products and processes or for explanations and meaning. ▫ Students were not given enough time to deeply engage with the task or to complete the task to the extent that was expected. ▫ Students did not have access to resources necessary to engage with the task at a high level. ▫ Other:

C The **Discussion** provides opportunities for students to engage with the high-level demands of the task:
▫ Students use multiple strategies and make explicit connections or comparisons between these strategies, or explain why they choose one strategy over another. ▫ Students use or discuss multiple representations and make connections between different representations or between the representation and their strategy, underlying mathematical ideas, and/or the context of the problem ▫ Students identify patterns or make conjectures, predictions, or estimates that are well grounded in underlying mathematical concepts or evidence. ▫ Students generate evidence to test their conjectures. Students use this evidence to generalize mathematical relationships, properties, formulas, or procedures. ▫ Students (rather than the teacher) determine the validity of answers, strategies or ideas. ▫ Other:

Clear Expectations / Self-Management of Learning (CE/SML)

Check all below that were used to communicate expectations for the lesson task.

☐ Oral explanation of expectations
☐ Criteria chart
☐ Rubric
☐ Other: _____
☐ Model of student work
-performance that meets or exceeds standard
-performance that is "on the way" toward meeting the standard

☐ Professional model- published example (i.e., from children's literature or magazine that is used to illustrate criteria of "good" work.
☐ Procedural directions- outlines all the steps and information necessary to complete the task.

IQA
Instructional Quality Assessment

Mathematics

II. Rubrics

Accountable Talk

In the *Accountable Talk* rubrics, "discussion" refers to any verbal interaction pertaining to a topic that has been introduced by the teacher during the lesson.

I. How effectively did the lesson-talk build Accountability to the Learning Community?

Engagement in the Learning Community – What percentage of students are engaged during whole-class discussions or lectures?

Scores for *Engagement in the Learning Community* must be based on whole-class teacher-facilitated discussions or lectures. If there were no whole-class teacher-facilitated discussions or lectures during the lesson, a rating of N/A should be given for this rubric.

To rate *Engagement in the Learning Community*, consider how students respond to at least one whole-class discussion or lecture. Active engagement is evidenced by students raising their hands, answering questions in unison or by responding in some other way to the discussion or lecture. Passive engagement is evidenced by students quietly listening to, but not participating in, the discussion or lecture. In addition, consider the percentage of students who are distracted, not paying attention or otherwise disengaged.

Rubric 1A: Engagement	
5	Over 75% of the students are actively engaged throughout a whole-class discussion or lecture.
4	50-75% of the students are actively engaged throughout a whole-class discussion or lecture.
3	Over 50% of the students are passively engaged (i.e., just listening) throughout a whole-class discussion or lecture.
2	50-75% of the students are distracted, disruptive or inattentive throughout a whole-class discussion or lecture.
1	75% or more of the students are distracted, disruptive or inattentive throughout a whole-class discussion or lecture.
N/A	Reason:

Participation in the Learning Community – What percentage of students make individual contributions during whole-class discussions?

Scores for *Participation* must be based on <u>whole-class</u> teacher-facilitated discussions or lectures. If there were no whole-class teacher-facilitated discussions or lectures during the lesson, a rating of N/A should be given for this rubric. If the teacher only lectured, a rating of 0 should be given for this rubric.

To rate *Participation in the Learning Community*, consider what percentage of students make individual contributions during at least one whole-class discussion. Contributions that may be considered include verbal contributions as well as instances where students contribute non-verbally on an individual basis (e.g. students write answers on the board or use their bodies in some way to add to the discussion).

Rubric 1B: Participation	
5	Over 75% of the students participate in a whole-class discussion.
4	50-75% of the students participate in a whole-class discussion.
3	25-49% of the students participate in a whole-class discussion.
2	Less than 25% of the students participate in a whole-class discussion.
1	None of the students participate in a whole-class discussion (i.e., the teacher only lectures).
N/A	Reason:

Scores for AT rubrics 2-5 (*Teacher's Linking/Revoicing, Students' Linking/Revoicing, Teacher Asking for Evidence or Reasoning, Students Providing Evidence or Reasoning*) should be based on <u>whole-class</u> discussions that are related to mathematics, if possible. If there is no observed whole-class discussion relating to mathematics, scores for these rubrics may be based on teacher-facilitated small group discussions.

On these rubrics, a score of 1-4 may only be given if there is a discussion relating to mathematics. A rating of 0 means that there was a discussion, but it did not relate to mathematics, and a rating of N/A means that there was no discussion at all (whole-class *or* small-group). Topics for discussion considered related to mathematics can include but are not limited to:

- **Preparing for a task requiring mathematics**
- **Logical reasoning**
- **Mathematical vocabulary**

Teacher's Linking and Revoicing Contributions: Does the teacher support students in connecting ideas and positions to build coherence in discussions related to mathematics?

In *Accountable Talk* Rubric 2 "revoice" refers to when a teacher restates a student's contribution in order to emphasize it, elicit reactions from the students in response to it, or build on it (i.e., use it in some way to further the conversation).

Rubric 2: Teacher's Linking/Revoicing	
4	During at least one discussion, the teacher <u>consistently</u> connects speakers' contributions to each other **and** shows how ideas/positions shared during the discussion relate to each other by revoicing students' ideas.
3	At least twice during the lesson, the teacher connects speakers' contributions to each other **and** shows how ideas/positions relate to each other by revoicing students' ideas.
2	At least twice during the lesson, the teacher links speakers' contributions to each other **but** does not show how ideas/positions relate to each other by revoicing students' ideas OR at least twice during the lesson the teacher revoices but does not link speakers' contributions OR only one strong effort is made to connect speakers' contributions to each other by linking and revoicing students' ideas
1	The teacher does not make any effort or makes only one weak effort to link speakers' contributions OR the teacher mechanically echoes students' contributions without linking them to each other.
0	There was at least one discussion during the lesson, but no discussion directly related to mathematics.
N/A	Reason:

Students' Linking and Revoicing Contributions Do student's contributions link to and build on each other during discussions related to mathematics?

Rubric 3: Students' Linking/Revoicing	
4	During at least one discussion, students consistently connect their contributions to each other **and** show how ideas/positions shared during the discussion relate to each other. (e.g., "I agree with Jay because…")
3	At least twice during the lesson, the students connect their contributions to each other **and** show how ideas/positions shared during the discussion relate to each other. (e.g., "I agree with Jay because…")
2	At least twice during the lesson, the students link students' contributions to each other **but** do not show how ideas/positions relate to each other. (e.g., "I disagree with Ana.") OR only one strong effort is made to connect their contributions with each other.
1	Students do not make any effort or make only one weak effort to link or revoice students' contributions.
0	There was at least one discussion during the lesson, but no discussion directly related to mathematics.
N/A	Reason:

II. How effectively did the lesson-talk build Accountability to Knowledge and Rigorous Thinking?

Asking: Were students pressed to support their contributions with evidence and/or reasoning during discussions related to mathematics?

Rubric 4: Teacher Asking for Evidence or Reasoning	
4	During at least one discussion, the teacher consistently asks students to provide evidence for their contributions, presses students for accuracy, OR presses students to explain their reasoning.
3	At least twice during the lesson the teacher asks students to provide evidence for their contributions, presses students for accuracy, OR presses students to explain their reasoning.
2	There are at least two superficial, trivial, or formulaic efforts to ask students to provide evidence for their contributions or explain their reasoning, OR only one strong effort is made to ask students to provide evidence for their contributions or explain their reasoning.
1	There are no efforts or only one weak effort to ask students to provide evidence for their contributions or explain their reasoning.
0	There was at least one discussion during the lesson, but no discussion directly related to mathematics.
N/A	Reason:

Providing: Did students support their contributions with evidence and/or reasoning during discussions related to mathematics? (This evidence must be appropriate to the content area – i.e., evidence from the text; citing an example, referring to prior classroom experience.)

Rubric 5: Students Providing Evidence or Reasoning	
4	During at least one discussion, students consistently provide accurate and appropriate evidence for their claims, including frequent references to the text or prior classroom experience, OR students explain their thinking, using reasoning in ways appropriate to the discipline.
3	At least twice during the lesson students provide accurate and appropriate evidence for their claims, including frequent references to the text or prior classroom experience, OR students explain their thinking, using reasoning in ways appropriate to the discipline.
2	In general, what little evidence or reasoning students offer to back up their claims is inaccurate, incomplete, or vague. There are at least two superficial or trivial efforts to provide evidence or explain reasoning, OR students only make one strong effort to provide evidence or explain their thinking.
1	Students do not back up their claims with evidence or explain the reasoning behind their claims, OR they make only one weak effort to do so.
0	There was at least one discussion during the lesson, but no discussion directly related to mathematics.
N/A	Reason:

Addendum to Accountable Talk Rubrics 2-5	
A	AT rubrics 2-5 were rated according to whole-class discussions.
B	AT rubrics 2-5 were rated according to small-group discussions.
N/A	Reason:

Academic Rigor: Mathematics

Scoring Guidelines for the *Academic Rigor in Mathematics* Rubrics

The three *Academic Rigor* rubrics (*Potential of the Task*, *Implementation of the Task,* and *Student Discussion Following the Task*) must all be rated with regard to the same task. This task should be an in-class task; *Academic Rigor* rubrics should be rated with regard to a homework assignment only if there is no in-class task (see below).

What is a task? A task is an activity that students engage in by themselves or in small groups. Unlike a problem that students might try to solve quickly in the midst of a discussion, a task gives all participating students sufficient time to try to solve problems independently of the teacher. Evidence of student work will most likely be apparent and a task could conceivably be evaluated.

If there is more than one in-class task in a lesson, which one should be scored? In the case that there is more than one task that could be considered for scoring with the *Academic Rigor* rubrics, choose which task to score according to the following criteria (in order of preference):

1. **Choose the task that is both completed and discussed in class.**
2. **If more than one task is completed and discussed in class, or if more than one task is completed in class but neither is discussed, choose the task that scores the highest on *Potential of the Task.***
3. **If all tasks have equal potential, choose the task that scores the highest on *Student Discussion Following the Task*.**
4. **If all tasks score equally on *Student Discussion Following the Task*, choose the task that scores highest on *Implementation of the Task.***
5. **If all tasks score equally on *Implementation of the Task*, choose the task that lasts the longest.**
6. **If the tasks are equal in every way, any one can be scored.**

How should the *Academic Rigor* rubrics be scored if there is no in-class task? If there is no in-class task, the *Academic Rigor* rubrics should be scored according to the following criteria (in order of preference):

1. **If students discuss their work on a completed homework assignment, rate the discussion for *Student Discussion Following the Task* and give a score of N/A for *Implementation of the Task*. If there is sufficient information about the assignment (e.g., if a worksheet is available or the teacher reviews his/her expectations or directions), rate this assignment for *Potential of the Task.* Otherwise, the *Potential of the Task* rubric must receive an N/A.**
2. **If there is no discussion about a completed homework assignment but the teacher assigns work to be completed later, this assignment may be scored for *Potential of the Task* only. In this case, the other two rubrics should receive an N/A.**
3. **In all other cases, if there is no in-class task all three *Academic Rigor* rubrics must received N/As.**

Potential of the Task: Did the task have the potential to engage students in rigorous thinking about challenging content?

To rate *Potential of the Task*, consider:
- **a. how the teacher sets up the task (i.e., directions and communicated expectations)**
- **b. any written task directions**

Rubric 1: Potential of the Task	
4	**The task has the potential to engage students in exploring and understanding the nature of mathematical concepts, procedures, and/or relationships, such as:** • Doing mathematics: using complex and non-algorithmic thinking (i.e., there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instructions, or a worked-out example); OR • Procedures with connections: applying a broad general procedure that remains closely connected to mathematical concepts. The task must explicitly prompt for evidence of students' reasoning and understanding. For example, the task **MAY** require students to: • solve a genuine, challenging problem for which students' reasoning is evident in their work on the task; • develop an explanation for why formulas or procedures work; • identify patterns and form generalizations based on these patterns; • make conjectures and support conclusions with mathematical evidence; • make explicit connections between representations, strategies, or mathematical concepts and procedures. • follow a prescribed procedure in order to explain/illustrate a mathematical concept, process, or relationship.
3	**The task has the potential to engage students in complex thinking or in creating meaning for mathematical concepts, procedures, and/or relationships. However, the task does not warrant a "4" because:** • the task does not explicitly prompt for evidence of students' reasoning and understanding. • students may be asked to engage in doing mathematics or procedures with connections, but the underlying mathematics in the task is not appropriate for the specific group of students (i.e., too easy or too hard to promote engagement with high-level cognitive demands); • students may need to identify patterns but are not pressed for generalizations; • students may be asked to use multiple strategies or representations but the task does not explicitly prompt students to develop connections between them; • students may be asked to make conjectures but are not asked to provide mathematical evidence or explanations to support conclusions
2	The potential of the task is limited to engaging students in using a procedure that is either specifically called for or its use is evident based on prior instruction, experience, or placement of the task. There is little ambiguity about what needs to be done and how to do it, OR the task does not require students to make connections to the concepts or meaning underlying the procedure being used, OR the focus of the task appears to be on producing correct answers rather than developing mathematical understanding (e.g., applying a specific problem solving strategy, practicing a computational algorithm). OR The task does not require student to engage in cognitively challenging work; the task is easy to solve.
1	The potential of the task is limited to engaging students in **memorizing or reproducing** facts, rules, formulae, or definitions. The task does not require students to make connections to the concepts or meaning that underlie the facts, rules, formulae, or definitions being memorized or reproduced.
0	The task requires no mathematical activity.
N/A	Reason:

Implementation of the Task: At what level did the teacher guide students to engage with the task in implementation?

To rate *Implementation of the Task*, consider:

a. how the teacher guides implementation of the task (i.e., feedback or guidance given to students as they work), and

b. how the majority of the students engage with the task (i.e., their work on the task).

Rubric 2: Implementation of the Task	
4	**Students engaged in exploring and understanding the nature of mathematical concepts, procedures, and/or relationships, such as:** • Doing mathematics: using complex and non-algorithmic thinking (i.e., there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instructions, or a worked-out example); OR • Procedures with connections: applying a broad general procedure that remains closely connected to mathematical concepts. There is explicit evidence of students' reasoning and understanding. For example, students may have: • solved a genuine, challenging problem for which students' reasoning is evident in their work on the task; • developed an explanation for why formulas or procedures work; • identified patterns and formed generalizations based on these patterns; • made conjectures and supported conclusions with mathematical evidence; • made explicit connections between representations, strategies, or mathematical concepts and procedures. • followed a prescribed procedure in order to explain/illustrate a mathematical concept, process, or relationship.
3	**Students engaged in complex thinking or in creating meaning for mathematical concepts, procedures, and/or relationships. However, the implementation does not warrant a "4" because:** • there is no explicit evidence of students' reasoning and understanding. • students engaged in doing mathematics or procedures with connections, but the underlying mathematics in the task was not appropriate for the specific group of students (i.e., too easy or too hard to sustain engagement with high-level cognitive demands); • students identified patterns but did not make generalizations; • students used multiple strategies or representations but connections between different strategies/representations were not explicitly evident; • students made conjectures but did not provide mathematical evidence or explanations to support conclusions
2	**Students did not engage in complex thinking or in creating meaning for mathematical concepts, procedures, and/or relationships. You may see that:** • students engaged in using a procedure that was either specifically called for or its use was evident based on prior instruction, experience, or placement of the task - there was little ambiguity about what needed to be done and how to do it; • students did not make connections to the concepts or meaning underlying the procedure being used; • the focus of the implementation appears to be on producing correct answers rather than developing mathematical understanding (e.g., applying a specific problem solving strategy, practicing a computational algorithm); • students did not engage in cognitively challenging work; the task was easy to solve; • the task had a *Potential* of 3, but students appeared not to be academically prepared to engage with the task on this level.
1	Students engaged in memorizing or reproducing facts, rules, formulae, or definitions. Students do not make connections to the concepts or meaning that underlie the facts, rules, formulae, or definitions being memorized or reproduced. OR the task had a *Potential* of 2, but students appeared not to be academically prepared to engage with the task on this level.
0	Students did not engage in mathematical activity.
N/A	Reason:

Student Discussion Following the Task: To what extent did students show their work and explain their thinking about the important mathematical content?

Rubric 3: Student Discussion Following the Task	
4	Students show/describe one strategy or representation they used to solve the task and provide complete and thorough explanations of why their strategy, idea, or procedure is valid. Students explain why their strategy works and/or is appropriate for the problem by making connections to the underlying mathematical ideas (e.g., "I divided because we needed equal groups"). OR Students show/discuss more than one strategy or representation for solving the task, and provide explanations of *why* the different strategies/representations were used to solve the task.
3	Students show/describe one strategy or representation they used to solve the task and make some attempt to explain *why* the strategy or representation is valid, BUT the explanations are not complete and thorough (e.g., student responses often require extended press from the teacher, are incomplete, lack precision, or fall short of making explicit connections). OR Students show/discuss more than one strategy or representation for solving the task, and do provide explanations of *how* the different strategies/representations were used to solve the task, but do not explain *why* they were used.
2	Students show/describe one strategy or procedure they used to solve the task (e.g., the steps for a multiplication problem, finding an average, or solving an equation; what they did first, second, etc) but do not explain why their strategy or procedure works and/or was appropriate for the problem;
1	Students share answers but do not show/describe how they solved the task.
0	Students' responses are non-mathematical.
N/A	Reason:

Clear Expectations/Self Management of Learning

The same task that is scored for the *Academic Rigor* rubrics should be scored for all *Clear Expectations/Self Management of Learning* rubrics.

A score of 1-4 can only be given on these rubrics if the task is related to mathematics.

Clarity and Detail of Expectations: To what extent does the teacher provide clear and detailed instructions to students so that they know what they would need to do, or include in their work, to do high-quality work in math?

The score for this rubric must be based on the actual expectations/directions shared with students for their performance on the task and cannot assume that previously discussed strategies are implicit in the expectations/directions.

Teachers who score high on *Clarity and Detail of Expectations* are able to clearly explain to students *ways* that they may go about producing high-quality work that includes clear evidence of their thinking (e.g., "You need to show me how you solved the problem using number sentences, graphs, or pictures. Here is an example of what good work might look like [using a similar problem]." OR "You need to explain how you solved the problem to your partner. You can use diagrams or blocks to help you. For example, you might say…").

Teachers who score low on this rubric share procedural directions (i.e., the basic information needed to complete the task) with their students but offer them little, if any, guidance about *ways* that they may go about producing high-quality work that includes clear evidence of their thinking.

Rubric 1: Clarity and Detail of Expectations*	
4	The teacher guides students in thinking about a way they can show/explain their work or think about the problem. The teacher explains what high quality work would look like to students AND illustrates this with models of high-quality student work and/or describes the difference between high-quality and lower-quality work (e.g. , A sample of high-quality work from a past assignment where the requirements for high-quality work were similar (ideally, the mathematical ideas or the strategies for solving the past assignment should be quite different from the current task). OR An indication of what a high-quality solution or explanation would contain/require: • "A good explanation would be clear enough that someone else looking at your paper can make sense of your strategy." • "Your graph can be a quick sketch. What I want to see in your work is how you used the given information to make the graph.")
3	The teacher guides students in thinking about a way they can show/explain their work or think about the problem (e.g., "I would like to see your mathematical work and an explanation of your thinking using words, diagrams, (or other representations)." OR "You may want to draw pictures or use manipulatives to help you solve this problem.")
2	The teacher communicates that students need to show/explain their work OR the teacher clearly communicates to students what he/she expects students to learn or think about in doing the task. However, the teacher does not offer suggestions for how students might go about showing/explaining their work or approaching the task. (e.g., "I want to see how you solved the problem." OR "Show your work." OR "Do these problems and see if you can figure out how multiplication and division are similar.").
1	The teacher provides procedural directions for the mathematics activity, but does not require students to provide evidence of their thinking or guide them in how to think about the problem. (e.g., "Complete Investigation # 3 on page 27. Work together and turn in 1 paper for the group. I am looking for neatness and completeness."). The teacher must communicate to students that they are expected to participate in a task relating to mathematics.
0	Neither procedural directions nor expectations for work in mathematics are shared with students OR the teacher is unable to score above a 0 because the task is unrelated to mathematics.
N/A	Reason:

*** If teacher over specifies the task expectations by providing or implying a set pathway to the solution or by providing models of all possible solutions to the task, the "Implementation of the Task" rubric of Academic Rigor will reflect the lowered rigor. Focus only on the Clarity and Detail of Expectations when scaling this rubric.**

Academic Rigor in the Teacher's Expectations: Do the instructions and/or evaluation criteria provided to students require them to engage in rigorous thinking about challenging content?

Ratings for *Academic Rigor in the Teacher's Expectations* should be based on what the teacher says and/or what the directions of the task say and/or what is stated in rubrics that the teacher refers to. Raters should make every possible attempt to look at and record any written directions for the task being scored with this rubric.

Teachers who score high on the *Academic Rigor in the Teacher's Expectations* rubric are able to communicate to students that they have high expectations for the type of mathematical thinking that students will engage in (e.g., "I expect you to find three different strategies for solving this problem.").

Rubric 2: Academic Rigor in the Teacher's Expectations	
4	The majority of the teacher's communicated expectations are for students to engage with the high-level demands of the task, such as using complex thinking and/or exploring and understanding mathematical concepts, procedures, and/or relationships (as described in Potential of the Task level 4).
3	At least some of the teacher's communicated expectations are for students to engage in complex thinking or in understanding important mathematics. However, the teacher's expectations do not warrant a "4" because: • the expectations are appropriate for a task that lacks the complexity to be a "4" (as described in Potential of the Task level 3); • the expectations do not reflect the potential of the task to elicit complex thinking (e.g., identifying patterns but not forming generalizations; using multiple strategies or representations without developing connections between them; providing shallow evidence or explanations to support conclusions). • the teacher expects complex thinking, but the expectations do not reflect the mathematical potential of the task.
2	The teacher's communicated expectations focus on skills that are germane to student learning, but these are not complex thinking skills (e.g., expecting use of a specific problem solving strategy, expecting short answers based on memorized facts, rules or formulas; expecting accuracy or correct application of procedures rather than on understanding mathematical concepts).
1	None of the teacher's communicated expectations focuses on substantive mathematical content (e.g., the teacher's communicated expectations focus on following directions, producing neat work, or following rules for cooperative learning).
0	Neither procedural directions nor expectations for quality work were given OR the task was unrelated to mathematics.
N/A	Reason:

Access to Expectations: *How many* students are provided with procedural directions or evaluation criteria?

To score between 1-2 on this rubric, teachers must, at the very least, share procedural expectations for the mathematical task with at least some of the students in the class (i.e., teachers must have scored at least a 1 on the Clarity and Detail of Expectations rubric).

Rubric 3A: Access to Expectations	
3	Directions or evaluation criteria have been explicated to ALL students
2	Directions or evaluation criteria have been explicated to SOME students.
1	Directions or evaluation criteria were not shared with any students.
0	The task was unrelated to mathematics.
N/A	Reason:

Access to Expectations – Public Record of Evaluation Criteria: Is there a *public record* of the evaluation criteria presented to students and is it referred to by the teacher?

Rubric 3B: Access to Expectations – Public Record of Evaluation Criteria	
3	The teacher referred to a public record of evaluation criteria to be used for the mathematics task.
2	There was a public record of evaluation criteria relevant to the mathematics task but the teacher did not refer to it.
1	There was no public record of evaluation criteria relevant to the mathematics task.
0	The task was unrelated to mathematics.
N/A	Reason:

Appendix B

Basic Statistics on All Measures Used in the Analyses

The Instructional Leadership Study

Appendix Table B.1

Basic Statistics on All Analytic Measures Used in the Instructional Leadership Study

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Principal survey							
Principal's receipt of professional development							
Frequency of principal's receipt of instruction-related PD	15	0.94 (N = 41)	42	1.71	0.7	0.0 - 4.0	0.5 - 3.2
Value principal places on instruction-related PD	23	0.98 (N = 6)	42	3.16	0.6	1.0 - 4.0	1.6 - 4.0
Frequency of principal's receipt of PD on the Principles of Learning	3	0.97 (N = 42)	42	2.11	1.0	0.0 - 4.0	0.0 - 4.0
Value principal places on PD on the Principles of Learning	3	0.97 (N = 36)	38	3.32	0.7	1.0 - 4.0	2.0 - 4.0
Frequency of principal's receipt of PD on Accountable Talk (survey item)	NA	NA	42	2.05	1.0	0.0 - 4.0	0.0 - 4.0
Value principal places on PD on Accountable Talk (survey item)	NA	NA	36	3.31	0.7	1.0 - 4.0	2.0 - 4.0
Frequency of principal's receipt of PD on Academic Rigor (survey item)	NA	NA	42	2.14	1.1	0.0 - 4.0	0.0 - 4.0
Value principal places on PD on Academic Rigor (survey item)	NA	NA	37	3.38	0.7	1.0 - 4.0	2.0 - 4.0
Frequency of principal's receipt of PD on Clear Expectations (survey item)	NA	NA	42	2.14	1.1	0.0 - 4.0	0.0 - 4.0
Value principal places on PD on Clear Expectations (survey item)	NA	NA	37	3.32	0.7	1.0 - 4.0	2.0 - 4.0

(continued)

Appendix Table B.1 (continued)

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Principal survey (continued)							
Principal's involvement in professional development for teachers							
Role principal plays in PD offered to teachers	21	0.93 (N = 35)	42	2.09	0.9	0.0 - 4.3	0.7 - 4.2
Time principal spends with teachers on instructional improvement	8	0.89 (N = 42)	42	2.91	0.6	1.0 - 4.6	1.5 - 4.4
Role principal plays in PD on the Principles of Learning offered to teachers	3	0.89 (N = 42)	42	2.58	1.7	0.0 - 6.0	0.0 - 6.0
Frequency of principal's giving teachers suggestions on implementing the Principles of Learning	3	0.95 (N = 42)	42	3.01	0.9	1.0 - 5.0	1.0 - 5.0
Role principal plays in PD on Accountable Talk (survey item)	NA	NA	42	2.43	1.8	0.0 - 6.0	0.0 - 6.0
Frequency of principal's giving teachers suggestions on Accountable Talk (survey item)	NA	NA	42	2.95	0.9	1.0 - 5.0	1.0 - 5.0
Role principal plays in PD on Academic Rigor (survey item)	NA	NA	42	2.64	1.8	0.0 - 6.0	0.0 - 6.0
Frequency of principal's giving teachers suggestions on Academic Rigor (survey item)	NA	NA	42	3.02	0.8	1.0 - 5.0	1.0 - 5.0
Role principal plays in PD on Clear Expectations (survey item)	NA	NA	42	2.67	1.9	0.0 - 6.0	0.0 - 6.0
Frequency of principal's giving teachers suggestions on Clear Expectations (survey item)	NA	NA	42	3.05	1.0	1.0 - 5.0	1.0 - 5.0

(continued)

Appendix Table B.1 (continued)

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Principal survey (continued)							
Other measures							
Principal's assessment of the school's PD environment for teachers	37	0.94 (N = 36)	42	2.31	0.6	0.0 - 4.0	1.1 - 3.2
Teacher survey							
Teachers' receipt of professional development							
Frequency of teachers' receipt of instruction-related PD	26	0.95 (N = 217)	42	1.45	0.4	0.0 - 4.0	0.7 - 2.6
Value teachers place on instruction-related PD	35	0.95 (N = 20)	42	3.05	0.4	1.0 - 4.0	1.9 - 3.6
Frequency of teachers' receipt of PD related to the Principles of Learning	7	0.95 (N = 233)	42	1.53	0.6	0.0 - 4.0	0.4 - 2.9
Value teachers place on PD related to the Principles of Learning	7	0.94 (N = 117)	42	2.97	0.4	1.0 - 4.0	1.8 - 3.7
Frequency of teachers' receipt of PD related to Accountable Talk (survey item)	NA	NA	42	1.55	0.8	0.0 - 4.0	0.0 - 3.5
Value teachers place on PD related to Accountable Talk[b]	2	0.73 (N = 177)	42	-0.10	0.5	NA	-1.3 - 0.8
Frequency of teachers' receipt of PD related to Accountable Talk in Math	2	0.86 (N = 236)	42	1.52	0.7	0.0 - 4.0	0.1 - 2.8
Value teachers place on PD related to Accountable Talk in Math[b]	3	0.80 (N = 156)	39	0.04	0.5	NA	-1.2 - 0.7

(continued)

Appendix Table B.1 (continued)

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Teacher survey (continued)							
Frequency of teachers' receipt of PD related to Academic Rigor in Math	3	0.91 (N = 237)	42	1.47	0.6	0.0 - 4.0	0.1 - 2.5
Value teachers place on PD related to Academic Rigor in Math[b]	4	0.85 (N = 155)	40	-0.03	0.5	NA	-1.1 - 0.7
Frequency of teachers' receipt of PD related to Academic Rigor in Reading	3	0.92 (N = 238)	42	1.51	0.6	0.0 - 4.0	0.4 - 3.3
Value teachers place on PD related to Academic Rigor in Reading[b]	4	0.87 (N = 142)	39	0.01	0.5	NA	-1.5 - 1.1
Frequency of teachers' receipt of PD related to Clear Expectations (survey item)	NA	NA	42	1.64	0.7	0.0 - 4.0	0.5 - 3.0
Value teachers place on PD related to Clear Expectations[b]	2	0.65 (N = 197)	42	-0.09	0.6	NA	-1.5 - 0.8
Other measures							
Teachers' assessment of the principal as an instructional leader	22	0.95 (N = 193)	42	1.97	0.5	0.5 - 3.9	0.8 - 2.8
Teachers' assessment of the principal as an organizational leader	5	0.84 (N = 238)	42	3.57	0.7	1.0 - 5.0	1.5 - 4.6

(continued)

Appendix Table B.1 (continued)

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Instructional Quality Assessment (IQA)							
Reading IQA score	3	0.77 (N = 74)	33	1.76	0.4	1.0 - 4.1	1.2 - 2.7
Accountable Talk in Reading	5	0.77 (N = 104)	40	1.95	0.4	1.0 - 4.2	1.0 - 2.9
Academic Rigor in Reading	2	0.45 (N = 76)	33	1.90	0.4	1.0 - 4.0	1.1 - 2.9
Clear Expectations in Reading (individual rubric)	NA	NA	34	1.44	0.4	1.0 - 4.0	1.0 - 2.3
Math IQA score	3	0.64 (N = 107)	40	1.86	0.3	1.0 - 4.1	1.4 - 2.9
Accountable Talk in Math	5	0.77 (N = 113)	41	2.00	0.4	1.0 - 4.2	1.2 - 2.9
Rigor of the Task in Math	2	0.92 (N = 107)	42	2.13	0.4	1.0 - 4.0	1.5 - 3.5
Clear Expectations in Math (individual rubric)	NA	NA	41	1.44	0.5	1.0 - 4.0	1.0 - 2.5
Student achievement							
Percentage of third-grade students meeting the state standard in reading in 2006	NA	NA	42	66.2	22.1	0.0 - 100.0	20.6 - 100.0
Percentage of third-grade students meeting the state standard in math in 2006	NA	NA	42	60.3	13.8	0.0 - 100.0	28.6 - 92.4

(continued)

Appendix Table B.1 (continued)

Measure	Number of Items in Scale	Reliability[a]	Number of Schools	Mean	Standard Deviation	Theoretical Range	Actual Range
Background characteristics							
Principal's years of experience	NA	NA	42	6.3	6.5	1.0 - ?	1.0 - 36.0
Teachers' years of experience	NA	NA	42	9.5	4.6	1.0 - ?	2.0 - 21.2
Average percentage of third-grade students meeting the state/city standard in reading in 2003, 2004, and 2005	NA	NA	42	58.4	25.6	0.0 - 100.0	15.5 - 95.2
Average percentage of third-grade students meeting the state/city standard in math in 2003, 2004, and 2005	NA	NA	42	57.6	19.1	0.0 - 100.0	26.8 - 93.9

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: The mean, standard deviation, and range of each measure are calculated with school as the unit of analysis; the sample represents the largest sample of schools that is used in the majority of analyses in this report (this sample excludes five schools whose principals did not respond to the survey and two additional schools with incomplete data). School-level teacher survey construct scores are suppressed where fewer than two teachers at the school have scores for the construct. School-level IQA scores are suppressed where fewer than half of the participating teachers at the school have scores. The reliabilities of teacher survey constructs and IQA scores are calculated with teacher as the unit of analysis.

[a]Reliability is reported as the standardized Cronbach's alpha of the items composing the construct. If the measure is composed of only one item, Cronbach's alpha is not applicable and "NA" is shown for the reliability of the measure.

Cronbach's alpha can be calculated only across records with no missing data for any of the component items; the number in parentheses below the Cronbach's alpha is the number of such records. Most records do not have data for each item measuring the *value* of a topic or type of professional development because respondents were instructed not to assign a value to professional development that they did not receive. Since the purpose of the value survey constructs is to measure how much the respondents valued whatever professional development they did receive, scores for these constructs were calculated using all items for which the respondents had data, with the exception of *value teacher places on PD related to Accountable Talk in Math / Academic Rigor in Math / Academic Rigor in Reading,* for which the respondents were required to have data on at least one item specific to the subject (math or reading) in order to be assigned a construct score.

[b]These constructs were created from items that were standardized to a mean of 0 and a standard deviation of 1 to account for the fact that the scales include items with different ranges and that not all items were answered by every respondent.

Appendix C

Items Making Up the Construct Scales Derived from the Surveys

Appendix C.1

Items Making Up the Construct Scales Derived from the Principal Survey

Frequency of principal's receipt of instruction-related professional development

During the 2005-2006 school year and the summer of 2005, how many times were the following topics included in professional development organized by your district for your professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

23b: 'Designing and implementing a school improvement plan'

23c: 'Understanding how district and state standards are aligned to the curriculum'

23d: 'Using school-based reading/math curricula to guide instruction'

23e: 'Using state and district assessments to guide instruction'

23f: 'Helping teachers understand how to communicate their expectations for quality work to students'

23g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

23h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

23i: 'Understanding proper implementation of district, state, and federal policies and procedure (for example, accountability, attendance, student promotion)'

23j: 'Helping teachers analyze student performance against the standards'

23k: 'Determining what features of teacher performance need to be improved and how'

23l: 'Determining what features of student performance need to be improved and how'

During the 2005-2006 school year and the summer of 2005, how often were you offered the opportunity to engage in each of the following types of district-sponsored activities to support your own professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

24d: 'Participating in Learning Walks that district administrative staff and/or other principals conduct at your school'

24f: 'Participating in Learning Walks at other schools'

24l: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

24m: 'Accessing Web-based courses or learning tools'

(continued)

Appendix C.1 (continued)

Value principal places on instruction-related professional development

Overall how valuable was each topic or type of professional development for your practice as a school leader during the 2005-2006 school year and the summer of 2005? (1 = Not valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable / OR 'Did not engage in this activity')

25b: 'Designing and implementing a school improvement plan'

25c: 'Understanding how district and state standards are aligned to the curriculum'

25d: 'Using school-based reading/math curricula to guide instruction'

25e: 'Using state and district assessments to guide instruction'

25f: 'Helping teachers understand how to communicate their expectations for quality work to students'

25g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

25h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

25i: 'Understanding proper implementation of district, state, and federal policies and procedure (for example, accountability, attendance, student promotion)'

25j: 'Helping teachers analyze student performance against the standards'

25k: 'Determining what features of teacher performance need to be improved and how'

25l: 'Determining what features of student performance need to be improved and how'

25aa: 'Being coached by another principal'

25bb: 'Coaching another principal'

25cc: 'Attending district-sponsored principal seminars or meetings'

25dd: 'Participating in Learning Walks that district administrative staff and/or other principals conduct at your school'

25ff: 'Participating in Learning Walks at other schools'

25gg: 'Discussing your work with your supervisor'

25hh: 'Informally collaborating or sharing ideas with other principals'

25ii: 'Participating in an informal study group with other principals'

25jj: 'Attending district-sponsored/supported university-based programs'

25kk: 'Attending district-sponsored/supported conferences'

25ll: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

25mm: 'Accessing Web-based courses or learning tools'

(continued)

Appendix C.1 (continued)

Frequency of principal's receipt of professional development on the Principles of Learning

During the 2005-2006 school year and the summer of 2005, how many times were the following topics included in professional development organized by your district for your professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

23f: 'Helping teachers understand how to communicate their expectations for quality work to students'

23g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

23h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

Value principal places on professional development on the Principles of Learning

Overall how valuable was each topic or type of professional development for your practice as a school leader during the 2005-2006 school year and the summer of 2005? (1 = Not valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable / OR 'Did not engage in this activity')

25f: 'Helping teachers understand how to communicate their expectations for quality work to students'

25g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

25h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

Frequency of principal's receipt of professional development on Accountable Talk (survey item)

During the 2005-2006 school year and the summer of 2005, how many times were the following topics included in professional development organized by your district for your professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

23h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

(continued)

Appendix C.1 (continued)

Value principal places on professional development on Accountable Talk (survey item)

Overall how valuable was each topic or type of professional development for your practice as a school leader during the 2005-2006 school year and the summer of 2005? (1 = Not valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable / OR 'Did not engage in this activity')

25h: 'Helping teachers understand how to engage students in whole-group discussions to promote learning'

Frequency of principal's receipt of professional development on Academic Rigor (survey item)

During the 2005-2006 school year and the summer of 2005, how many times were the following topics included in professional development organized by your district for your professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

23g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

Value principal places on professional development on Academic Rigor (survey item)

Overall how valuable was each topic or type of professional development for your practice as a school leader during the 2005-2006 school year and the summer of 2005? (1 = Not valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable / OR 'Did not engage in this activity')

25g: 'Helping teachers understand how to engage students in active reasoning about and analysis of challenging content'

Frequency of principal's receipt of professional development on Clear Expectations (survey item)

During the 2005-2006 school year and the summer of 2005, how many times were the following topics included in professional development organized by your district for your professional growth and development? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

23f: 'Helping teachers understand how to communicate their expectations for quality work to students'

(continued)

Appendix C.1 (continued)

Value principal places on professional development on Clear Expectations (survey item)

Overall how valuable was each topic or type of professional development for your practice as a school leader during the 2005-2006 school year and the summer of 2005? (1 = Not valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable / OR 'Did not engage in this activity')

25f: 'Helping teachers understand how to communicate their expectations for quality work to students'

Role principal plays in professional development offered to teachers

Please indicate whether you typically conceptualized, presented, attended, arranged, or did not participate in any way in professional development offered to teachers by your school or district that included these topics during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Conceptualized = 2 points, Presented = 2 points, Attended = 1 point, Arranged = 1 point, No participation = 0 points)

19a: 'Aligning curriculum and instruction with state and/or district content standards'

19b: 'Tailoring instructional strategies to special student populations (for example, English language learners, Special Education students)'

19c: 'Implementing the math curriculum'

19d: 'Implementing the reading curriculum'

19e: 'Communicating explicitly to students the expectations for quality work'

19f: 'Engaging students in active reasoning about and analysis of challenging content'

19g: 'Engaging students in whole-group discussions to promote learning'

19h: 'Classroom management'

19i: 'Using student work to improve/refine instruction'

19j: 'Using student test results to improve/refine instruction'

19k: 'Helping students get along with each other'

19l: 'Understanding district and state policies (for example, procedures for reporting child abuse, inclusion mandates)'

(continued)

Appendix C.1 (continued)

Role principal plays in professional development offered to teachers (continued)

Please indicate whether you attended, arranged or did not participate in any way in these types of professional development opportunities offered to teachers during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Attended = 1 point, Arranged = 1 point, No participation = 0 points)

20a: 'Observing model lessons within your school'

20b: 'Observing model lessons in other schools'

20c: 'Participating in Learning Walks in your school'

20d: 'Participating in study groups with other teachers at their grade level'

20e: 'Participating in content-area study groups'

20g: 'Participating in a school-based workshop/course led by an instructional coach or other knowledgeable professional'

20i: 'Working one-on-one / in a group of 2 to 4 with an instructional coach or other knowledgeable professional'

20j: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

20k: 'Accessing Web-based courses or learning tools'

(continued)

Appendix C.1 (continued)

Time principal spends with teachers on instructional improvement

In a typical week, how much time do you spend on the following areas/activities? (1 = no time [0 hours] per week, 2 = A small amount of time [1 to 4 hours] per week, 3 = A moderate amount of time [5 to 15 hours] per week, 4 = A lot of time [More than 15 hours] per week)

32d: 'Dropping in on teachers to see what is happening in terms of instruction'

32e: 'Making scheduled visits to teachers' classrooms (outside of a formal evaluation) to see what is happening in terms of instruction'

32f: 'Reviewing student work with teachers to identify problems and successes'

In a typical school year, how often do you spend time on the following activities? (1 = Rarely, 2 = Several times per year, 3 = Several times per month, 4 = Several times per week, 5 = Daily)

33e: 'Reviewing student achievement data with teachers to guide instruction'

33g: 'Giving suggestions to one or more teachers on how to communicate explicitly to students the expectations for quality work'

33h: 'Giving suggestions to one or more teachers on how to engage students in active reasoning about and analysis of challenging content'

33i: 'Giving suggestions to one or more teachers on how to engage students in whole-group discussions to promote learning'

33j: 'Providing other feedback and suggestions to teachers regarding curriculum and instruction'

Role principal plays in professional development on the Principles of Learning offered to teachers

Please indicate whether you typically conceptualized, presented, attended, arranged or did not participate in any way in professional development offered to teachers by your school or district that included these topics during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Conceptualized = 2 points, Presented = 2 points, Attended = 1 point, Arranged = 1 point, No participation = 0 points)

19e: 'Communicating explicitly to students the expectations for quality work'

19f: 'Engaging students in active reasoning about and analysis of challenging content'

19g: 'Engaging students in whole-group discussions to promote learning'

(continued)

Appendix C.1 (continued)

Frequency of principal's giving teachers suggestions on implementing the Principles of Learning

In a typical school year, how often do you spend time on the following activities? (1 = Rarely, 2 = Several times per year, 3 = Several times per month, 4 = Several times per week, 5 = Daily)

33g: 'Giving suggestions to one or more teachers on how to communicate explicitly to students the expectations for quality work'

33h: 'Giving suggestions to one or more teachers on how to engage students in active reasoning about and analysis of challenging content'

33i: 'Giving suggestions to one or more teachers on how to engage students in whole-group discussions to promote learning'

Role principal plays in professional development on Accountable Talk (survey item)

Please indicate whether you typically conceptualized, presented, attended, arranged, or did not participate in any way in professional development offered to teachers by your school or district that included these topics during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Conceptualized = 2 points, Presented = 2 points, Attended = 1 point, Arranged = 1 point, No participation = 0 points)

19g: 'Engaging students in whole-group discussions to promote learning'

Frequency of principal's giving teachers suggestions on Accountable Talk (survey item)

In a typical school year, how often do you spend time on the following activities? (1 = Rarely, 2 = Several times per year, 3 = Several times per month, 4 = Several times per week, 5 = Daily)

33i: 'Giving suggestions to one or more teachers on how to engage students in whole-group discussions to promote learning'

Role principal plays in professional development on Academic Rigor (survey item)

Please indicate whether you typically conceptualized, presented, attended, arranged, or did not participate in any way in professional development offered to teachers by your school or district that included these topics during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Conceptualized = 2 points, Presented = 2 points, Attended = 1 point, Arranged = 1 point, No participation = 0 points)

19f: 'Engaging students in active reasoning about and analysis of challenging content'

(continued)

Appendix C.1 (continued)

Frequency of principal's giving teachers suggestions on Academic Rigor (survey item)

In a typical school year, how often do you spend time on the following activities? (1 = Rarely, 2 = Several times per year, 3 = Several times per month, 4 = Several times per week, 5 = Daily)

33h: 'Giving suggestions to one or more teachers on how to engage students in active reasoning about and analysis of challenging content'

Role principal plays in professional development on Clear Expectations (survey item)

Please indicate whether you typically conceptualized, presented, attended, arranged, or did not participate in any way in professional development offered to teachers by your school or district that included these topics during the 2005-2006 school year and the summer of 2005. (Please mark all that apply.) (Conceptualized = 2 points, Presented = 2 points, Attended = 1 point, Arranged = 1 point, No participation = 0 points)

19e: 'Communicating explicitly to students the expectations for quality work'

Frequency of principal's giving teachers suggestions on Clear Expectations (survey item)

In a typical school year, how often do you spend time on the following activities? (1 = Rarely, 2 = Several times per year, 3 = Several times per month, 4 = Several times per week, 5 = Daily)

33g: 'Giving suggestions to one or more teachers on how to communicate explicitly to students the expectations for quality work'

(continued)

Appendix C.1 (continued)

Principal's assessment of the school's professional development environment for teachers

A professional development session may cover more than one topic. How often were teachers at your school offered professional development sessions and other staff activities by your school or district that included these topics during the 2005-2006 school year and the summer of 2005? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

17a: 'Aligning curriculum and instruction with state and/or district content standards'

17b: 'Tailoring instructional strategies to special student populations (for example, English language learners, Special Education students)'

17c: 'Implementing the math curriculum'

17d: 'Implementing the reading curriculum'

17e: 'Communicating explicitly to students the expectations for quality work'

17f: 'Engaging students in active reasoning about and analysis of challenging content'

17g: 'Engaging students in whole-group discussions to promote learning'

17i: 'Using student work to improve/refine instruction'

17j: 'Using student test results to improve/refine instruction'

How often were teachers at your school offered these types of professional development by your school or district during the 2005-2006 school year and the summer of 2005? (0 = Never, 1 = Once or twice a year, 2 = Three or four times a year, 3 = Once or twice a month, 4 = At least once a week)

18a: 'Observing model lessons within your school'

18b: 'Observing model lessons in other schools'

18c: 'Participating in Learning Walks in your school'

18d: 'Participating in study groups with other teachers at their grade level'

18e: 'Participating in content-area study groups'

18h: 'Attending a district-sponsored/supported conference'

18i: 'Working one-on-one / in a group of 2 to 4 with an instructional coach or other knowledgeable professional'

18j: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

18k: 'Accessing Web-based courses or learning tools'

(continued)

Appendix C.1 (continued)

Principal's assessment of the school's professional development environment for teachers (continued)

What proportion of teachers typically participated in professional development sessions and other staff activities that included these topics during the 2005-2006 school year and the summer of 2005? (0 = None, 1 = Some, 2 = About half, 3 = Most, 4 = All)

21a: 'Aligning curriculum and instruction with state and/or district content standards'

21b: 'Tailoring instructional strategies to special student populations (for example, English language learners, Special Education students)'

21c: 'Implementing the math curriculum'

21d: 'Implementing the reading curriculum'

21e: 'Communicating explicitly to students the expectations for quality work'

21f: 'Engaging students in active reasoning about and analysis of challenging content'

21g: 'Engaging students in whole-group discussions to promote learning'

21i: 'Using student work to improve/refine instruction'

21j: 'Using student test results to improve/refine instruction'

What proportion of teachers participated in these types of professional development during the 2005-2006 school year and the summer of 2005? (0 = None, 1 = Some, 2 = About half, 3 = Most, 4 = All)

22a: 'Observing model lessons within your school'

22b: 'Observing model lessons in other schools'

22c: 'Participating in Learning Walks in your school'

22d: 'Participating in study groups with other teachers at their grade level'

22e: 'Participating in content-area study groups'

22g: 'Participating in a school-based workshop/course led by an instructional coach or other knowledgeable professional'

22h: 'Attending a district-sponsored/supported conference'

22i: 'Working one-on-one or in a group of 2 to 4 with an instructional coach or other knowledgeable professional'

22j: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

22k: 'Accessing Web-based courses or learning tools'

Appendix C.2

Items Making Up the Construct Scales Derived from the Teacher Survey

Frequency of teacher's receipt of instruction-related professional development

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005?
(0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8a: 'Aligning curriculum and instruction with state and/or district content standards'

8b: 'Tailoring instructional strategies to special student populations (e.g., English language learners, Special Education students)'

8c: 'Communicating explicitly to students the expectations for quality work'

8d: 'Engaging students in active reasoning about and analysis of challenging content'

8e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

8f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

8g: 'Helping students learn content and skills central to developing conceptual understandings in math'

8h: 'Engaging students in whole-group discussions to promote learning'

8i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

8j: 'Components of reading instruction (e.g., phonics, comprehension, vocabulary, fluency)'

8k: 'Deepened understanding of mathematical concepts (for teachers)'

8l: 'Engaging students from diverse backgrounds'

8n: 'Implementing the math curriculum'

8o: 'Implementing the reading curriculum'

8p: 'Using student work to improve/refine instruction'

8q: 'Using student test results to improve/refine instruction'

(continued)

Appendix C.2 (continued)

Frequency of teacher's receipt of instruction-related professional development (continued)

During the 2005-2006 school year and summer the summer of 2005, how often were you offered the opportunity to engage in each of the following types of professional development? (0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

9a: 'Observing model lessons within your school'

9d: 'Participating in study groups with other teachers at your grade level in your school'

9e: 'Participating in content area study groups in your school'

9h: 'Participating in school-based workshops/courses led by an instructional coach or other knowledgeable professional'

9i: 'Participating in professional development activities involving teachers across schools in your district (e.g. grade level or content area meetings, training sessions)'

9j: 'Receiving feedback from another teacher who observed in your class'

9k: 'Collaborating with other teachers (e.g., planning lessons, discussing common challenges, analyzing student work)'

9l: 'Working one-on-one or in a group of 2-4 with an instructional coach or other professional'

9m: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

9n: 'Accessing web-based courses or learning tools'

Value teacher places on instruction-related professional development

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10a: 'Aligning curriculum and instruction with state and/or district content standards'

10b: 'Tailoring instructional strategies to special student populations (e.g., English language learners, Special Education students)'

10c: 'Communicating explicitly to students the expectation for quality work'

10d: 'Engaging students in active reasoning about and analysis of challenging content'

10e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

10f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

10g: 'Helping students learn content and skills central to developing conceptual understandings in math'

(continued)

Appendix C.2 (continued)

Value teacher places on instruction-related professional development (continued)

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10h: 'Engaging students in whole-group discussions to promote learning'

10i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

10j: 'Components of reading instruction (e.g., phonics, comprehension, vocabulary, fluency)'

10k: 'Deepened understanding of mathematical concepts (for teachers)'

10l: 'Engaging students from diverse backgrounds'

10n: 'Implementing the math curriculum'

10o: 'Implementing the reading curriculum'

10p: 'Using student work to improve/refine instruction'

10q: 'Using student test results to improve/refine instruction'

If you engaged in these types of district- or school-sponsored professional development activities during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

11a: 'Observing model lessons within your school'

11b: 'Observing model lessons in other schools'

11c: 'Participating in Learning Walks in your school'

11d: 'Participating in study groups with other teachers at your grade level in your school'

11e: 'Participating in content area study groups in your school'

11h: 'Participating in school-based workshops/courses led by an instructional coach or other knowledgeable professional'

11i: 'Participating in professional development activities involving teachers across schools in your district (e.g. grade level, or content area meetings, training sessions)'

11j: 'Receiving feedback from another teacher who observed in your class'

11k: 'Collaborating with other teachers (e.g., planning lessons, discussing common challenges, analyzing student work)'

11l: 'Working one-on-one or in a group of 2-4 with an instructional coach or other professional'

11m: 'Studying video clips to find evidence of effective teaching and learning taking place in classrooms'

11n: 'Accessing web-based courses or learning tools'

(continued)

Appendix C.2 (continued)

Value teacher places on instruction-related professional development (continued)

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005.

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12a: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Deepened my substantive knowledge of mathematics'

12b: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Deepened my substantive knowledge of components of reading instruction'

12c: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Increased my ability to set and communicate clear expectations for student work'

12d: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to involve students in active reasoning and problem solving'

12e: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to engage students in whole-group discussions to promote learning'

Please indicate the extent to which you agree or disagree with the following statements about the math curriculum relevant to your assignment

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

17i: The math curriculum and the professional development I receive are aligned with each other

Please indicate the extent to which you agree or disagree with the following statements about the reading curriculum relevant to your assignment

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

20k: The reading curriculum and the professional development I receive are aligned with each other

(continued)

Appendix C.2 (continued)

Frequency of teacher's receipt of professional development related to the Principles of Learning

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005?

(0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8c: 'Communicating explicitly to students the expectations for quality work'

8d: 'Engaging students in active reasoning about and analysis of challenging content'

8e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

8f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

8g: 'Helping students learn content and skills central to developing conceptual understandings in math'

8h: 'Engaging students in whole-group discussions to promote learning'

8i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

Value teacher places on professional development related to the Principles of Learning

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10c: 'Communicating explicitly to students the expectation for quality work'

10d: 'Engaging students in active reasoning about and analysis of challenging content'

10e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

10f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

10g: 'Helping students learn content and skills central to developing conceptual understandings in math'

10h: 'Engaging students in whole-group discussions to promote learning'

10i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

(continued)

Appendix C.2 (continued)

Frequency of teacher's receipt of professional development related to Accountable Talk (survey item)

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005? (0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8h: 'Engaging students in whole-group discussions to promote learning'

Value teacher places on professional development related to Accountable Talk

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10h: 'Engaging students in whole-group discussions to promote learning'

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005. (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12e: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to engage students in whole-group discussions to promote learning'

Frequency of teacher's receipt of professional development related to Accountable Talk in Math

A professional development session may cover more than one topic. How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005? (0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8h: 'Engaging students in whole-group discussions to promote learning'

8i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

(continued)

Appendix C.2 (continued)

Value teacher places on professional development related to Accountable Talk in Math

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10h: 'Engaging students in whole-group discussions to promote learning'

10i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005.

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12e: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to engage students in whole-group discussions to promote learning'

Frequency of teacher's receipt of professional development related to Academic Rigor in Math

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005?

(0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8d: 'Engaging students in active reasoning about and analysis of challenging content'

8g: 'Helping students learn content and skills central to developing conceptual understandings in math'

8i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

(continued)

Appendix C.2 (continued)

Value teacher places on professional development related to Academic Rigor in Math

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10d: 'Engaging students in active reasoning about and analysis of challenging content'

10g: 'Helping students learn content and skills central to developing conceptual understandings in math'

10i: 'Ensuring that students explain their thinking about important mathematical content during discussions'

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005.

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12d: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to involve students in active reasoning and problem solving'

Frequency of teacher's receipt of professional development related to Academic Rigor in Reading

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005?

(0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8d: 'Engaging students in active reasoning about and analysis of challenging content'

8e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

8f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

(continued)

Appendix C.2 (continued)

Value teacher places on professional development related to Academic Rigor in Reading

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10d: 'Engaging students in active reasoning about and analysis of challenging content'

10e: 'Choosing texts that contain literary or informational content that is complex and engaging enough to warrant extended discussion'

10f: 'Designing reading activities in which students are given the opportunity to develop and elaborate their ideas, including providing evidence for their positions'

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005.

(1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12d: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Improved my ability to involve students in active reasoning and problem solving'

Frequency of teacher's receipt of professional development related to Clear Expectations (survey item)

How often did you participate in district or school-sponsored professional development that included these topics during the 2005-2006 school year and the summer of 2005?

(0 = Never, 1 = Once or twice a year, 2 = Three of four times a year, 3 = Once or twice a month, 4 = At least once a week)

8c: 'Communicating explicitly to students the expectations for quality work'

(continued)

Appendix C.2 (continued)

Value teacher places on professional development related to Clear Expectations

If you engaged in district- or school-sponsored professional development activities that included these topics during the 2005-2006 school year and the summer of 2005, overall how valuable was each activity for your professional development? (1 = Not Valuable, 2 = Minimally valuable, 3 = Moderately valuable, 4 = Very valuable/ OR Did not engage in this activity)

10c: 'Communicating explicitly to students the expectation for quality work'

Please indicate the extent to which you agree or disagree with the following statements about the school and district – sponsored professional development activities in which you participated during the 2005-2006 school year and the summer of 2005. (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

12c: Overall, the professional development activities I participated in during the 2005-2006 school year and the summer 2005…'Increased my ability to set and communicate clear expectations for student work'

Teacher's assessment of the principal as an instructional leader

Please indicate the extent to which you agree or disagree with the following statements about the math curriculum relevant to your assignment (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

17q: My principal has helped with the implementation of the math curriculum in my classroom

Please indicate the extent to which you agree or disagree with the following statements about the reading curriculum relevant to your assignment (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

20s: My principal has helped with the implementation of the reading curriculum in my classroom

(continued)

Appendix C.2 (continued)

Teacher's assessment of the principal as an instructional leader (continued)

Please indicate the frequency with which your principal has performed the following actions since the beginning of the school year (0 = Never, 1 = Less than once a month, 2 = Once or twice a month, 3 = At least once a week)

21a: 'Given me useful feedback and/or suggestions on my teaching'

21b: 'Given me useful suggestions on how to engage students in whole-group discussions to promote learning'

21c: 'Given me useful suggestions on how to engage students in active reasoning about and analysis of challenging content'

21d: 'Given me useful suggestions on how to communicate explicitly to students the expectations for quality work'

21e: 'Conducted a Learning Walk in my classroom'

21f: 'Visited my classroom (outside of a formal evaluation or Learning Walk) for 15 minutes or more at a time'

21g: 'Led professional development sessions in which I participated'

21h: 'Attended professional development sessions alongside the staff'

21i: 'Arranged for professional development sessions that are relevant to my teaching assignment'

21j: 'Reviewed student work with me (individually or in a group)'

21k: 'Reviewed student test results with me (individually or in a group)'

21l: 'Attended or participated in grade level or content area meetings'

(continued)

Appendix C.2 (continued)

Teacher's assessment of the principal as an instructional leader (continued)

Please indicate the extent to which you agree or disagree with the following statements about your principal's leadership (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

22a: The principal at my school…'Sets high standards for teaching and learning'

22b: (REVERSE-CODED): The principal at my school…'Has limited experience and/or knowledge of best instructional practices'

22c: The principal at my school…'Helps me adapt my teaching practices according to analyses of state or district assessment results'

22e: The principal at my school…'Engages school staff in developing the school's instructional program'

22f: The principal at my school…'Understands what students at different grade level are expected to know and be able to do'

22j: (REVERSE-CODED): The principal at my school…'Has little time to regularly visit classroom'

22n: The principal at my school…'Arranges for support when I need it (e.g., access to coaches, outside consultants, district curriculum staff)'

22o: The principal at my school…'Provides feedback to the faculty on Learning Walks that occur in my school'

Teacher's assessment of the principal as an organizational leader

Think about the leadership your principal provides at your school. Please indicate the extent to which you agree or disagree with the following statements about your principal's leadership (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Strongly Agree)

22d: The principal at my school…'Enforces school rules for student conduct and backs me up when needed'

22g: The principal at my school…'Ensures that I have adequate resources in my classroom'

22h: The principal at my school…'Helps build unity among the staff'

22i: (REVERSE-CODED): The principal at my school…'Spends too much time out of the school building'

22l: The principal at my school…'Knows the strengths and needs of the school's students and families'

Appendix D

Results of Regression Analyses Examining the Relationships Between Steps in the Theory of Action

The Instructional Leadership Study

Appendix Table D.1.a

Results of Regression Analyses on Step 1 to Step 2 in the Theory of Action: Instruction-Related Professional Development

Independent Variable	Role Principal Plays in PD Offered to Teachers: Standardized Coefficient	Role Principal Plays in PD Offered to Teachers: T-Statistic (Significance)	Time Principal Spends with Teachers on Instructional Improvement: Standardized Coefficient	Time Principal Spends with Teachers on Instructional Improvement: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of principal's receipt of instruction-related PD	0.421	2.290 (p = 0.028) **	0.297	4.314 (p = 0.000) ***
Value principal places on instruction-related PD	0.336	0.961 (p = 0.343)	0.294	2.243 (p = 0.031) **
Covariates				
Principal's years of experience	-0.054	-0.654 (p = 0.517)	0.124	4.001 (p = 0.000) ***
Teachers' years of experience	-0.296	-1.809 (p = 0.079) *	-0.103	-1.681 (p = 0.102)
School district				
Austin	0.386	1.458 (p = 0.154)	0.306	3.079 (p = 0.004) ***
NYC Region 10	0.152	0.768 (p = 0.448)	0.170	2.282 (p = 0.029) **
St. Paul	0.289	1.230 (p = 0.227)	0.234	2.656 (p = 0.012) **
Sample size (number of schools)		42		42
R-square		0.882		0.983

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.1.b

Results of Regression Analyses on Step 1 to Step 2 in the Theory of Action: Professional Development Related to the Principles of Learning (POLs)

Independent Variable	Role Principal Plays in PD Related to the POLs: Standardized Coefficient	Role Principal Plays in PD Related to the POLs: T-Statistic (Significance)	Frequency of Principal's Giving Teachers Suggestions on Implementing the POLs: Standardized Coefficient	Frequency of Principal's Giving Teachers Suggestions on Implementing the POLs: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of principal's receipt of PD related to the POLs	0.412	1.500 (p = 0.144)	0.143	1.161 (p = 0.254)
Value principal places on PD related to the POLs	0.208	0.484 (p = 0.632)	0.346	1.801 (p = 0.081) *
Covariates				
Principal's years of experience	-0.085	-0.741 (p = 0.465)	0.164	3.185 (p = 0.003) ***
Teachers' years of experience	-0.304	-1.313 (p = 0.199)	-0.070	-0.680 (p = 0.502)
School district				
Austin	0.503	1.605 (p = 0.119)	0.295	2.104 (p = 0.044) **
NYC Region 10	0.200	0.870 (p = 0.391)	0.215	2.093 (p = 0.045) **
St. Paul	0.323	1.307 (p = 0.201)	0.260	2.350 (p = 0.025) **
Sample size (number of schools)		38		38
R-square		0.802		0.960

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.1.c

Results of Regression Analyses on Step 1 to Step 2 in the Theory of Action: Professional Development Related to the Principle of Accountable Talk

Independent Variable	Role Principal Plays in PD Related to Accountable Talk: Standardized Coefficient	Role Principal Plays in PD Related to Accountable Talk: T-Statistic (Significance)	Frequency of Principal's Giving Teachers Suggestions on Implementing Accountable Talk: Standardized Coefficient	Frequency of Principal's Giving Teachers Suggestions on Implementing Accountable Talk: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of principal's receipt of PD related to Accountable Talk	0.311	0.982 (p = 0.334)	0.144	1.072 (p = 0.292)
Value principal places on PD related to Accountable Talk	0.316	0.712 (p = 0.482)	0.305	1.622 (p = 0.116)
Covariates				
Principal's years of experience	-0.044	-0.331 (p = 0.743)	0.176	3.097 (p = 0.004) ***
Teachers' years of experience	-0.118	-0.445 (p = 0.660)	-0.088	-0.782 (p = 0.441)
School district				
Austin	0.360	1.002 (p = 0.324)	0.313	2.062 (p = 0.048) **
NYC Region 10	0.098	0.354 (p = 0.726)	0.232	1.975 (p = 0.058) *
St. Paul	0.163	0.556 (p = 0.582)	0.299	2.408 (p = 0.023) **
Sample size (number of schools)		36		36
R-square		0.751		0.955

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.1.d

Results of Regression Analyses on Step 1 to Step 2 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor

Independent Variable	Role Principal Plays in PD Related to Academic Rigor: Standardized Coefficient	Role Principal Plays in PD Related to Academic Rigor: T-Statistic (Significance)	Frequency of Principal's Giving Teachers Suggestions on Implementing Academic Rigor: Standardized Coefficient	Frequency of Principal's Giving Teachers Suggestions on Implementing Academic Rigor: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of principal's receipt of PD related to Academic Rigor	0.231	0.821 (p = 0.418)	0.192	1.636 (p = 0.112)
Value principal places on PD related to Academic Rigor	-0.024	-0.052 (p = 0.959)	0.358	1.893 (p = 0.068) *
Covariates				
Principal's years of experience	-0.116	-0.958 (p = 0.345)	0.165	3.275 (p = 0.003) ***
Teachers' years of experience	-0.301	-1.303 (p = 0.203)	-0.023	-0.239 (p = 0.813)
School district				
Austin	0.787	2.374 (p = 0.024) **	0.252	1.826 (p = 0.078) *
NYC Region 10	0.348	1.445 (p = 0.159)	0.154	1.531 (p = 0.136)
St. Paul	0.597	2.297 (p = 0.029) **	0.179	1.653 (p = 0.109)
Sample size (number of schools)		37		37
R-square		0.797		0.965

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.1.e

Results of Regression Analyses on Step 1 to Step 2 in the Theory of Action: Professional Development Related to the Principle of Clear Expectations

Independent Variable	Role Principal Plays in PD Related to Clear Expectations: Standardized Coefficient	Role Principal Plays in PD Related to Clear Expectations: T-Statistic (Significance)	Frequency of Principal's Giving Teachers Suggestions on Implementing Clear Expectations: Standardized Coefficient	Frequency of Principal's Giving Teachers Suggestions on Implementing Clear Expectations: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of principal's receipt of PD related to Clear Expectations	0.436	1.470 (p = 0.152)	0.074	0.537 (p = 0.596)
Value principal places on PD related to Clear Expectations	0.251	0.497 (p = 0.623)	0.423	1.803 (p = 0.081) *
Covariates				
Principal's years of experience	-0.124	-0.971 (p = 0.340)	0.166	2.787 (p = 0.009) ***
Teachers' years of experience	-0.464	-1.777 (p = 0.086) *	-0.076	-0.623 (p = 0.538)
School district Austin	0.503	1.460 (p = 0.155)	0.270	1.684 (p = 0.103)
NYC Region 10	0.299	1.163 (p = 0.254)	0.238	1.988 (p = 0.056) *
St. Paul	0.368	1.320 (p = 0.197)	0.243	1.871 (p = 0.071) *
Sample size (number of schools)		37		37
R-square		0.761		0.948

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.a

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Instruction-Related Professional Development

Independent Variable	Frequency of Teachers' Receipt of Instruction-Related PD: Standardized Coefficient	Frequency of Teachers' Receipt of Instruction-Related PD: T-Statistic (Significance)	Value Teachers Place on Instruction-Related PD: Standardized Coefficient	Value Teachers Place on Instruction-Related PD: T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD offered to teachers	0.230	2.139 (p = 0.039) **	0.043	1.040 (p = 0.305)
Covariates				
Principal's years of experience	0.162	2.788 (p = 0.008) ***	0.008	0.347 (p = 0.730)
Teachers' years of experience	0.080	0.701 (p = 0.488)	-0.034	-0.788 (p = 0.436)
School district				
Austin	0.398	3.395 (p = 0.002) ***	0.676	15.043 (p = 0.000) ***
NYC Region 10	0.248	3.035 (p = 0.004) ***	0.419	13.394 (p = 0.000) ***
St. Paul	0.313	2.805 (p = 0.008) ***	0.576	13.479 (p = 0.000) ***
Sample size (number of schools)		42		42
R-square		0.940		0.991

(continued)

Appendix Table D.2.a (continued)

Independent Variable	Frequency of Teachers' Receipt of Instruction-Related PD: Standardized Coefficient	Frequency of Teachers' Receipt of Instruction-Related PD: T-Statistic (Significance)	Value Teachers Place on Instruction-Related PD: Standardized Coefficient	Value Teachers Place on Instruction-Related PD: T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Time principal spends with teachers on instructional improvement	0.479	2.069 (p = 0.046) **	0.060	0.670 (p = 0.507)
Covariates				
Principal's years of experience	0.087	1.312 (p = 0.198)	-0.002	-0.077 (p = 0.939)
Teachers' years of experience	0.060	0.538 (p = 0.594)	-0.040	-0.937 (p = 0.355)
School district				
Austin	0.273	1.597 (p = 0.119)	0.672	10.213 (p = 0.000) ***
NYC Region 10	0.145	1.169 (p = 0.250)	0.414	8.664 (p = 0.000) ***
St. Paul	0.215	1.457 (p = 0.154)	0.573	10.096 (p = 0.000) ***
Sample size (number of schools)		42		42
R-square		0.939		0.991

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.b

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Professional Development Related to the Principles of Learning (POLs)

	Frequency of Teachers' Receipt of PD Related to the POLs		Value Teachers Place on PD Related to the POLs	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD related to the POLs	0.204	2.012 (p = 0.052) *	0.035	0.887 (p = 0.381)
Covariates				
Principal's years of experience	0.194	2.656 (p = 0.012) **	0.015	0.528 (p = 0.601)
Teachers' years of experience	0.093	0.662 (p = 0.512)	0.003	0.049 (p = 0.961)
School district				
Austin	0.405	3.166 (p = 0.003) ***	0.663	13.375 (p = 0.000) ***
NYC Region 10	0.249	2.854 (p = 0.007) ***	0.396	11.685 (p = 0.000) ***
St. Paul	0.268	2.147 (p = 0.039) **	0.554	11.453 (p = 0.000) ***
Sample size (number of schools)		42		42
R-square		0.904		0.986

(continued)

Appendix Table D.2.b (continued)

Independent Variable	Frequency of Teachers' Receipt of PD Related to the POLs: Standardized Coefficient	Frequency of Teachers' Receipt of PD Related to the POLs: T-Statistic (Significance)	Value Teachers Place on PD Related to the POLs: Standardized Coefficient	Value Teachers Place on PD Related to the POLs: T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Frequency of principal's giving teachers suggestions on implementing the POLs	0.329	1.495 (p = 0.144)	0.053	0.633 (p = 0.531)
Covariates				
Principal's years of experience	0.124	1.478 (p = 0.148)	0.003	0.108 (p = 0.915)
Teachers' years of experience	0.062	0.438 (p = 0.664)	-0.003	-0.051 (p = 0.959)
School district				
Austin	0.375	2.262 (p = 0.030) **	0.660	10.441 (p = 0.000) ***
NYC Region 10	0.203	1.655 (p = 0.107)	0.389	8.338 (p = 0.000) ***
St. Paul	0.221	1.420 (p = 0.164)	0.547	9.229 (p = 0.000) ***
Sample size (number of schools)		42		42
R-square		0.900		0.985

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.c

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Accountable Talk

	Frequency of Teachers' Receipt of PD Related to Accountable Talk		Value Teachers Place on PD Related to Accountable Talk	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD related to Accountable Talk	0.147	1.246 (p = 0.221)	0.208	0.816 (p = 0.420)
Covariates				
Principal's years of experience	0.225	2.399 (p = 0.022) **	0.027	0.132 (p = 0.895)
Teachers' years of experience	0.083	0.464 (p = 0.645)	0.159	0.412 (p = 0.683)
School district				
Austin	0.399	2.673 (p = 0.011) **	-0.210	-0.649 (p = 0.520)
NYC Region 10	0.222	2.138 (p = 0.039) **	-0.622	-2.765 (p = 0.009) ***
St. Paul	0.303	2.015 (p = 0.051) *	-0.152	-0.465 (p = 0.645)
Sample size (number of schools)		42		42
R-square		0.841		0.253

(continued)

Appendix Table D.2.c (continued)

Independent Variable	Frequency of Teachers' Receipt of PD Related to Accountable Talk		Value Teachers Place on PD Related to Accountable Talk	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Frequency of principal's giving teachers suggestions on implementing Accountable Talk	0.137	0.522 (p = 0.605)	0.431	0.769 (p = 0.447)
Covariates				
Principal's years of experience	0.198	1.844 (p = 0.073) *	-0.056	-0.245 (p = 0.808)
Teachers' years of experience	0.086	0.470 (p = 0.641)	0.190	0.485 (p = 0.630)
School district				
Austin	0.418	2.025 (p = 0.050) *	-0.330	-0.749 (p = 0.458)
NYC Region 10	0.219	1.447 (p = 0.157)	-0.733	-2.271 (p = 0.029) **
St. Paul	0.287	1.437 (p = 0.159)	-0.297	-0.697 (p = 0.490)
Sample size (number of schools)		42		42
R-square		0.836		0.252

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.d

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor in Reading

	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Reading		Value Teachers Place on PD Related to Academic Rigor in Reading	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD related to Academic Rigor	0.079	0.690 (p = 0.495)	0.072	0.252 (p = 0.803)
Covariates				
Principal's years of experience	0.188	2.258 (p = 0.031) **	-0.061	-0.289 (p = 0.774)
Teachers' years of experience	0.037	0.243 (p = 0.810)	-0.122	-0.316 (p = 0.754)
School district				
Austin	0.501	3.330 (p = 0.002) ***	0.196	0.517 (p = 0.608)
NYC Region 10	0.308	3.313 (p = 0.002) ***	-0.455	-1.945 (p = 0.060) *
St. Paul	0.386	2.655 (p = 0.012) **	0.348	0.948 (p = 0.350)
Sample size (number of schools)		39		39
R-square		0.896		0.339

(continued)

Appendix Table D.2.d (continued)

Independent Variable	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Reading		Value Teachers Place on PD Related to Academic Rigor in Reading	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Frequency of principal's giving teachers suggestions on implementing Academic Rigor	0.338	1.397 (p = 0.172)	0.277	0.445 (p = 0.659)
Covariates				
Principal's years of experience	0.122	1.385 (p = 0.175)	-0.115	-0.507 (p = 0.616)
Teachers' years of experience	0.001	0.006 (p = 0.995)	-0.155	-0.414 (p = 0.682)
School district				
Austin	0.371	2.076 (p = 0.046) **	0.097	0.212 (p = 0.834)
NYC Region 10	0.215	1.802 (p = 0.081) *	-0.528	-1.724 (p = 0.094) *
St. Paul	0.298	1.906 (p = 0.065) *	0.282	0.699 (p = 0.489)
Sample size (number of schools)		39		39
R-square		0.900		0.341

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.e

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor in Math

Independent Variable	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Math: Standardized Coefficient	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Math: T-Statistic (Significance)	Value Teachers Place on PD Related to Academic Rigor in Math: Standardized Coefficient	Value Teachers Place on PD Related to Academic Rigor in Math: T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD related to Academic Rigor	0.187	1.859 (p = 0.072) *	0.513	1.983 (p = 0.056) *
Covariates				
Principal's years of experience	0.147	1.976 (p = 0.056) *	0.292	1.523 (p = 0.137)
Teachers' years of experience	0.162	1.229 (p = 0.228)	-0.065	-0.191 (p = 0.850)
School district				
Austin	0.451	3.558 (p = 0.001) ***	-0.309	-0.949 (p = 0.349)
NYC Region 10	0.262	3.182 (p = 0.003) ***	-0.739	-3.493 (p = 0.001) ***
St. Paul	0.166	1.397 (p = 0.171)	-0.116	-0.382 (p = 0.705)
Sample size (number of schools)		40		40
R-square		0.913		0.429

(continued)

Appendix Table D.2.e (continued)

Independent Variable	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Math		Value Teachers Place on PD Related to Academic Rigor in Math	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Frequency of principal's giving teachers suggestions on implementing Academic Rigor	0.333	1.456 (p = 0.155)	0.246	0.404 (p = 0.689)
Covariates				
Principal's years of experience	0.075	0.920 (p = 0.364)	0.187	0.866 (p = 0.393)
Teachers' years of experience	0.113	0.845 (p = 0.404)	-0.173	-0.488 (p = 0.629)
School district				
Austin	0.415	2.527 (p = 0.016) **	-0.018	-0.041 (p = 0.967)
NYC Region 10	0.205	1.743 (p = 0.090) *	-0.622	-1.989 (p = 0.055) *
St. Paul	0.136	0.953 (p = 0.347)	0.090	0.238 (p = 0.814)
Sample size (number of schools)		40		40
R-square		0.910		0.366

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.2.f

Results of Regression Analyses on Step 2 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Clear Expectations

	Frequency of Teachers' Receipt of PD Related to Clear Expectations		Value Teachers Place on PD Related to Clear Expectations	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 1				
Variable in the Theory of Action				
Role principal plays in PD related to Clear Expectations	0.139	1.374 (p = 0.178)	-0.158	-0.692 (p = 0.493)
Covariates				
Principal's years of experience	0.131	1.676 (p = 0.103)	0.015	0.085 (p = 0.933)
Teachers' years of experience	-0.005	-0.030 (p = 0.976)	-0.424	-1.244 (p = 0.222)
School district				
Austin	0.512	3.842 (p = 0.000) ***	0.450	1.503 (p = 0.141)
NYC Region 10	0.265	2.744 (p = 0.009) ***	-0.415	-1.911 (p = 0.064) *
St. Paul	0.460	3.460 (p = 0.001) ***	0.436	1.458 (p = 0.154)
Sample size (number of schools)		42		42
R-square		0.891		0.448

(continued)

Appendix Table D.2.f (continued)

Independent Variable	Frequency of Teachers' Receipt of PD Related to Clear Expectations		Value Teachers Place on PD Related to Clear Expectations	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Model 2				
Variable in the Theory of Action				
Frequency of principal's giving teachers suggestions on implementing Clear Expectations	0.135	0.644 (p = 0.524)	-0.132	-0.284 (p = 0.778)
Covariates				
Principal's years of experience	0.094	1.081 (p = 0.287)	0.054	0.277 (p = 0.783)
Teachers' years of experience	-0.040	-0.264 (p = 0.794)	-0.382	-1.137 (p = 0.263)
School district				
Austin	0.547	3.306 (p = 0.002) ***	0.398	1.085 (p = 0.285)
NYC Region 10	0.282	2.233 (p = 0.032) **	-0.445	-1.587 (p = 0.121)
St. Paul	0.478	3.057 (p = 0.004) ***	0.406	1.172 (p = 0.249)
Sample size (number of schools)		42		42
R-square		0.886		0.442

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.a

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Instruction-Related Professional Development

Independent Variable	Frequency of Teachers' Receipt of Instruction-Related PD: Standardized Coefficient	Frequency of Teachers' Receipt of Instruction-Related PD: T-Statistic (Significance)	Value Teachers Place on Instruction-Related PD: Standardized Coefficient	Value Teachers Place on Instruction-Related PD: T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of instruction-related PD	0.188	1.379 (p = 0.177)	0.066	1.322 (p = 0.195)
Value principal places on instruction-related PD	-0.068	-0.263 (p = 0.794)	-0.060	-0.633 (p = 0.531)
Covariates				
Principal's years of experience	0.145	2.369 (p = 0.023) **	0.003	0.136 (p = 0.893)
Teachers' years of experience	-0.016	-0.131 (p = 0.897)	-0.061	-1.382 (p = 0.176)
School district				
Austin	0.548	2.795 (p = 0.008) ***	0.723	10.059 (p = 0.000) ***
NYC Region 10	0.313	2.133 (p = 0.040) **	0.440	8.183 (p = 0.000) ***
St. Paul	0.435	2.504 (p = 0.017) **	0.617	9.683 (p = 0.000) ***
Sample size (number of schools)		42		42
R-square		0.935		0.991

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.b

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Professional Development Related to the Principles of Learning (POLs)

	Frequency of Teachers' Receipt of PD Related to the POLs		Value Teachers Place on PD Related to the POLs	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of PD related to the POLs	0.103	0.558 (p = 0.581)	-0.024	-0.330 (p = 0.743)
Value principal places on PD related to the POLs	0.361	1.258 (p = 0.218)	0.125	1.117 (p = 0.272)
Covariates				
Principal's years of experience	0.169	2.191 (p = 0.036) **	0.019	0.622 (p = 0.539)
Teachers' years of experience	-0.009	-0.060 (p = 0.953)	0.020	0.329 (p = 0.745)
School district				
Austin	0.308	1.468 (p = 0.152)	0.601	7.344 (p = 0.000) ***
NYC Region 10	0.148	0.963 (p = 0.343)	0.372	6.198 (p = 0.000) ***
St. Paul	0.184	1.112 (p = 0.275)	0.494	7.651 (p = 0.000) ***
Sample size (number of schools)		38		38
R-square		0.911		0.987

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.c

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Accountable Talk

Independent Variable	Frequency of Teachers' Receipt of PD Related to Accountable Talk		Value Teachers Place on PD Related to Accountable Talk	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of PD related to Accountable Talk	0.286	1.259 (p = 0.218)	-0.016	-0.032 (p = 0.975)
Value principal places on PD related to Accountable Talk	0.201	0.630 (p = 0.533)	0.938	1.302 (p = 0.203)
Covariates				
Principal's years of experience	0.166	1.726 (p = 0.095) *	-0.046	-0.210 (p = 0.835)
Teachers' years of experience	-0.095	-0.501 (p = 0.620)	0.201	0.467 (p = 0.644)
School district				
Austin	0.322	1.253 (p = 0.220)	-0.632	-1.086 (p = 0.286)
NYC Region 10	0.111	0.561 (p = 0.579)	-1.035	-2.298 (p = 0.029) **
St. Paul	0.275	1.308 (p = 0.201)	-0.374	-0.784 (p = 0.439)
Sample size (number of schools)		36		36
R-square		0.872		0.346

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.d

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor in Reading

Independent Variable	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Reading		Value Teachers Place on PD Related to Academic Rigor in Reading	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of PD related to Academic Rigor	0.052	0.261 (p = 0.796)	-0.224	-0.472 (p = 0.641)
Value principal places on PD related to Academic Rigor	0.212	0.644 (p = 0.525)	1.195	1.542 (p = 0.134)
Covariates				
Principal's years of experience	0.191	2.180 (p = 0.037) **	0.029	0.140 (p = 0.889)
Teachers' years of experience	-0.012	-0.070 (p = 0.944)	0.041	0.103 (p = 0.918)
School district				
Austin	0.406	1.662 (p = 0.107)	-0.545	-0.946 (p = 0.352)
NYC Region 10	0.232	1.392 (p = 0.175)	-0.958	-2.443 (p = 0.021) **
St. Paul	0.306	1.598 (p = 0.121)	-0.210	-0.467 (p = 0.644)
Sample size (number of schools)		36		36
R-square		0.896		0.422

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.e

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor in Math

	Frequency of Teachers' Receipt of PD Related to Academic Rigor in Math		Value Teachers Place on PD Related to Academic Rigor in Math	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of PD related to Academic Rigor	0.027	0.151 (p = 0.881)	-0.245	-0.523 (p = 0.605)
Value principal places on PD related to Academic Rigor	0.271	0.940 (p = 0.355)	0.491	0.655 (p = 0.518)
Covariates				
Principal's years of experience	0.129	1.649 (p = 0.110)	0.265	1.302 (p = 0.203)
Teachers' years of experience	0.086	0.586 (p = 0.562)	-0.103	-0.272 (p = 0.788)
School district				
Austin	0.431	2.025 (p = 0.052) *	-0.085	-0.154 (p = 0.878)
NYC Region 10	0.209	1.355 (p = 0.186)	-0.679	-1.691 (p = 0.102)
St. Paul	0.157	0.988 (p = 0.331)	0.114	0.277 (p = 0.784)
Sample size (number of schools)		36		36
R-square		0.919		0.453

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.3.f

Results of Regression Analyses on Step 1 to Step 3 in the Theory of Action: Professional Development Related to the Principle of Clear Expectations

Independent Variable	Frequency of Teachers' Receipt of PD Related to Clear Expectations		Value Teachers Place on PD Related to Clear Expectations	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Frequency of principal's receipt of PD related to Clear Expectations	-0.046	-0.229 (p = 0.820)	-0.351	-0.817 (p = 0.420)
Value principal places on PD related to Clear Expectations	0.221	0.653 (p = 0.518)	0.504	0.689 (p = 0.496)
Covariates				
Principal's years of experience	0.139	1.622 (p = 0.115)	0.121	0.654 (p = 0.518)
Teachers' years of experience	-0.087	-0.496 (p = 0.624)	-0.243	-0.641 (p = 0.526)
School district				
Austin	0.524	2.268 (p = 0.031) **	0.071	0.142 (p = 0.888)
NYC Region 10	0.290	1.683 (p = 0.103)	-0.658	-1.764 (p = 0.088) *
St. Paul	0.449	2.400 (p = 0.023) **	0.157	0.389 (p = 0.700)
Sample size (number of schools)		37		37
R-square		0.893		0.497

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.4.a

Results of Regression Analyses on Step 3 to Step 4 in the Theory of Action: Instruction-Related Professional Development

Independent Variable	Reading IQA Score		Math IQA Score	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of instruction-related PD	0.410	2.451 (p = 0.021) **	0.092	0.681 (p = 0.501)
Value teachers place on instruction-related PD	-0.214	-0.445 (p = 0.660)	-0.141	-0.392 (p = 0.697)
Covariates				
Principal's years of experience	-0.072	-1.182 (p = 0.248)	-0.009	-0.183 (p = 0.856)
Teachers' years of experience	0.096	1.037 (p = 0.309)	-0.009	-0.118 (p = 0.906)
School district				
Austin	0.385	1.398 (p = 0.174)	0.659	2.979 (p = 0.005) ***
NYC Region 10	0.436	2.124 (p = 0.043) **	0.547	3.732 (p = 0.001) ***
St. Paul	0.497	1.823 (p = 0.080) *	0.610	2.993 (p = 0.005) ***
Sample size (number of schools)		33		40
R-square		0.968		0.972

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.4.b

Results of Regression Analyses on Step 3 to Step 4 in the Theory of Action: Professional Development Related to the Principles of Learning (POLs)

	Reading IQA Score		Math IQA Score	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of PD related to the POLs	0.221	1.696 (p = 0.102)	-0.086	-0.898 (p = 0.376)
Value teachers place on PD related to the POLs	0.236	0.700 (p = 0.490)	0.456	1.784 (p = 0.084) *
Covariates				
Principal's years of experience	-0.052	-0.867 (p = 0.394)	0.016	0.364 (p = 0.718)
Teachers' years of experience	0.093	0.976 (p = 0.338)	-0.001	-0.009 (p = 0.992)
School district				
Austin	0.207	1.073 (p = 0.293)	0.357	2.190 (p = 0.036) **
NYC Region 10	0.312	2.227 (p = 0.035) **	0.359	3.414 (p = 0.002) ***
St. Paul	0.335	1.738 (p = 0.094) *	0.337	2.250 (p = 0.031) **
Sample size (number of schools)		33		40
R-square		0.967		0.974

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.4.c

Results of Regression Analyses on Step 3 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Accountable Talk

	Reading Accountable Talk IQA Subscore		Math Accountable Talk IQA Subscore	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action[a]				
Frequency of teachers' receipt of PD related to Accountable Talk	0.248	2.963 (p = 0.006) ***	-0.016	-0.147 (p = 0.884)
Value teachers place on PD related to Accountable Talk	-0.048	-1.202 (p = 0.238)	0.003	0.067 (p = 0.947)
Covariates				
Principal's years of experience	-0.027	-0.595 (p = 0.556)	-0.005	-0.095 (p = 0.925)
Teachers' years of experience	-0.003	-0.034 (p = 0.973)	0.025	0.299 (p = 0.767)
School district				
Austin	0.437	6.534 (p = 0.000) ***	0.597	7.251 (p = 0.000) ***
NYC Region 10	0.391	6.773 (p = 0.000) ***	0.571	8.491 (p = 0.000) ***
St. Paul	0.504	7.009 (p = 0.000) ***	0.528	7.041 (p = 0.000) ***
Sample size (number of schools)		40		38
R-square		0.972		0.969

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]Different measures were used in the reading and math analyses to represent the frequency and value of teachers' professional development related to Accountable Talk. The measures used in the math analysis each include an item that is specific to Accountable Talk *in Math,* whereas the measures used in the reading analysis reflect the general concept of Accountable Talk (that is, there are no items specific to Accountable Talk *in Reading).*

The Instructional Leadership Study

Appendix Table D.4.d

Results of Regression Analyses on Step 3 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor

Independent Variable	Reading Academic Rigor IQA Subscore: Standardized Coefficient	Reading Academic Rigor IQA Subscore: T-Statistic (Significance)	Math Rigor of the Task IQA Subscore: Standardized Coefficient	Math Rigor of the Task IQA Subscore: T-Statistic (Significance)
Variables in the Theory of Action[a]				
Frequency of teachers' receipt of PD related to Academic Rigor	0.220	1.521 (p = 0.142)	-0.026	-0.247 (p = 0.806)
Value teachers place on PD related to Academic Rigor	0.038	0.746 (p = 0.463)	0.032	0.806 (p = 0.426)
Covariates				
Principal's years of experience	-0.093	-1.367 (p = 0.185)	0.015	0.342 (p = 0.734)
Teachers' years of experience	0.046	0.458 (p = 0.651)	0.057	0.743 (p = 0.463)
School district				
Austin	0.439	4.584 (p = 0.000) ***	0.633	7.739 (p = 0.000) ***
NYC Region 10	0.456	5.580 (p = 0.000) ***	0.497	7.877 (p = 0.000) ***
St. Paul	0.483	4.411 (p = 0.000) ***	0.503	7.820 (p = 0.000) ***
Sample size (number of schools)		30		40
R-square		0.966		0.972

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTES: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]Different measures were used in the reading and math analyses to represent the frequency and value of teachers' professional development related to Academic Rigor. The measures used in the math analysis include items that are specific to Academic Rigor *in Math*, and the measures used in the reading analysis include items that are specific to Academic Rigor *in Reading.*

The Instructional Leadership Study

Appendix Table D.4.e

Results of Regression Analyses on Step 3 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Clear Expectations

Independent Variable	Reading Clear Expectations IQA Subscore: Standardized Coefficient	Reading Clear Expectations IQA Subscore: T-Statistic (Significance)	Math Clear Expectations IQA Subscore: Standardized Coefficient	Math Clear Expectations IQA Subscore: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of PD related to Clear Expectations	0.327	2.060 (p = 0.049) **	-0.204	-1.272 (p = 0.212)
Value teachers place on PD related to Clear Expectations	0.033	0.498 (p = 0.622)	0.082	1.111 (p = 0.274)
Covariates				
Principal's years of experience	0.006	0.078 (p = 0.938)	0.004	0.060 (p = 0.953)
Teachers' years of experience	0.134	1.065 (p = 0.296)	-0.085	-0.622 (p = 0.538)
School district Austin	0.267	2.370 (p = 0.025) **	0.810	6.244 (p = 0.000) ***
NYC Region 10	0.353	3.557 (p = 0.001) ***	0.648	6.057 (p = 0.000) ***
St. Paul	0.310	2.316 (p = 0.028) **	0.656	4.790 (p = 0.000) ***
Sample size (number of schools)		34		41
R-square		0.940		0.914

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.5.a

Results of Regression Analyses on Step 2 to Step 4 in the Theory of Action: Instruction-Related Professional Development

Independent Variable	Reading IQA Score: Standardized Coefficient	Reading IQA Score: T-Statistic (Significance)	Math IQA Score: Standardized Coefficient	Math IQA Score: T-Statistic (Significance)
Variables in the Theory of Action				
Role principal plays in PD offered to teachers	0.079	0.687 (p = 0.498)	-0.047	-0.530 (p = 0.600)
Time principal spends with teachers on instructional improvement	-0.093	-0.378 (p = 0.709)	0.202	1.070 (p = 0.292)
Covariates				
Principal's years of experience	0.030	0.440 (p = 0.664)	-0.027	-0.523 (p = 0.605)
Teachers' years of experience	0.133	1.224 (p = 0.232)	0.003	0.032 (p = 0.975)
School district				
Austin	0.453	2.966 (p = 0.006) ***	0.523	4.460 (p = 0.000) ***
NYC Region 10	0.489	3.768 (p = 0.001) ***	0.447	4.930 (p = 0.000) ***
St. Paul	0.542	3.596 (p = 0.001) ***	0.494	4.561 (p = 0.000) ***
Sample size (number of schools)		33		40
R-square		0.961		0.972

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.5.b

Results of Regression Analyses on Step 2 to Step 4 in the Theory of Action: Professional Development Related to the Principles of Learning (POLs)

	Reading IQA Score		Math IQA Score	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Role principal plays in PD related to the POLs	0.124	1.532 (p = 0.138)	0.013	0.217 (p = 0.829)
Frequency of principal's giving teachers suggestions on implementing the POLs	-0.076	-0.461 (p = 0.649)	0.058	0.447 (p = 0.658)
Covariates				
Principal's years of experience	0.025	0.394 (p = 0.696)	-0.003	-0.067 (p = 0.947)
Teachers' years of experience	0.155	1.502 (p = 0.145)	0.003	0.043 (p = 0.966)
School district				
Austin	0.399	3.325 (p = 0.003) ***	0.569	6.269 (p = 0.000) ***
NYC Region 10	0.458	4.638 (p = 0.000) ***	0.486	6.973 (p = 0.000) ***
St. Paul	0.513	4.198 (p = 0.000) ***	0.532	6.006 (p = 0.000) ***
Sample size (number of schools)		33		40
R-square		0.964		0.971

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.5.c

Results of Regression Analyses on Step 2 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Accountable Talk

Independent Variable	Reading Accountable Talk IQA Subscore: Standardized Coefficient	Reading Accountable Talk IQA Subscore: T-Statistic (Significance)	Math Accountable Talk IQA Subscore: Standardized Coefficient	Math Accountable Talk IQA Subscore: T-Statistic (Significance)
Variables in the Theory of Action				
Role principal plays in PD related to Accountable Talk	-0.006	-0.100 (p = 0.921)	0.017	0.312 (p = 0.757)
Frequency of principal's giving teachers suggestions on implementing Accountable Talk	-0.207	-1.663 (p = 0.106)	0.016	0.133 (p = 0.895)
Covariates				
Principal's years of experience	0.074	1.452 (p = 0.156)	-0.011	-0.221 (p = 0.827)
Teachers' years of experience	-0.011	-0.132 (p = 0.896)	0.031	0.389 (p = 0.700)
School district				
Austin	0.678	7.250 (p = 0.000) ***	0.541	5.977 (p = 0.000) ***
NYC Region 10	0.585	8.088 (p = 0.000) ***	0.524	7.762 (p = 0.000) ***
St. Paul	0.708	7.511 (p = 0.000) ***	0.556	6.274 (p = 0.000) ***
Sample size (number of schools)		40		41
R-square		0.967		0.970

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.5.d

Results of Regression Analyses on Step 2 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Academic Rigor

	Reading Academic Rigor IQA Subscore		Math Rigor of the Task IQA Subscore	
Independent Variable	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Role principal plays in PD related to Academic Rigor	0.135	1.756 (p = 0.091) *	0.006	0.111 (p = 0.912)
Frequency of principal's giving teachers suggestions on implementing Academic Rigor	0.098	0.558 (p = 0.581)	0.015	0.118 (p = 0.907)
Covariates				
Principal's years of experience	-0.031	-0.499 (p = 0.622)	0.024	0.534 (p = 0.597)
Teachers' years of experience	0.122	1.144 (p = 0.263)	0.041	0.523 (p = 0.604)
School district				
Austin	0.350	2.809 (p = 0.009) ***	0.598	6.385 (p = 0.000) ***
NYC Region 10	0.414	4.256 (p = 0.000) ***	0.455	7.019 (p = 0.000) ***
St. Paul	0.425	3.345 (p = 0.003) ***	0.519	6.110 (p = 0.000) ***
Sample size (number of schools)		33		42
R-square		0.962		0.972

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.5.e

Results of Regression Analyses on Step 2 to Step 4 in the Theory of Action: Professional Development Related to the Principle of Clear Expectations

Independent Variable	Reading Clear Expectations IQA Subscore: Standardized Coefficient	Reading Clear Expectations IQA Subscore: T-Statistic (Significance)	Math Clear Expectations IQA Subscore: Standardized Coefficient	Math Clear Expectations IQA Subscore: T-Statistic (Significance)
Variables in the Theory of Action				
Role principal plays in PD related to Clear Expectations	0.222	2.420 (p = 0.023) **	0.051	0.504 (p = 0.617)
Frequency of principal's giving teachers suggestions on implementing Clear Expectations	-0.101	-0.531 (p = 0.600)	0.113	0.550 (p = 0.586)
Covariates				
Principal's years of experience	0.089	1.161 (p = 0.256)	-0.028	-0.337 (p = 0.738)
Teachers' years of experience	0.225	1.724 (p = 0.096) *	-0.078	-0.558 (p = 0.580)
School district				
Austin	0.315	2.273 (p = 0.031) **	0.598	3.932 (p = 0.000) ***
NYC Region 10	0.362	3.085 (p = 0.005) ***	0.449	3.815 (p = 0.001) ***
St. Paul	0.394	2.805 (p = 0.009) ***	0.486	3.358 (p = 0.002) ***
Sample size (number of schools)		34		41
R-square		0.941		0.911

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and classroom observations of third-grade teachers in these schools.

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.6.a

Results of Regression Analyses on Step 4 to Step 5 in the Theory of Action: Overall Instructional Quality Assessment (IQA) Scores

Independent Variable	Percentage of Students Meeting the Standard in Reading: Standardized Coefficient	Percentage of Students Meeting the Standard in Reading: T-Statistic (Significance)	Percentage of Students Meeting the Standard in Math: Standardized Coefficient	Percentage of Students Meeting the Standard in Math: T-Statistic (Significance)
Variable in the Theory of Action				
IQA Score in Reading/Math	0.390	2.703 (p = 0.012) **	0.294	1.698 (p = 0.099) *
Covariates				
Achievement of prior-year third-grade students in reading/math	0.187	0.679 (p = 0.503)	0.678	3.477 (p = 0.001) ***
Principal's years of experience	0.016	0.395 (p = 0.696)	0.062	1.479 (p = 0.149)
Teachers' years of experience	0.038	0.490 (p = 0.628)	-0.033	-0.414 (p = 0.681)
School district				
Austin	0.405	1.718 (p = 0.098) *	-0.060	-0.312 (p = 0.757)
NYC Region 10	0.071	0.753 (p = 0.458)	0.092	0.812 (p = 0.422)
St. Paul	0.111	0.730 (p = 0.472)	0.040	0.288 (p = 0.775)
Sample size (number of schools)		33		40
R-square		0.979		0.972

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.6.b

Results of Regression Analyses on Step 4 to Step 5 in the Theory of Action: Accountable Talk IQA Subscores

Independent Variable	Percentage of Students Meeting the Standard in Reading		Percentage of Students Meeting the Standard in Math	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Accountable Talk score in reading/math	0.381	2.962 (p = 0.006) ***	0.414	2.623 (p = 0.013) **
Covariates				
Achievement of prior-year third-grade students in reading/math	0.002	0.011 (p = 0.992)	0.636	3.448 (p = 0.002) ***
Principal's years of experience	0.002	0.072 (p = 0.943)	0.071	1.789 (p = 0.083) *
Teachers' years of experience	0.065	1.024 (p = 0.313)	-0.039	-0.523 (p = 0.604)
School district				
Austin	0.570	2.986 (p = 0.005) ***	-0.076	-0.441 (p = 0.662)
NYC Region 10	0.098	1.355 (p = 0.185)	0.028	0.270 (p = 0.789)
St. Paul	0.161	1.495 (p = 0.144)	-0.021	-0.166 (p = 0.869)
Sample size (number of schools)		40		41
R-square		0.983		0.975

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.6.c

Results of Regression Analyses on Step 4 to Step 5 in the Theory of Action: Academic Rigor IQA Subscores

Independent Variable	Percentage of Students Meeting the Standard in Reading: Standardized Coefficient	Percentage of Students Meeting the Standard in Reading: T-Statistic (Significance)	Percentage of Students Meeting the Standard in Math: Standardized Coefficient	Percentage of Students Meeting the Standard in Math: T-Statistic (Significance)
Variable in the Theory of Action				
Academic Rigor score in reading/math[a]	0.324	2.293 (p = 0.030) **	0.289	1.645 (p = 0.109)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.324	1.151 (p = 0.260)	0.684	3.388 (p = 0.002) ***
Principal's years of experience	0.030	0.705 (p = 0.487)	0.070	1.635 (p = 0.111)
Teachers' years of experience	0.054	0.677 (p = 0.505)	-0.062	-0.782 (p = 0.439)
School district				
Austin	0.303	1.192 (p = 0.244)	-0.053	-0.267 (p = 0.791)
NYC Region 10	0.063	0.596 (p = 0.557)	0.109	1.025 (p = 0.312)
St. Paul	0.081	0.487 (p = 0.630)	0.057	0.425 (p = 0.673)
Sample size (number of schools)		33		42
R-square		0.978		0.970

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]Academic Rigor in Reading combines Rigor of the Task and Rigor of the Discussion. However, due to the large proportion of math classroom observations that did not include a discussion following the task, Academic Rigor in Math only represents Rigor of the Task.

The Instructional Leadership Study

Appendix Table D.6.d

Results of Regression Analyses on Step 4 to Step 5 in the Theory of Action: Clear Expectations IQA Subscores

Independent Variable	Percentage of Students Meeting the Standard in Reading		Percentage of Students Meeting the Standard in Math	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variable in the Theory of Action				
Clear Expectations score in reading/math	0.186	1.684 (p = 0.104)	0.091	0.886 (p = 0.382)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.231	0.788 (p = 0.437)	0.723	3.458 (p = 0.001) ***
Principal's years of experience	0.011	0.259 (p = 0.797)	0.074	1.677 (p = 0.103)
Teachers' years of experience	0.055	0.680 (p = 0.502)	-0.048	-0.578 (p = 0.567)
School district				
Austin	0.475	1.891 (p = 0.069) *	0.026	0.132 (p = 0.896)
NYC Region 10	0.161	1.941 (p = 0.063) *	0.189	1.952 (p = 0.059) *
St. Paul	0.206	1.397 (p = 0.174)	0.151	1.210 (p = 0.234)
Sample size (number of schools)		34		41
R-square		0.977		0.968

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; classroom observations of third-grade teachers in these schools; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.7.a

Results of Regression Analyses on Step 3 to Step 5 in the Theory of Action: Instruction-Related Professional Development for Teachers

Independent Variable	Percentage of Students Meeting the Standard in Reading		Percentage of Students Meeting the Standard in Math	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of instruction-related PD	0.124	1.160 (p = 0.254)	0.094	0.688 (p = 0.496)
Value teachers place on instruction-related PD	0.178	0.608 (p = 0.547)	0.137	0.368 (p = 0.715)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.290	1.247 (p = 0.221)	0.699	3.353 (p = 0.002) ***
Principal's years of experience	0.002	0.063 (p = 0.950)	0.063	1.297 (p = 0.203)
Teachers' years of experience	0.046	0.700 (p = 0.489)	-0.048	-0.566 (p = 0.575)
School district				
Austin	0.349	1.215 (p = 0.233)	-0.042	-0.144 (p = 0.887)
NYC Region 10	0.097	0.747 (p = 0.460)	0.142	0.874 (p = 0.388)
St. Paul	0.113	0.595 (p = 0.556)	0.078	0.346 (p = 0.731)
Sample size (number of schools)		42		42
R-square		0.981		0.969

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.7.b

Results of Regression Analyses on Step 3 to Step 5 in the Theory of Action: Professional Development for Teachers on the Principles of Learning (POLs)

Independent Variable	Percentage of Students Meeting the Standard in Reading		Percentage of Students Meeting the Standard in Math	
	Standardized Coefficient	T-Statistic (Significance)	Standardized Coefficient	T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of PD related to the POLs	0.093	1.186 (p = 0.244)	0.074	0.725 (p = 0.474)
Value teachers place on PD related to the POLs	0.283	1.314 (p = 0.198)	0.244	0.892 (p = 0.379)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.341	1.484 (p = 0.147)	0.702	3.420 (p = 0.002) ***
Principal's years of experience	0.003	0.095 (p = 0.925)	0.062	1.329 (p = 0.193)
Teachers' years of experience	0.035	0.558 (p = 0.581)	-0.054	-0.668 (p = 0.508)
School district				
Austin	0.254	0.951 (p = 0.348)	-0.103	-0.414 (p = 0.681)
NYC Region 10	0.062	0.594 (p = 0.556)	0.110	0.867 (p = 0.392)
St. Paul	0.061	0.379 (p = 0.707)	0.035	0.195 (p = 0.847)
Sample size (number of schools)		42		42
R-square		0.982		0.970

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

The Instructional Leadership Study

Appendix Table D.7.c

Results of Regression Analyses on Step 3 to Step 5 in the Theory of Action: Professional Development for Teachers on the Principle of Accountable Talk

Independent Variable	Percentage of Students Meeting the Standard in Reading: Standardized Coefficient	Percentage of Students Meeting the Standard in Reading: T-Statistic (Significance)	Percentage of Students Meeting the Standard in Math: Standardized Coefficient	Percentage of Students Meeting the Standard in Math: T-Statistic (Significance)
Variables in the Theory of Action[a]				
Frequency of teachers' receipt of PD related to Accountable Talk	0.055	0.834 (p = 0.410)	0.081	0.800 (p = 0.430)
Value teachers place on PD related to Accountable Talk	0.059	1.864 (p = 0.071) *	0.007	0.183 (p = 0.856)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.367	1.641 (p = 0.110)	0.805	4.061 (p = 0.000) ***
Principal's years of experience	0.011	0.307 (p = 0.761)	0.054	1.245 (p = 0.223)
Teachers' years of experience	0.024	0.391 (p = 0.698)	-0.099	-1.271 (p = 0.213)
School district				
Austin	0.457	2.308 (p = 0.027) **	0.003	0.018 (p = 0.986)
NYC Region 10	0.223	3.913 (p = 0.000) ***	0.202	2.447 (p = 0.020) **
St. Paul	0.234	2.462 (p = 0.019) **	0.166	1.817 (p = 0.079) *
Sample size (number of schools)		42		39
R-square		0.983		0.976

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]Different measures were used in the reading and math analyses to represent the frequency and value of teachers' professional development related to Accountable Talk. The measures used in the math analysis each include an item that is specific to Accountable Talk *in Math*, whereas the measures used in the reading analysis reflect the general concept of Accountable Talk (that is, there are no items specific to Accountable Talk *in Reading*).

The Instructional Leadership Study

Appendix Table D.7.d

Results of Regression Analyses on Step 3 to Step 5 in the Theory of Action: Professional Development for Teachers on the Principle of Academic Rigor

Independent Variable	Percentage of Students Meeting the Standard in Reading: Standardized Coefficient	Percentage of Students Meeting the Standard in Reading: T-Statistic (Significance)	Percentage of Students Meeting the Standard in Math: Standardized Coefficient	Percentage of Students Meeting the Standard in Math: T-Statistic (Significance)
Variables in the Theory of Action[a]				
Frequency of teachers' receipt of PD related to Academic Rigor	0.000	-0.007 (p = 0.995)	0.119	1.155 (p = 0.257)
Value teachers place on PD related to Academic Rigor	0.049	1.994 (p = 0.055) *	0.010	0.252 (p = 0.803)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.507	2.617 (p = 0.014) **	0.718	3.594 (p = 0.001) ***
Principal's years of experience	-0.002	-0.084 (p = 0.934)	0.058	1.294 (p = 0.205)
Teachers' years of experience	0.025	0.497 (p = 0.623)	-0.070	-0.897 (p = 0.376)
School district				
Austin	0.366	2.139 (p = 0.040) **	0.030	0.165 (p = 0.870)
NYC Region 10	0.204	4.281 (p = 0.000) ***	0.205	2.415 (p = 0.022) **
St. Paul	0.222	2.974 (p = 0.006) ***	0.160	1.628 (p = 0.113)
Sample size (number of schools)		39		40
R-square		0.990		0.973

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTES: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

[a]Different measures were used in the reading and math analyses to represent the frequency and value of teachers' professional development related to Academic Rigor. The measures used in the math analysis include items that are specific to Academic Rigor *in Math* and the measures used in the reading analysis include items that are specific to Academic Rigor *in Reading*.

The Instructional Leadership Study

Appendix Table D.7.e

Results of Regression Analyses on Step 3 to Step 5 in the Theory of Action: Professional Development for Teachers on the Principle of Clear Expectations

Independent Variable	Percentage of Students Meeting the Standard in Reading: Standardized Coefficient	Percentage of Students Meeting the Standard in Reading: T-Statistic (Significance)	Percentage of Students Meeting the Standard in Math: Standardized Coefficient	Percentage of Students Meeting the Standard in Math: T-Statistic (Significance)
Variables in the Theory of Action				
Frequency of teachers' receipt of PD related to Clear Expectations	0.087	1.128 (p = 0.267)	0.011	0.113 (p = 0.910)
Value teachers place on PD related to Clear Expectations	0.021	0.591 (p = 0.558)	0.027	0.612 (p = 0.545)
Covariates				
Achievement of prior-year third-grade students in reading/math	0.291	1.228 (p = 0.228)	0.713	3.384 (p = 0.002) ***
Principal's years of experience	0.012	0.336 (p = 0.739)	0.077	1.675 (p = 0.103)
Teachers' years of experience	0.053	0.794 (p = 0.433)	-0.042	-0.503 (p = 0.618)
School district				
Austin	0.486	2.232 (p = 0.032) **	0.084	0.440 (p = 0.663)
NYC Region 10	0.202	3.047 (p = 0.004) ***	0.244	2.754 (p = 0.009) ***
St. Paul	0.223	2.034 (p = 0.050) **	0.183	1.573 (p = 0.125)
Sample size (number of schools)		42		42
R-square		0.981		0.968

SOURCES: MDRC calculations from survey responses of principals and third- and fourth-grade teachers in study schools in Austin, New York City Region 10, and St. Paul; and publicly available data on third-grade student achievement on the Texas Assessment of Knowledge and Skills (TAKS 2003-2006), the New York State Test (2006), the New York City CTB-Reading and CTB-Math tests (2003-2005), the Minnesota Comprehensive Assessment Series II (MCA-II 2006), and the Minnesota Comprehensive Assessment (MCA 2003-2005).

NOTE: Statistical significance levels are indicated as: * = 10 percent; ** = 5 percent; and *** = 1 percent.

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About MDRC

MDRC is a nonprofit, nonpartisan social and education policy research organization dedicated to learning what works to improve the well-being of low-income people. Through its research and the active communication of its findings, MDRC seeks to enhance the effectiveness of social and education policies and programs.

Founded in 1974 and located in New York City and Oakland, California, MDRC is best known for mounting rigorous, large-scale, real-world tests of new and existing policies and programs. Its projects are a mix of demonstrations (field tests of promising new program approaches) and evaluations of ongoing government and community initiatives. MDRC's staff bring an unusual combination of research and organizational experience to their work, providing expertise on the latest in qualitative and quantitative methods and on program design, development, implementation, and management. MDRC seeks to learn not just whether a program is effective but also how and why the program's effects occur. In addition, it tries to place each project's findings in the broader context of related research — in order to build knowledge about what works across the social and education policy fields. MDRC's findings, lessons, and best practices are proactively shared with a broad audience in the policy and practitioner community as well as with the general public and the media.

Over the years, MDRC has brought its unique approach to an ever-growing range of policy areas and target populations. Once known primarily for evaluations of state welfare-to-work programs, today MDRC is also studying public school reforms, employment programs for ex-offenders and people with disabilities, and programs to help low-income students succeed in college. MDRC's projects are organized into five areas:

- Promoting Family Well-Being and Child Development
- Improving Public Education
- Raising Academic Achievement and Persistence in College
- Supporting Low-Wage Workers and Communities
- Overcoming Barriers to Employment

Working in almost every state, all of the nation's largest cities, and Canada and the United Kingdom, MDRC conducts its projects in partnership with national, state, and local governments, public school systems, community organizations, and numerous private philanthropies.