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Principal Ownership of an Instructional Initiative: Advancing a Conceptual Framework for the Study of Leadership

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Principal Ownership of an Instructional Initiative: Advancing a Conceptual Framework for the Study of Leadership

Abstract

ABSTRACT

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Abigail Gray

There is a need for unified theory as to how and why principals' engagement with instructional initiatives does or does not develop, and how that engagement manifests, both in specific leadership behaviors and in changes in teacher practice. Such theory could inform policy decision-making by shedding light on the mechanisms that may facilitate principals' engagement with reform initiatives, and by clarifying what that engagement might ultimately produce. This study seeks to advance a new theoretical perspective on principal behavior in the context of instructional reform by examining the implementation of a literacy intervention through the lens of principal ownership. Using structural equation modeling and targeted qualitative inquiry, the study tests a hypothesized conceptual framework for principal ownership which posits that three antecedents (control, knowledge, and self-investment) contribute to principals' engagement in ownership behavior relative to an instructional initiative. The framework further posits that this ownership behavior—specifically, change promotion relative to the initiative—leads to changes in teacher collaboration around the reform, and ultimately influences classroom practice. This framework builds upon extant theory regarding school leadership, the processes around school change, and psychological ownership. While further research is needed to confirm these findings, the results of this exploratory study suggest that the hypothesized relationships are plausible. Significant pathways are found between the antecedents and the ownership behavior, and between the behavior and teacher collaboration. Mediational analysis of the pathways between principals' ownership behavior and the reform's reported influence on classroom instruction reveals that both the direct pathway and the indirect pathway (mediated by teacher collaboration) are significant. The findings of case-study research focused on three schools largely support the SEM study's conclusions and the hypothesized relationships. Viewed together, the quantitative and qualitative findings highlight lingering questions and directions for future research.

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PRINCIPAL OWNERSHIP OF AN INSTRUCTIONAL INITIATIVE:
ADVANCING A CONCEPTUAL FRAMEWORK FOR THE STUDY OF LEADERSHIP

Abigail Gray

A DISSERTATION

in

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Jonathan A. Supovitz

There is a need for unified theory as to how and why principals’ engagement with instructional initiatives does or does not develop, and how that engagement manifests, both in specific leadership behaviors and in changes in teacher practice. Such theory could inform policy decision-making by shedding light on the mechanisms that may facilitate principals’ engagement with reform initiatives, and by clarifying what that engagement might ultimately produce. This study seeks to advance a new theoretical perspective on principal behavior in the context of instructional reform by examining the implementation of a literacy intervention through the lens of principal ownership. Using structural equation modeling and targeted qualitative inquiry, the study tests a hypothesized conceptual framework for principal ownership which posits that three antecedents (control, knowledge, and self-investment) contribute to principals’ engagement in ownership behavior relative to an instructional initiative. The framework further posits that this ownership behavior—specifically, change promotion relative to the initiative—leads to changes in teacher collaboration
around the reform, and ultimately influences classroom practice. This framework builds upon extant theory regarding school leadership, the processes around school change, and psychological ownership. While further research is needed to confirm these findings, the results of this exploratory study suggest that the hypothesized relationships are plausible. Significant pathways are found between the antecedents and the ownership behavior, and between the behavior and teacher collaboration. Mediational analysis of the pathways between principals’ ownership behavior and the reform’s reported influence on classroom instruction reveals that both the direct pathway and the indirect pathway (mediated by teacher collaboration) are significant. The findings of case-study research focused on three schools largely support the SEM study’s conclusions and the hypothesized relationships. Viewed together, the quantitative and qualitative findings highlight lingering questions and directions for future research.
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This research was carried out in the context of a much larger study: a five-year, national evaluation of Reading Recovery. This evaluation is being conducted in fulfillment of a 2010 grant from the U.S. Department of Education’s Office of Innovation and Improvement’s Investing in Innovation Scaling Up What Works program. The grant was awarded to The Ohio State University to support the national expansion of Reading Recovery.

The evaluation is being conducted by a research team at the Consortium for Policy Research in Education (CPRE) at the University of Pennsylvania, in collaboration with the Center for Research in Education and Social Policy (CRESP) at the University of Delaware. As the author of this dissertation, I have been a part of the Reading Recovery evaluation team since 2011.

The idea for this dissertation grew out of CPRE’s efforts to understand the implementation of Reading Recovery, and more specifically the extent to which observed variation in the program’s school-level impacts may be a function of differences in implementation across schools. My colleagues on the CPRE research team and I identified principal engagement early colleagues as a factor that may underlie differences in program impacts. This dissertation is an attempt to explore this phenomenon deeply, as a means to better understand the mechanisms by which school-level implementation impacts the effectiveness of instructional programs.
CHAPTER 1: Introduction

Decades of research have demonstrated that principals play a key role in the instructional success of their schools (Louis, Leithwood, Wahlstrom, & Anderson, 2010). Furthermore, findings from recent studies of school leadership suggest that principals’ impacts on school outcomes are achieved, in large part, through their impact on teachers and school processes (Hallinger & Heck, 1996; Supovitz, Sirinides, & May, 2010). With these understandings increasingly cemented by research findings, newer questions of interest surround how principals can most effectively influence teachers in support of instructional goals. How and why do some principals succeed in fostering momentum and support for their priorities?

Instructional-change initiatives offer particularly fertile ground for the exploration of these questions. A considerable body of literature suggests that instructional practice in schools is highly resistant to outside influence; that most instructional reform efforts fail to achieve real and lasting change in the classroom (Datnow 2000a; Elmore, 1996; Cuban, 2013a). And, some studies indicate, principal engagement may be a particularly critical factor in the success of instructional reforms (Coburn & Russell, 2008; Useem, Christman, Gold, & Simon, 1997; Datnow, Hubbard, & Mehan, 1998). However, principals’ engagement with instructional initiatives cannot be presumed. As middle managers within district hierarchies, principals are often charged with
implementing programs and initiatives they did not select, or in which they are not particularly invested (Coburn, 2003). Even initiatives generated at the building level must compete for the principal’s attention and leadership (Weinbaum, Weiss, & Beaver, 2012), and research has demonstrated that some programs in a school often receive more focus from the principal than others (Useem et al, 1997).

Researchers have begun to investigate factors that may impact principals’ investment in a given instructional initiative (Stein & Nelson, 2003; McLaughlan & Mitra, 2001; Prestine & Nelson, 2005). However, there is a shortage of unified theory as to how and why principals’ engagement with instructional initiatives does or does not develop, and how that engagement manifests in specific leadership behaviors and in changes in teacher practice. Such theory could inform policy decision-making by shedding light on the mechanisms that may facilitate principals’ engagement with reform initiatives, as well as clarifying what that engagement might ultimately produce. These factors combine to make understanding *principals’ ownership of instructional initiatives* a matter of great consequence.

The use of the phrase “ownership” in education research is not novel; many studies nod to the presumed importance of school leaders’ ownership for the success of instructional initiatives (Desimone, 2002; Coburn, 2005; Fullan & Miles, 1992). However, a closer look reveals that, as a construct, ownership remains poorly developed and under-conceptualized in the education literature.
Concrete descriptions of the predictors, dimensions, and manifestations of ownership are absent, as are attempts at its measurement.

Psychological ownership research offers a new perspective on this issue—one that may ultimately yield explanatory theories on key school-leadership questions. Though it has never been applied to the school context, psychological ownership theory has been shown to apply to human nature generally, and to have particular utility for understanding workplace dynamics (Beggan, 1992; Vandewalle et al., 1995; Van Dyne & Pierce, 2004; Wagner et al., 2003). Furthermore, as Leithwood and Duke (1999) assert: “the contributions of psychology, both positive and negative, typically are underestimated in the most frequently cited accounts of the evolution of sources of school leadership authority” (p. 57).

In order to develop psychological ownership as a lens on school leadership, research must establish its pertinence to schools and school reform. Key questions include: How do principals’ feelings of ownership relative to an instructional initiative develop, and how are they expressed in terms of concrete leadership behaviors? How does a sense of ownership impact principals’ leadership of instructional initiatives in their buildings and how, in turn, does that leadership impact instruction in the classroom? Furthermore, which research methods and designs are best suited to the exploration of this phenomenon? The proposed study offers insights on each of these questions.
This study seeks to advance a new theoretical perspective on principal leadership in the context of instructional reform. It posits that a principal's sense of ownership relative to a given initiative affects both her leadership around the reform and the extent of its impact on instruction. Using structural equation modeling and focused qualitative inquiry, the study tests a hypothesized conceptual model for principal ownership that builds upon established theory regarding school leadership, the processes around school change, and psychological ownership. Ultimately, it offers a novel framework for considering principals' leadership of instructional initiatives in their schools, and new insights on why principals engage with reform and how that engagement takes shape.
CHAPTER 2: Literature Review

The theoretical framework for the proposed study draws upon three fields of scholarship. First, it is informed by decades of empirical study of principal leadership; this literature examines the extent to which, and the ways in which, principals impact instruction and student learning. Second, the framework draws on the extensive literature focused on change in schools, which highlights the essential intransigence of the structures of schooling, and the challenges principals face in rallying teachers behind instructional reform efforts. Finally, the proposed study is informed by the theoretical and empirical literature on psychological ownership, which suggests that ownership develops in the presence of particular antecedents and that it results in a specific set of behaviors. Viewed together, these literatures make a strong case for the cultivation of a theory-driven ownership perspective on principal leadership.

Research on School Leadership

Research has explored the nature and extent of principals’ impact on schools and students for several decades. In the process, scholars have arrived at some relatively clear and consistent conclusions. The first of these is that principals matter; a majority of the recent school-leadership research underscores the pivotal role of the principal in the instructional success of a school. Effect sizes for most school-level variables, viewed independently, are
now understood to be small, and leadership is no exception (Louis et al., 2010). With consistently “educationally significant” effects (Leithwood, Louis, Anderson, & Wahlstrom, 2004, p. 21), however, leadership is now believed to be one of the most consequential of these variables (Cheng, 1994; Goldring, Porter, Murphy, Elliott, & Cravens, 2007; Leithwood et al., 2004; Waters, Marzano, & McNulty, 2003).

In an early installment of their large, recent school-leadership study for the Wallace Foundation, Leithwood, Seashore Louis, Anderson and Wahlstrom note that “the total (direct and indirect) effects of leadership on student learning account for about a quarter of total school effects” (Leithwood et al., 2004, p. 5). The authors conclude that leadership is “second only to classroom instruction among all school-related factors that contribute to what students learn at school” (2004, p. 5). The authors reiterate this assertion later, in the final report of the Wallace Foundation study, writing that “after six years of research, we are even more confident about this claim” (Louis et al., 2010, p. 9). Other scholars express similar conviction. Leithwood, Patten, and Jantzi (2010) write:

School leaders are capable of having significant positive effects on student learning and other important outcomes…. Indeed, enough evidence is now at hand to justify claims about significant leadership effects on students that the focus of attention for many leadership researchers has moved on to include questions about how those effects occur (p.1).

The indirect nature of principal impacts

A second finding that is now well substantiated is that principals’ impact on
student achievement is mostly indirect. The research on the pathways of principals’ impacts is not new; much of the foundational work in this area was done in the late 1990s. However, the theoretical model underlying this study is significantly informed by this research, as it merges key understandings about the pathways and predictors of principal effects with more recent work on ownership. It is therefore worthwhile to explore the fundamental assumptions about principal effects that underlie the proposed study.

Research has revealed with relative consistency that principals influence students primarily by influencing their schools—by shaping the instructional and cultural environments in which learning happens. Analyzing 40 mostly quantitative studies exploring principals’ effects on schools, Hallinger and Heck (1998) observe that principal-effects studies proceed roughly chronologically from the early presumption of a bivariate relationship between principal leadership and student outcomes (Cheng, 1994) to a recognition that the relationship is rarely direct (Hallinger & Heck, 1996, 1998). Of the earlier studies—those seeking direct relationships between principal factors and student achievement—Hallinger and Heck write: “With but a few exceptions, the effects of principal leadership among [these] studies were nonexistent, weak, conflicting, or suspect in terms of validity” (p. 37).

This finding regarding direct-effects models of principal impact echoes a key conclusion of Hallinger and Leithwood’s (1994) more cursory review, published four years earlier:
When viewed in light of prior research, the findings here support the continued study of principal impact on student performance through indirect rather than direct paths. Earlier research that examined principal impact through bivariate analysis was clearly inadequate to the task of detecting effects. (p. 216)

In the wake of these conclusions, a marked shift in the research literature illustrates a new interest in identifying the variables that mediate principal effects on student-level outcomes. These mediated-effects studies hypothesize a broad range of intervening variables. Day, Sammons, Hopkins, Leithwood, and Kington (2008) offer a sense of the scope of this research, citing studies focused on the mediating role of:

…time on task (Smyth, 1987); quality of instruction/instructional climate (Biddle & Dunkin, 1987); a curriculum rich in ideas and engaging for pupils (Brophy, n.d); a safe and orderly climate (Teddlie & Stringfield, 1993); staff participation in school-wide decision-making (e.g. Conley, 1991); school culture (Deal, 2005); teacher commitment (Dannetta, 2002; Day et al, 2007); collective teacher efficacy (Goddard et al, 2000); sense of professional community (Louis & Kruse, 1995); organizational learning processes (Silins & Mulford, 2004); school goals (Hallinger & Heck, 1996); teachers’ capacity and experience (Glass, 2002); and procedures for monitoring pupil progress (Walberg, 1984). (p. 14)

Reflecting on the findings of these indirect-effects studies, Hallinger and Heck conclude that while the research clarifies that principal effects on student outcomes are largely indirect, it also confirms that they are real and often significant. “Studies based on a mediated-effects model,” they write, “frequently uncovered statistically significant indirect effects of principal leadership on student achievement via such variables (Hallinger & Heck, 1996, p. 38).”
Antecedent effects

Along with this growing focus on mediation models, principal-effects research is increasingly interested in the extent to which principal leadership is both an exogenous variable—one that impacts teachers and schools—and an endogenous variable acted upon by a range of factors both internal and external to schools. Research on antecedent effects attends increasingly to this duality (Pitner, 1988). It is a framing Hallinger and Heck endorse: “Both quantitative and qualitative studies confirm the appropriateness of conceptualizations that posit exogenous or antecedent variables as influencing the exercise of principal leadership” (Hallinger & Heck, 1996, p. 20).

Different studies have hypothesized different sets of antecedents, from socioeconomic status (SES) (Hallinger & Murphy, 1986; Scott & Teddlie, 1987), to school size (Cheng, 1994), communication patterns (Heck, 1992), school performance characteristics (Glasman & Fuller (1992), and principal personality traits (Bossert, 1982; Leithwood & Jantzi, 1990; Hallinger & Murphy, 1986a, 1986b). In addition, many studies have combined examinations of antecedent variables with a mediated-effects approach. For instance, Wiley (2001) found that principal leadership had a positive but indirect effect on student achievement in math, through the development of “professional communities.” Her model incorporated schools’ SES as an antecedent variable. Similarly, Hallinger, Bickman and Davis (1996) identified a positive effect on school achievement when leadership was mediated by instructional climate and instructional
organization, and that leadership itself was influenced by antecedent variables including SES, parental involvement and principals’ gender.

In the estimation of both Hallinger and Leithwood (1994) and Hallinger and Heck (1996; 1998), the emergence of antecedent and indirect-effects models of principal impact represent significant improvements over the originally conceived bivariate models not only methodologically, but also theoretically. Hallinger and Heck praise the “theoretical richness” of many of the studies in the antecedent-effects and antecedent/mediated-effects traditions. Hallinger and Leithwood, similarly, observe that:

Notable improvements [in recent principal effects research] include a clear explication of theoretical constructs and models, the use of multi-level, multi-variate designs, more sophisticated analytic procedures, and a broader set of outcome measures of impact. (Hallinger & Leithwood, 1994, p. 125)

Teachers as the critical mediators

Most recent empirical studies of principal effects identify teachers as the critical mediating variable between principal leadership and student achievement (Witziers, Bosker, & Kruger, 2003; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Supovitz, Sirinides, & May, 2010; Creemers & Reetzigt, 1996; Heck and Hallinger, 2010a, 2010b; Robinson, Lloyd & Rowe, 2008; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Mulford & Silins, 2003). Indeed, most scholars now regard principals’ impact on students as a function of their effectiveness at influencing, directing, resourcing, motivating, and positioning teachers via a range of activities. These activities are widely understood to include the following:
…developing a shared vision [among school staff members], increasing the academic press for learning, emphasizing teacher professional development, facilitating a collaborative working culture, and involving stakeholders in decision making. (Heck & Hallinger, 2010b, p. 230)

Various studies have determined that while principals’ engagement in instruction is important (Bamburg & Andrews, 1991), their direct, day-to-day supervision of teachers’ work yields little gain (Burkhauser et al., 2012; Horng et al., 2009). Larger school-leadership impacts are realized through principals’ work in establishing school-wide goals or purposes, and facilitating teachers’ investment in those goals (Bamburg & Andrews, 1991; Goldring & Pasternack, 1994; Hallinger, 2003). Citing Hallinger and Heck (1996), Hallinger (2003) writes that “instructional leadership influences the quality of school outcomes through the alignment of school structures (e.g, academic standards, time allocation, curriculum) with the school’s mission” (p. 333). Heck, Larson, Marcoulides, similarly, observe that “many of the important instructional leadership behaviors influencing school achievement are not related to the regular clinical supervision of teachers.” Rather, they attribute positive effects on student achievement to principals’ efforts in “clarifying, coordinating, and communicating a unified school educational purpose... Effective principals appear to build a sense of teamwork at the school” (Heck, Larson, & Marcoulides, 1990, p. 122). As Mulford and Silins (2003) explain, “‘collective teacher efficacy’ is the important intervening variable between leadership and teacher work and then student outcomes” (p. 184).

This conclusion is consistent with findings from other strands of the leadership literature. For example, a current focus of the literature on leadership
styles is transformational leadership, a conceptualization that emphasizes principals’ impacts on “the commitments and capacities of organizational members” (Leithwood & Duke, 1999, p. 48). Transformational leaders are presumed to manage through the facilitation of a shared sense of purpose and direction, which motivates others within the organization to work toward common goals (Griffith, 2004; Leithwood & Jantzi, 1990; Leithwood & Duke, 1999). “Transformational leadership,” write Marks and Printy (2003), “focuses on problem finding, problem solving, and collaboration with stakeholders with the goal of improving organizational performance” (p. 372).

Relevant to this study, the transformational-leadership literature also emphasizes the role of leadership in the context of change; this research is interested in schools in flux, and in the management of change as a primary task of the principal. Citing Conley and Goldman (1994) and Leithwood (1994), Marks and Printy (2003) write that research on “transformational leadership affirmed the centrality of the principal’s reform role, particularly in introducing innovation and shaping organizational culture” (p. 373).

Research on Instructional Reform: The Principal as the Agent of Change

The principal’s key role in organizing teachers for change is further underscored by the vast literature on change in schools. This perspective clearly reinforces empirical findings regarding the mediated nature of principals’ influence, and the hypothesis that school leadership acts primarily through
teacher and school-climate variables.

Understandings about how change happens in schools have evolved over decades of research. Early views of program and policy implementation as essentially a top-down adoption process dominated policy research in the 1950s and 60s, but quickly gave way to deeper insights regarding the importance of context and ground-level players in the implementation of change efforts (Mazmanian & Sabatier, 1983; Sabatier, 1986; Pressman & Wildavsky, 1973; Odden, 1991; Fullan 2000; Neumerski, 2012). With this transition, Miles (1993) writes, researchers and reform implementers alike “began to move intellectually from add-on or drop-in concepts of change ‘within the system’ to change of the system itself” (p. 229).

This early evolution in thought regarding reform implementation in general was paralleled in research on schools, where scholars moved from a “center-to-periphery” view of change implementation in favor of a “bilateral process” view that gave weight to the role of local actors in shaping and determining the outcomes of reform initiatives (Farrar, DeSanctis, & Cohen, 1980). Studies of the instructional reforms of the 1950s and 60s focused on fidelity, or “degree of implementation” (Fullan & Pomfret, 1977), and revealed low levels of reform uptake among teachers (Fullan & Pomfret, 1977; Hjern & Porter, 1981). As Leithwood & Duke (1999) explain, “…it soon became apparent that adoption decisions by [school and district] leaders did not have much to do with actual use of whatever was adopted in classrooms” (p. 59).
By the late 1970s and early 80s, scholars had embraced the position that change in schools—and, in particular, change in instruction (Datnow 2000b; Cuban, 1982, 2013)—was fraught with challenges, many of them stemming from teachers’ push-back against reform efforts (Cuban, 2013). The RAND change agent studies of the late 1970s, with their introduction of mutual adaptation theory, helped cement the critical role of teachers in shaping the reform-implementation process in schools (Berman & McLaughlin, 1976).

**Persistence at the technical core**

As many scholars have observed, teachers’ resistance to altering classroom practices in meaningful ways can be a significant impediment to instructional reform (Datnow, Borman, & Stringfield, 2000; Elmore, 1996; Cuban, 2013). Ogawa, Crowson, and Goldring (1999) identify this “persistence” in the face of change efforts as one of a handful of key dilemmas “at the very heart of school reform” (p. 287). Multiple studies validate this insight, revealing that reform initiatives intended to bring about lasting, meaningful improvement in significant numbers of schools rarely work (Fullan, 1998; Reynolds, 2005; Odden, 1991). Ultimately, McCullough writes, “the structures of schooling have proven ... highly resistant to fundamental change” (2005, p. 167).

This has proven particularly true of instructional reform, a fact attributed in the sociological literature on schooling—which, Leithwood and Duke (1999) contend, offers “a more decidedly ‘change agent’ view of school leadership than had any other prior source” (Leithwood & Duke, 1999, p. 59)—to an enduring and
fundamental disconnect between school and district policies and the “technical core” (Elmore, 1996) of instruction. Different scholars have conceptualized this disconnect in different ways: Weick (1976) famously described it as “loose coupling” between the instructional and managerial functions of the school. Bidwell (1965) understood it as a division between the “particularism” of the classroom and the “universalism” of administrators’ school-wide focus. To Lortie (1975), the disconnect was a function of “variable zoning” that keeps administrators at a distance from the goings-on inside classrooms.

The passage of decades has brought new lenses on the difficulties involved with instructional change. Coburn (2001), for instance, identifies a set of “gate-keeping” behaviors by which teachers limit the penetration of change initiatives into their classrooms. Regardless of how it is understood, this persistence at the heart of instruction has proven a highly enduring phenomenon (Datnow et al., 2000a). Indeed, Elmore (1996) and others have demonstrated, “the closer an innovation gets to the core of schooling, the less likely it is that it will influence teaching and learning on a large scale” (p. 4). Cuban (1988, 1992) describes this phenomenon in terms of first-order change that “stays at the organizational periphery” (cited in Ogawa, Crowson, & Goldring, 1999, p. 286) and second-order, instructional change: “Reforms come and go, but not often does an innovation penetrate to the second level” (p. 286).

In addition to shedding light on the role of teachers in school-level change, this perspective on the dynamics around change in schools also offers insights
as to the role of school principals in facilitating instructional reform. Regarded jointly with the principal-effects literature, it offers a resounding lesson: To achieve change in student outcomes (or any other school-level variables), principals must achieve change in teachers. As Spillane contends, “…teachers are the key agents when it comes to changing classroom practice: They are the final policy brokers” (1999, p.144).

Ownership: A New Lens on Leadership

The final theoretical perspective informing this study—research on ownership and its impacts on behavior—goes back centuries. Rousseau (1762) associated the origins of society with assertions of property ownership. James (1890) and Durkheim (1957) further explored the role of individuals’ relationships with their possessions in the development of morality and social organizations (Pierce, Kostova, & Dirks, 2001). More relevant to this discussion, however, is the mid-20th century emergence of the theoretical literature focused on ownership as a psychological phenomenon. Sometimes referred to as the “psychology of mine” (Litwinsky, 1942, 1947; Furby, 1978), this literature introduced the notion that a sense of ownership over one’s possessions is “a cognitive-affective state that characterizes the human condition” (Pierce, Kostova, & Dirks, 2003, pp. 84). Among its assertions is the idea that possessions become a part of the extended self, and that ownership of possessions plays a role in the development and
maintenance of self-concept (Belk, 1988; Dittmar, 1992; Pierce, Kostova, & Dirks, 2001).

The conceptualization of ownership presented here as a lens for understanding school leadership owes much to the more recent literature on “psychological ownership,” which emerged in the 1990s as a distinct field with strong theoretical connections to the psychological study of possession (Pierce, Rubenfeld, & Morgan, 1991; Pierce, VanDyne, & Cummings, 1992, 1994; Mayhew, Ashkansasy, Bramble, & Gardner, 2007). Whereas the older work presumed physical or legal possession of the object of ownership, the psychological ownership literature asserts that feelings of ownership can develop “in the absence of any formal or legal claims” (Mayhew et al., 2007a, p. 477). Defined by Pierce, Kostova and Dirks (2003) as “the state in which individuals feel as though the target of ownership or a piece of that target is ‘theirs’ (i.e., “It is mine!”)” (p. 86), psychological ownership is therefore not contingent upon any sort of actual possession. According to Ceja and Tapies, 2011:

Psychological ownership develops naturally within the cognitive and affective domains, describing people’s inclination to experience an intense connection with ideas, objects, relationships and other elements outside the material sphere, as if they were an extended part of themselves (p. 3).

Most scholars of psychological ownership contend that the state has cognitive, affective, and behavioral components (Druskat & Pescosolido, 2002); this research is intensely interested in the concrete ways a sense of ownership impacts behavior and decision-making (Pierce, Kostova, & Dirks, 2001; Vandewalle, Van Dyne, & Kostova, 1995; Wagner, Parker, & Christiansen, 2003).
Psychological ownership explored

Since its emergence, the psychological ownership construct has undergone considerable theoretical exploration and definition in the psychology and organizational psychology literatures (Avey, Avolio, Crossley, & Luthans, 2009; Beggan, 1992; Ceja & Tàpies, 2011; Mayhew et al., 2007a; Olzer, Yilmaz, & Ozler, 2008; O'Driscoll, Pierce, & Coghlan, 2006; Pierce & Jussila, 2010; Pierce et al., 2001, 2003; Vandewalle et al., 1995; Van Dyne & Pierce, 2004; Wagner et al., 2003). Though these studies vary in terms of focus and perspective, they have yielded some consensus as to the nature of psychological ownership as a construct, and as to its utility for a range of organizational applications.

The literature posits different models for understanding psychological ownership, with each emphasizing attitudes, behaviors, and sentiments to varying degrees (Pierce & Jussila, 2011; Druskat & Pescosolido, 2002). Though specifics vary, most scholars agree on a shared set of behavioral manifestations that includes extra-role activities; change-promotion; stewardship; and caring on behalf the object of ownership (Mayhew et al., 2007b; O'Driscoll et al., 2006; Pierce et al., 2003; Wagner et al., 2003). Theorized dimensions and manifestations of psychological ownership have been investigated via both quantitative (Avey et al., 2009; Van Dyne & Pierce, 2004) and qualitative (Ceja & Tàpies, 2011) instruments designed specifically for the measurement of the psychological ownership construct. In addition, several studies have established
the conceptual distinctness of psychological ownership from a range of related constructs—an important task given the vague fashion in which the term “ownership” has traditionally been employed (Pierce & Jusilla, 2001; Mayhew et al., 2007).

Theoretical explorations of psychological ownership contend that feelings of ownership can develop toward a broad range of “targets” that is not limited to physical objects. Citing early research into the psychology of mine that identified feelings of ownership among children toward songs and nursery rhymes (Isaacs, 1933), Pierce, Kostova and Dirks (2001) write:

There is empirical evidence that individuals express feelings of ownership toward their work (Beaglehole, 1932), their organization (Dirks, Cummings, & Pierce, 1996), the products they create (Das, 1993), their jobs (Peters & Austin, 1985), the practices employed by their organizations (Kostova, 1998), and specific issues in their organizations (Pratt & Dutton, 2000). (p. 301)

In their 2000 study of library employees, Pratt and Dutton (2000) apply the construct of psychological ownership to “the relationship between organizational members and potential organizational issues” (p. 123). Where ownership of workplace issues was observed, they note “a strong fusion between the self and the object” and assert that individual employees’ levels of ownership of various issues in the workplace are directly related to the extent to which the issues were integrated with the employees’ personal identities.

While acknowledging that ownership, as a fundamental human issue, manifests in a broad range of contexts, much of the literature on psychological ownership explores the construct as a workplace phenomenon. Management
and organizational scholars have taken particular interest in its implications for organizational dynamics and labor management (Avey et al., 2009; Ceja & Tàpies, 2011; Mayhew et al., 2007a; O’Driscoll et al., 2006; Pierce & Jussila, 2010, 2011; Pierce, Rubenfeld, & Morgan, 1991; Vandewalle et al., 1995; Wagner et al., 2003). The bulk of studies on psychological ownership assert that the concept, as O’Driscoll (2006) asserts, “has considerable explanatory power in research on work-related attitudes and behaviors” (p. 408).

The antecedents to ownership

Studies from both the psychological and organizational perspectives have sought to understand the antecedents to ownership—the conditions under which individuals develop a sense of ownership toward a given target. Theoretical work points to three primary antecedents: control over the target of ownership; deep knowledge of the target; and investment of the self into the target (Mayhew et al., 2007a; Pierce & Jussila, 2010, 2011; Pierce et al., 2003). These three antecedents—sometimes called the “routes” to psychological ownership—are theorized to be “distinct, complementary, and additive in nature” (Pierce et al., 2003, pp. 96):

Any single route can result in feelings of ownership independent of the others. However, the feelings of ownership for a particular target will be stronger when an individual arrives at this state as a result of traveling multiple routes … rather than just one route. The routes do not have a multiplicative relationship, which would imply that if any one of the routes does not occur, ownership will not emerge. (p. 96)
Decades of research into the psychology of mine have revealed a close connection between the ability to exert control over a target and the development of feelings of ownership. Furby (1978) and others focused on the distinction between “self” objects, which can be controlled and are therefore subject to feelings of ownership, and “non-self” objects that lie beyond one’s control (Pierce et al., 2003; Seligman, 1975). These early studies show a direct correlation between the amount of control one has over a target and the extent to which it is perceived as an extension of the self (Ellwood, 1927; Furby, 1978; Prelinger, 1959; McClelland, 1951).

Building on this earlier research, Pierce, Kostova, and Dirks (2001) assert that control “appears to be a key characteristic of psychological ownership” (p. 301), and several recent studies have sought to confirm that relationship (Mayhew et al., 2007; Pierce et al., 2004; O’Driscool, Pierce & Coughlin, 2001). Pierce, O’Driscooll & Coughlin (2004) investigated control as an antecedent to employees’ psychological ownership of both their jobs and their organizations overall under a range of work conditions. The relationships were tested using a series of mediated regressions which revealed that “control correlated with organization-based ownership, \( r = .47, p < .05 \), and with job-based feelings of ownership, \( r = .52, p < .05 \)” (Pierce et al., 2004, pp. 523). The study’s correlational design and use of cross-sectional data preclude causal conclusions, but its findings do support the plausibility of control as an antecedent to psychological ownership. This study utilized a 7-item scale of psychological ownership.
developed and validated by Pierce and Van Dyne (2004), an instrument that has since been used in other research (Mayhew et al., 2007a).

A second study, by Mayhew, Ashkanasy, Bramble, and Gardner (2007), used hierarchical multiple regression analyses to test the relationship between “autonomy”—an established measure of employees’ control over their work (Brass, 1985; Tanaka & Yamauschi, 2000)—and both “organization-based and job-based psychological ownership” (Mayhew et al., 2007, pp. 490). In addition to establishing organization-based and job-based psychological ownership as separate phenomena and “supporting the distinctiveness of psychological ownership from related work attitudes,” this study’s findings “are consistent with the prediction that autonomy would be related to both job-based and organization-based psychological ownership. Autonomy had both direct and indirect effects on psychological ownership…” (p. 495). Indeed, the authors write, “The unique ability of autonomy to predict [a range of psychological ownership correlates] above any mediation effects emphasizes the importance of considering autonomy when investigating employees in organizations” (p. 495).

A second hypothesized antecedent to psychological ownership, knowledge of the target of ownership, has been the subject of considerable theoretical and empirical study within the field of psychology generally. For instance, multiple studies have established the relationship between knowledge of, or exposure to, an object and favorable feelings toward it (Zajonc, 1968; Bornstein, 1989; Beggan, 1992). Similarly, Beaglehole (1932) posited that “fusion”
with the self develops as a result of intimate knowledge of an object (Pierce et al., 2001). Drawing on this research, Pierce and Jussila, 2011, posit that:

The more information and the better the knowledge an individual has about an object, the deeper the relationship between the self and the object and, hence, the stronger the feeling of ownership toward it... The intensity of association (e.g., the number of interactions of the individual with the target) will also influence the outcome. A longer association with a target (e.g., long tenure) will likely lead to perceptions of knowing the target better, and, as a result, to a sense of ownership. (Pierce et al., 2001, pp. 302)

Significant empirical study aimed at establishing the impact of having intimate knowledge of a target on the development of psychological ownership, as a specific construct, remains to be done. Just a few such studies have been undertaken. In one of these, a qualitative investigation of psychological ownership within family-owned businesses, Ceja and Tapies (2011) correlate “intimate familiarity with the family business” with a range of psychological ownership manifestations, including stewardship behaviors, pride, and commitment. Furthermore, they find a negative relationship between a lack of knowledge about the business and psychological ownership.

Like knowledge, self-investment as an antecedent to psychological ownership has received little empirical investigation directly focused on the psychological ownership construct. However, a few studies highlight parallel links. For instance, Pratt and Dutton (2000) examine the relationship between ownership and attention (a corollary of investment), finding that individual employees’ sense of an issue’s worthiness of their attention is directly related to the extent to which it becomes a target of their psychological ownership.
Ownership and the school-reform context

Though never as part of a unified theory, all three of the theorized antecedents to ownership have been previously identified as factors of interest in studies of principal leadership and school reform. For example, significant research has examined issues of school leaders’ control and autonomy in school change. Louis et al. (2010) describe the need for districts to balance their instructional agendas with principals’ ability to control the factors that make them effective. They advocate, for instance, that districts support principals’ “efficacy” by “allowing schools sufficient flexibility in pursuit of district goals,” adding that “the absence of principal efficacy can thwart important district initiatives” (p. 16) and that principal efficacy has significant effects on student achievement. Honig and Hatch (2004) frame the issue of control in terms of “coherence…between external demands and schools’ own goals and strategies” (p. 16).

The second psychological ownership antecedent—knowledge—is, similarly, a recurring if under-investigated theme in the leadership literature. Many studies have suggested that principals’ depth of understanding about reform initiatives matters. Trider and Leithwood (1988), for instance, found that principals’ content background impacts the amount of effort and attention they give to particular programs. Stein and Nelson (2003) advance a conceptualization of “leadership content knowledge” as a corollary to Shulman’s (1986) “missing paradigm” in teaching, pedagogical content knowledge. Citing McLaughlin and Mitra (2001), Stein and Nelson contend that “promoting and
sustaining … changes in teaching and learning required a supportive principal who understood and actively endorsed the values and perspectives underlying the project” (Prestine & Nelson, 2005, p. 54). Coburn (2005) cites a long list of leadership practices that are directly impacted by principals’ instructional knowledge. She suggests, however, that more research is needed on the role of principal knowledge in the context of instructional-change implementation.

Self-investment, as the third psychological ownership antecedent, shares several parallels with the school-leadership literature. For instance, Pratt and Dutton’s (2000) finding regarding the relationship between ownership and attention, as a form of self-investment, parallels findings by Useem et al. (1997), which identify principals’ inattention to reform initiatives as a major impediment to instructional change. Research focused on school principals’ ownership of instructional reforms—and in particular, the conditions under which that ownership develops—promises insights on the factors underlying principals’ attention to particular initiatives.

As these parallels suggest, clear connections with the core components of psychological ownership exist in the literature on principals and school reform already. What is missing, however, is an explanatory theory that can shed light on why and how control, knowledge, and self-investment matter, and connect them with concrete leadership behaviors around instructional initiatives. Psychological ownership theory offers this opportunity.
CHAPTER 3: Conceptual Framework

None of the existing literature on psychological ownership connects it with schools. However, psychological ownership theory is highly relevant to the study of principals, and particularly in the context of instructional reform implementation. This lens promises useful insight on why, whether, and how principals engage with particular reform initiatives, and on the impact of that engagement on instructional activity in schools.

This study seeks to excise the vague and under-conceptualized notion of “ownership” that is frequently evoked in the education literature (Coburn, 2005; Desimone, 2002; Fullan & Miles, 1992). In its place, it posits a model for principal ownership that comprises three antecedents to principal ownership, and one behavioral manifestation. The model hypothesizes the pathways by which principals’ ownership of a reform initiative can catalyze broader instructional change.

Figure 1 depicts the conceptual model for this study. The model posits that a principal’s control, knowledge, and self-investment relative to the reform lead to behaviors that impact teachers’ collaboration about the initiative and, in turn, influence classroom practice. The model hypothesizes that the three antecedents to psychological ownership established in prior research—control, knowledge, and self-investment—are also important in the context of an instructional reform initiative. Consistent with prior work on psychological
ownership, the framework posits that the three antecedents are distinct phenomena that may, but do not necessarily, co-occur relative to a given instructional initiative (Mayhew et al., 2007; Pierce & Jussila, 2010, 2011; Pierce et al., 2003).

![Conceptual framework for principal ownership of an instructional initiative](image)

*Figure 1. Conceptual framework for principal ownership of an instructional initiative*

The first of the hypothesized antecedents to ownership, Control, is understood in the psychological ownership literature as the extent to which an individual has the ability to influence the target of ownership (Pierce, O'Driscoll, Coughlin, 2004). Consistent with the dimensions of control identified in this literature and the findings of preliminary research for this study, I define Control
as decision-making authority and autonomy related to the program. The Control domain does not include involvement in the day-to-day operation of the program; the emphasis of this domain is on autonomy and involvement in major decisions.

I define the second hypothesized antecedent to principal ownership, Knowledge, as an understanding of the goals and processes of the initiative. This definition does not include knowledge of day-to-day occurrences or details related to the program’s operation in the school; the emphasis of this domain is on understanding.

Again consistent with both the psychological ownership literature and qualitative findings about the implementation of the instructional initiative under examination in this study, I define the third hypothesized antecedent, Self-Investment, as personal investment in the success of the initiative. That is, caring about, engagement with, and attention to the program. Self-investment is manifested in communication or decisions that mark the initiative as a personal priority for the principal, or in attention to details of its operation in a school. The emphasis of this domain is on engagement.

The framework further hypothesizes that these antecedents contribute to a specific behavioral manifestation of ownership on the part of the principal—that is, action that is intended to steer the school or district in the direction of the reform. This includes making decisions or taking steps that support the spread of the reform’s instructional philosophy or practice, including the alignment of other activities with its approach. The emphasis of this domain is on action in support of the initiative’s instructional agenda. Again, this pathway reflects a substantial
body of research that suggests that psychological ownership manifests in particular types of behaviors relative to the target of ownership. Change-promotion behavior has been identified in prior work as one such manifestation (O’Driscoll, 2006; Pierce, Kostova, & Dirks, 2001; Vandewalle, Van Dyne, & Kostova, 1995; Wagner, Parker, & Christiansen, 2003), and was selected as the ownership manifestation of interest to this study on the basis of its relevance to the implementation of instructional initiatives.

In the hypothesized conceptual model, principals’ change-promotion behaviors toward the instructional initiative lead to increased collaboration among teachers about the reform, and ultimately to perceived, self-reported influence on first-grade teachers’ classroom practice. This pathway is consistent with prior research on principal effects, on transformational leadership, and on change in schools, all of which suggest that principals’ impacts on student achievement are mediated by teacher factors, that teachers are the key agents of reform (Hallinger & Heck, 1996; Day, Sammons, Hopkins, Leithwood, & Kington, 2008), and that teacher collaboration and “collective efficacy” lie at the heart of instructional change (Mulford & Silins, 2003). While the existence of direct pathways from principal change-promotion behavior to changes in classroom practice are also explored, the model hypothesizes that the impact of principal behavior on the classroom practice of teachers is indirect, and mediated by teachers’ communication about the reform.

While it encapsulates much existing thought about the factors that may influence principals’ engagement with instructional change initiatives (Louis et al.,
2010; Stein & Nelson, 2003; Useem, Christman, Gold, & Simon, 1997), this framework offers a novel conceptualization of principal ownership as a unifying and explanatory theory for principals’ engagement with instructional initiatives.
CHAPTER 4: The Context for the Study

The lessons of this study are applicable beyond the specific context of the research; any serious exploration of the causes and consequences of principals’ behavior promises pertinent insights for school-improvement and leadership broadly. However, features of the particular instructional initiative under study here—Reading Recovery—shaped my approach to this project in ways that should inform any future research in this area. A brief overview of Reading Recovery, and a discussion of the specific aspects of the program that influenced the research design, are presented here.

Reading Recovery: The intervention

Reading Recovery is a school-based intervention designed to accelerate the literacy progress of struggling first-grade readers. The intervention itself consists of a 12- to 20-week series of one-to-one lessons provided by a highly trained literacy teacher. Participating students meet with this expert teacher for 30 minutes each day during the intervention period, as a supplement to their regular classroom instruction in literacy. The Reading Recovery-trained teacher designs and implements an individualized program for each student, and she (these teachers are almost all women) constantly adjusts and modifies the
instructional plan based on her continual monitoring of the student’s progress (May, Gray, Gillespie, Sirinides, Sam, Goldsworthy, Armijo, Tognatta, 2013).

Grounded in theory that highlights the critical importance of early intervention, Reading Recovery emphasizes the feasibility of permanently altering a child’s academic trajectory through intensive, short-term work with a skilled instructor. The intervention’s primary goal is to equip struggling readers with a flexible, self-directed set of literacy skills and strategies that help them catch up with their first-grade peers quickly, and remain at grade level in literacy over the long term (May et al., 2013).

Reading Recovery instruction is highly constructivist. Program theory posits that any child can learn to read well, regardless of disadvantage or disability, and that all students bring strengths that can be harnessed in service of the learning process. While the lessons comprise a structured set of general activities, within that structure the instructional program is driven entirely by the teacher’s moment-to-moment assessment of an individual student’s literacy strengths and needs. To that end, Reading Recovery teachers are trained to be expert observers; skilled Reading Recovery teachers can notice and interpret very subtle literacy behaviors and quickly translate them into nuanced instructional decisions (May et al., 2013).

Among literacy educators, Reading Recovery teachers are renowned for their diagnostic and instructional expertise. As part of the training process for Reading Recovery, these teachers complete an intensive, year-long, graduate-
level course in literacy instruction and theory, and they receive regular on-site support and coaching from experienced Reading Recovery teacher-trainers. One well-known feature of the Reading Recovery training process is the “behind-the-glass” training session; each week, a few teachers-in-training bring their own students to class, which is held in a specially designed classroom equipped with a two-way mirror and an observation area. While each teacher instructs her student behind the mirror, a group of trainees, experienced teachers, and teacher-trainers discusses and analyzes her lesson in minute detail (May et al., 2013).

Developed in New Zealand in the 1970s by a cognitive psychologist named Marie Clay, Reading Recovery was first introduced in the U.S. in the 1980s through a partnership between Clay and a group of literacy researchers at The Ohio State University. Since that time, it has become a widely used literacy intervention in U.S. schools, and has received considerable—though not unanimous—praise for its effectiveness. In 2008, Reading Recovery was recognized by the U.S. Department of Education Institute of Education Sciences’ What Works Clearinghouse for its demonstrated impacts on students’ literacy learning (May et al., 2013).

**Reading Recovery as a Feature of a School**

Reading Recovery is, first and foremost, a focused intervention that targets a small number of low-achieving children in a school. However, Reading
Recovery advocates and many school-level observers understand the program much more broadly—as a comprehensive instructional reform with school-wide impacts. Through several years of in-depth research on Reading Recovery, my colleagues at the Consortium for Policy Research in Education (CPRE) and I have observed that in robust implementations, the philosophies that underlie Reading Recovery’s model pervade and inform literacy instruction school-wide. Classroom curricula, materials, and other interventions are chosen specifically for their fit with Reading Recovery’s instructional approach and their ability to help classroom teachers at all grade levels adopt strategies and language that closely complement Reading Recovery’s (May et al., 2013).

In schools with more fully integrated Reading Recovery programs, the intervention also features prominently in the school-wide referral or response to intervention process. Decisions about which students receive Reading Recovery and how best to support them during and after the intervention are made by school-wide intervention teams, which review Reading Recovery lesson data and incorporate the teacher’s observations into their decision-making.

Through interviews and case studies, CPRE has observed that the principals of these high-implementation schools are often personally involved with the program. They know which students are receiving the implementation and how they are progressing. They pay attention to the long-term progress of the students, months and years after they complete the intervention. These principals tend to be knowledgeable about the intervention—a minority are even
Reading Recovery-trained themselves—and they describe it as a focal point of their schools’ literacy programming (May et al., 2013).

The principals of these high-implementation schools often attend carefully to decisions about the hiring and/or training of teachers for Reading Recovery, and they very intentionally position these expert teachers for maximum school-wide influence. As a result of this positioning, the Reading Recovery-trained expert teacher is recognized not only as the provider of a critical early intervention, but as an instructional resource for the entire building. Frequently, this teacher is explicitly encouraged—through more or less formal roles and structures—to share her knowledge about literacy with other teachers, to help them build their own literacy expertise, and to support them in applying Reading Recovery-based tools and strategies in their own classrooms (May et al., 2013).

One principal describes this positioning as follows:

When there’s a question about literacy or there’s a question about reading or writing instruction, [the Reading Recovery-trained teachers] are gonna be the leaders in the school for literacy. They’re gonna be the people that our other colleagues are asking questions to... And so we’re trying to match up our teachers who are weaker in reading instruction with those Reading Recovery teachers so they can see what the best practices look like. Because they’re applying those Reading Recovery strategies into [the other teachers’] dated reading instruction.

CPRE has also observed that, in other schools, Reading Recovery looks very different. Indeed, in weak implementations Reading Recovery-trained teachers often work in relative isolation, their impact largely confined to the few first-grade students they directly serve with daily lessons. They often report having little time or opportunity to communicate about instruction with other
teachers in the building, and may note that the instruction their students receive in the regular classroom does not support the progress they are making in their Reading Recovery lessons (May et al., 2013).

My colleagues at CPRE and I observe that these weak Reading Recovery implementations often exist in schools whose principals are not highly involved with the day-to-day operation of the program, who do not understand the intervention well, and who regard Reading Recovery as just one of many programs they oversee. In these schools, Reading Recovery personnel report that sustainability of the program is a concern—without strong support from the principal, the program is continually at risk of being eliminated to make room in the budget for other priorities.

CPRE’s findings about the strength of Reading Recovery implementation as a function of principal interest and engagement are consistent with prior research which suggests that instructional initiatives often compete with one another for school leaders’ time and attention, and that initiatives can suffer and ultimately fail for lack of principal engagement (Weinbaum, Weiss, & Beaver, 2012; Useem et al, 1997; Coburn, 2003). In this way, it seems, Reading Recovery is quite typical of instructional initiatives: The extent of its impact or influence on the school and its students varies widely, and this variation appears to be at least partly a function of differences in principal leadership. The goal of this dissertation is to look more deeply at the causes, nature, and impact of this variation.
Ownership in the Context of Reading Recovery

Part of the early work of this study was to understand how the ownership constructs of interest—Control, Knowledge, Self-Investment, and Change Promotion—are expressed in the context of Reading Recovery. While prior research suggests the kinds of activities and characteristics that comprise each construct in any context, it was important to identify the concrete and observable indicators that signify each domain in a Reading Recovery implementation.

The following discussion details the understandings drawn from my early analysis of preliminary interview data on principals’ interactions with Reading Recovery. These are preliminary findings; they were used primarily to provide a framework for the measurement work later in the study, and to guide the development of the data-collection instruments described in Chapter 5: Methods. Because of their significance to primary data collection, and because they are distinct from the main findings of the study, these preliminary findings are discussed here, separate from the major findings of this project.

Reading Recovery and Principal Control

As detailed in Chapter 3: Conceptual Framework, I define the first hypothesized antecedent to principal ownership, Control, as decision-making authority and autonomy related to the program. Preliminary research conducted at the outset of the study indicated that, in the context of Reading Recovery’s implementation, the extent to which districts dictate programmatic decision-making—versus decentralizing it to the building level—is the key determinant of
principals’ control. I observed that, in some districts, principals have great latitude in specifying the interventions used in their schools and in hiring staff for the programs; in others, these decisions are made at the district level and principals have little involvement in decisions about the adoption and maintenance of Reading Recovery.

Preliminary findings suggest that, at one end of the Control continuum, principals are instrumental in bringing Reading Recovery to their schools. Some single-handedly select the program and budget for it at the building level; others successfully fight for needed district funding or approval. Other principals participate with district or school-level personnel in a team process that results in the introduction of Reading Recovery at the school. At the other extreme—the “low-control” end of the continuum—Reading Recovery implementations are managed at the district level; principals in these districts have little or no say in whether their schools use Reading Recovery, and little authority to expand a successful program or discontinue a flagging one.

In addition to decisions about instituting and maintaining Reading Recovery, preliminary interview data reveal that principals have varying levels of authority over the hiring and firing of Reading Recovery staff. I observed that this dimension of principal control over the program is generally a function of one of two closely related factors: district hiring policies and union rules governing personnel decisions. While many principals are instrumental in determining which teachers receive Reading Recovery training, in filling Reading Recovery
positions in their schools, and in removing ineffective teachers, some have far less involvement in these processes.

The ability to make adjustments to staffing, or to expand or alter an implementation, can be particularly important to principals who have “inherited” Reading Recovery from a predecessor. A Reading Recovery trainer describes one such situation:

[This principal is] starting fresh and getting to choose the [Reading Recovery teachers] herself, because the past Reading Recovery teachers were chosen by another principal. So it’s almost like this is her idea now. And so she’s been more communicative with me, asking a lot more questions, providing a lot more information about the building, bringing the Reading Recovery teachers in training into the decision-making much more about how to set up their schedule, how to talk with the first grade teachers about who needs to be tested and how we’ll go through this process of selection… Now that it’s her decision to train people, it’s now her program.

**Reading Recovery and Principal Knowledge**

I define the second hypothesized antecedent to principal ownership, Knowledge, as *an understanding of the goals and processes of the program.*

The preliminary research conducted at the outset of this study revealed that principals’ knowledge of Reading Recovery comprises two complementary layers of understanding: procedural understanding about the operation of the Reading Recovery program, and instructional and theoretical literacy expertise. Findings of the preliminary research suggested that principals with high levels of knowledge generally demonstrate both types of understanding. Those with moderate knowledge may understand the program from an operational
standpoint but lack a strong grasp on its theoretical underpinnings. Principals with the lowest levels of knowledge may exhibit neither type of understanding.

Principals with operational knowledge of Reading Recovery, preliminary findings indicate, typically understand the intervention’s purpose and processes. This layer of understanding can be observed primarily in their management of logistical details: They grasp the importance of Reading Recovery training and ongoing professional development, and ensure that teachers’ schedules permit them to fully participate. They recognize the need to adhere to the daily lesson schedule, and give thought to issues like allowing teachers adequate prep time between lessons. Low-knowledge principals, on the other hand, may assign the Reading Recovery teacher roles that conflict with the one-to-one lesson schedule, like covering classes when other teachers are absent, or may overload her schedule. A trainer explains:

A principal that lacks understanding might say, “Well, you can do a lesson during this thirty minutes, and you can do a lesson during this thirty minutes,” without having the understanding that there is transition to get the child from the classroom, get the child seated, books unpacked, start the lesson, get the child back to the room. It ends up not being a full 30-minute timeframe [for the Reading Recovery lesson].

Based on the preliminary research, I observed that more knowledgeable principals couple this procedural familiarity with instructional insight. At a minimum, they are familiar with the underlying philosophy that guides the program, and embrace its focus on early, individualized intervention. As one trainer explains:
[A knowledgeable principal] gets the concept that in order for children to really come out in front of the eight ball we have to make accelerated progress at an early, early age, or early on in their processing difficulties. A lot of people don’t get that. They will say “Oh, they’re just young and, you know, why don’t we give them a chance, time will tell.” [Principals who understand Reading Recovery have] the urgency of “We know that there’s some difficulty here and we need to address it right now!”

Along with this perspective, the most knowledgeable principals bring expertise in literacy and an understanding of how Reading Recovery’s instructional approach operationalizes its underlying theory. According to reports in the preliminary interviews, they have observed Reading Recovery lessons—often many of them—and understand the sequence of activities that characterize instruction. Unlike low-knowledge principals, who may unwittingly pair Reading Recovery with classroom curricula that undermine its instructional agenda, high-knowledge principals are well versed in the literacy programs and practices that align with and support Reading Recovery.

High-knowledge principals demonstrate their understanding of the initiative in the ways that they talk about it, and about literacy instruction in general. They use the language of Reading Recovery—terms like “text levels” and “running records”—in discussions with Reading Recovery and classroom teachers alike. They speak about the interrelatedness of reading and writing, and understand that these are not separate activities, but closely related components of a single process.

Many high-knowledge principals have significant personal experience with the program and a deep-seated belief in its effectiveness. Many were early
literacy teachers prior to becoming administrators; a few are Reading Recovery trained. One principal reports:

[I] pursued the opportunity to participate in the [scale-up] grant to get a Reading Recovery teacher… because it was a program that I was familiar with as a teacher. I had seen its value and I felt that it was far and away just the best intervention that was out there for reading.

In other cases, knowledge about the intervention develops over time, through contact with trained teachers and their trainers. Reflecting on a principal’s learning process with Reading Recovery, one trainer said: “She would come to some of our meetings and she would cite things that [Reading Recovery founder Marie] Clay said or something related to Reading Recovery about children. She’s become a student of Reading Recovery.”

**Reading Recovery and Principal Self-Investment**

As noted in *Chapter 3: Conceptual Framework*, I define Self-Investment—the third hypothesized antecedent to principal ownership—as *personal caring about, engagement with, and attention to the program*. Based on the preliminary research, I find that in the context of Reading Recovery’s implementation, Self-Investment manifests in concrete ways that are both observable and more or less particular to the program. Early-stage interviews revealed that principals who exhibit high levels of self-investment in Reading Recovery are personally involved in the program in ways that are consistent and visible to others. They troubleshoot problems and broadcast successes; they are vocal about the ways Reading Recovery benefits their students and schools.
According to my preliminary findings, highly invested principals also demonstrate particular commitment to the success of Reading Recovery by personally shepherding key features of its operation. They attend meetings related to student selection and progress, communicate with parents about the intervention, monitor program outcomes, and track individual students’ performance during and after the intervention. Their colleagues understand that Reading Recovery is a personal priority—some describe it as a “pet project”—for their principals. As one trainer observes:

[This principal] really wants to know about the Reading Recovery students and she seems to know these students and their needs and feels that they’re in the right place because they’re getting Reading Recovery lessons. You know, she sees their progress. She’s invested in their progress as well.

By contrast with low-investment principals, high-investment principals communicate with Reading Recovery teachers more regularly, and communicate with others in the school about the initiative more frequently. They have more frequent contact with Reading Recovery teacher-trainers than do their less-invested counterparts.

**Change Promotion**

A principal’s change promotion behavior amounts to an expression of her accumulated control, knowledge and expertise about the program. On the basis of qualitative findings about the program, I define Change-Promotion behavior as action that is intended to steer the school or district in the direction of the reform. This includes making decisions or taking steps that support the spread of
Reading Recovery philosophy or practice, including the alignment of instructional activities with its approach. The emphasis of this domain is on *action in support of Reading Recovery’s instructional agenda*.

The preliminary research for this study suggested that, in the context of a Reading Recovery implementation change-promotion behavior is exemplified, first and foremost, by an effort to bring the trained, expert teacher into regular contact with other teachers in the building for the purpose of spreading Reading Recovery-based instructional expertise with others. Principals who engage in very high levels of change-promotion behavior often assign Reading Recovery-trained expert teachers an explicit instructional leadership role in the school—she may double as an instructional coach, for instance—or have her co-teach with other teachers in the regular classroom. These principals may involve Reading Recovery-trained staff in the design and conduct of school-wide professional development, and may require her attendance at grade-level or professional learning community meetings where literacy instruction is discussed. A teacher-trainer describes one principal's engagement of her Reading Recovery teachers in explicit leadership roles:

> She put the two trained Reading Recovery teachers in leadership positions within that building. Those folks basically ruled the roost, so to speak, about what kinds of data were collected at the classroom level, and she very much let them lead the show.

Similarly, preliminary findings suggest that principals who engage in high levels of change-promotion behavior prioritize alignment with Reading Recovery
when making decisions about other curricula or interventions for the school. They may engage the Reading Recovery teacher and/or trainer in the selection of curricula or materials for regular classroom use, and may eliminate instructional elements they regard as poor fits with Reading Recovery’s philosophy and approach. These principals may ensure, for example, that all classroom teachers use running records to assess and document students’ progress, or that all texts are leveled using Reading Recovery’s text levels or the complementary Fountas & Pinnell™ leveling system. Some encourage their teachers to incorporate Reading Recovery-based instructional techniques in their classrooms; others require it.

Principals who exhibit high levels of change-promotion behavior also create systems and structures to integrate Reading Recovery’s progress data with school decision-making, and involve the Reading Recovery teacher in decisions about students’ next steps, including whether special education referral may be necessary.

The preliminary interviews reveal that low-change-promotion principals, by contrast, do not take active steps to facilitate the spread of Reading Recovery-based instructional knowledge throughout their schools. While they do not necessarily prevent Reading Recovery teachers from taking initiative on their own, they do not create structure or processes to facilitate regular contact between Reading Recovery teachers and others, nor do they position trained expert teachers strategically to ensure maximum impact on instruction in the
building. These principals allow Reading Recovery and regular classroom instruction to operate in parallel, with little or no effort aimed at aligning them.

The discussion above reveals many consistencies with the voluminous prior research focused on principals’ engagement with reform efforts (Leithwood & Duke, 1999; Heck, Larson, & Marcoulides, 1990; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Hallinger & Heck, 1996), supporting the relevance of this work to research on instructional change, school reform, and leadership more broadly. These consistencies will be explored more fully in Chapter 9: Discussion. Here, however, it is worth noting that in addition to these consistencies, this preliminary effort to link the ownership constructs with Reading Recovery yields details specific to the program that were essential to the development of the data-collection instruments for overall study. My process for translating these insights into qualitative and quantitative data-collection instruments is described in detail in Chapter 5: Methods.
CHAPTER 5: Methods

This study explores three questions related to principal ownership of instructional initiatives. These are as follow:

1. Do the antecedents to psychological ownership—control, knowledge, and self-investment—impact principals’ change-promotion behavior toward instructional initiatives?

2. Is there a relationship between principals’ change-promotion behavior toward an instructional initiative and classroom teachers’ sense of the reform’s impact on their own instruction? To what extent is this relationship mediated by teacher collaboration related to the reform?

3. What relationships emerge from empirical study of the conceptual framework that can be illuminated through case studies?

I used a sequenced mixed-methods design with tightly integrated quantitative and qualitative components to address these questions. These components are described in detail here.
Overview: Empirical study

Questions #1 and 2 were addressed via the development and testing of a measurement model for principal ownership and a structural model that examines the hypothesized pathways between the antecedents to principal ownership, the behavioral manifestation of principal ownership selected for this study (change promotion), and the teacher outcomes identified in Research Question #2. This analysis was conducted using structural equation modeling (SEM).

The data for the empirical study were derived from survey items I created to measure the constructs of interest. The psychological ownership constructs examined in this study are latent—that is, they are abstract phenomena that cannot be observed directly (Byrne, 2012). Therefore, it was necessary to develop a latent-variable model in order to measure them. My phased process for developing this model based on the findings of preliminary interviews is described in detail below. Survey data were collected during the spring and summer of 2013.

Structural equation modeling offers a number of advantages over standard regression methods for this type of analysis, including the ability to model latent variables that cannot be observed directly. It also provides the opportunity to position variables—principal leadership behavior, in this case—as simultaneously dependent and independent, and to model relationship pathways between multiple variables. In addition, unlike other regression methods, SEM integrates a
multivariate model of the latent factors that estimates an error variance for each item. This permits an examination of the relationships among the latent variables using only the variance explained, or the reliable portion of each latent variable. As a result, SEM makes fewer assumptions about scale structure and factor reliability than standard regression. This approach is well-suited to a project like the study described here, which introduces not only new constructs to the study of school change, but also new measurement instruments.

A number of recent studies have employed SEM methodology to identify the specific pathways by which principals’ impacts on their schools are realized (Hallinger & Heck 2011; Leithwood, Anderson, Mascall & Strauss, 2010; Leithwood, Patten, & Jantzi, 2010; Supovitz, Sirinides, & May, 2010; Mulford & Silins, 2003; Griffith, 2004; ten Bruggencate, Luyten, Scheerens, & Sleegers, 2012). For example, Supovitz, Sirinides and May (2010) examined a system of relationships between principal instructional leadership, teacher peer influence, changes in instructional practice, and student learning outcomes. They determined that “principal leadership is significantly related to student learning through change in [teachers’] instruction” (p. 45). Principal leadership’s effect on teacher peer influence emerged as the most significant relationship in the model, suggesting a key role for principals in facilitating instructionally influential relationships between teachers (Supovitz et al., 2010). Heck and Hallinger also used SEM in a pair of studies in 2010 and 2011 to build on Mulford and Silins (2009) conceptualization of leadership as a reciprocal process in which principals’
leadership is not assumed to be a strictly causal variable. Among other findings from these studies, the authors concluded that a reciprocal relationship between capacity-building and leadership positively impacted student outcomes over time (Heck & Hallinger, 2011).

**Overview: Case Studies**

Research Question #3 was addressed through three mini case studies, which were developed through interviews with the key players involved with the implementation of Reading Recovery at particular schools. While case-study research can suffer from limited generalizability, it has the ability to contribute depths of insight related to participant experience and context that cannot be achieved through empirical study alone (Leithwood, Louis, Anderson, & Wahlstrom, 2004; Gentilucci & Muto, 2007; Werts et al., 2012). In addition, it can shed light on factors and mechanisms that are both essential to a given phenomenon and invisible to quantitative analysis.

In the case of this particular study, the qualitative research component functions as an important complement to the empirical analysis. In addition to providing the kind of detailed descriptive analysis referenced above and offering insights on context and participants’ experiences, the mini case studies strengthen the overall project in several ways: First, they help address methodological weaknesses in the study by highlighting issues that are not evident through empirical analysis alone. Second, as detailed later, the data for
the empirical analysis were drawn from newly developed measures that were piloted in the context of the study; the case-study research therefore also serves to address the weakness of these measures by providing additional evidence as to the nature and impact of the hypothesized phenomena. Finally, the case studies serve to explore the directionality of the hypothesized relationships. This latter focus is useful in the context of an SEM analysis using cross-sectional data, as the directionality of relationships cannot be established conclusively through the SEM study alone (Lei & Wu, 2007).

The qualitative component of the study comprises two distinct phases. As discussed in Chapter 4: Context for the Study, preliminary findings from Phase I informed the development of the data-collection instruments for the rest of the study. Phase II involved the development of three mini case studies, each of which examines the phenomenon of principal ownership through the lens of a particular school’s Reading Recovery implementation. The mini case studies were designed to provide an in-depth examination of the relationships explored in the SEM analysis. The sampling strategy for these cases, which is described below, reflects my interest in close and strategic integration of the quantitative and qualitative components of the study design.

The study’s case-study component also provides insight into the phenomenon of principal ownership that is not captured by the SEM study by featuring the perspectives and voices of principals, who are excluded from the SEM analysis by design (more on this below).
Overview: Study design

The mixed-methods design for the study comprises two distinct, sequenced phases: a qualitative inductive phase followed by a mixed-methods deductive phase. In this second phase, the quantitative and qualitative data were collected in parallel and then analyzed sequentially. The design is exploratory sequential in the inductive phase, in that qualitative data collected and analyzed in this phase informed the development of themes and instruments for the deductive phase (Creswell & Plano Clark, 2010). The design for the deductive phase is explanatory sequential; qualitative data were used to help illustrate and interpret quantitative findings (Creswell & Plano Clark, 2010).

This design proceeds from a development rationale (Green et al, 1989; Johnson & Onwuebguzie, 2004). As such, findings from each round of data collection build upon and further develop the findings of previous rounds.

Figure 2. Overview of the mixed-methods study design: Phase I (inductive) & Phase II (deductive)
Figure 2 provides an overview of the deployment of qualitative and quantitative methods in both phases of the study.

A mixed-methods study like the one described here incorporates the strengths and avoids the pitfalls of both qualitative and quantitative approaches. Writing at the conclusion of their landmark, six-year study of school leadership, Louis, Leithwood, Wahlstrom and Anderson (2010) report that the mixed-methods approach “offered opportunities that we had not fully appreciated in the early stages of our work” (Louis et al., 2010, p. 11). Furthermore, by incorporating both quantitative and qualitative methods, this study incorporates both the theoretical complexity Hallinger and Heck advocate (1998) and multi-methodological analytical sophistication.

**Sampling & Data Collection**

Data for this dissertation were collected via a multi-step process between September, 2011 and September, 2013. The timing of data collection activity was as follows:

- Phase I qualitative data collection (inductive): Fall 2011 – Spring 2012
- Phase II qualitative data collection (deductive): Fall 2012 – Summer 2013
- Quantitative data collection: Spring – Summer 2013
Qualitative Sampling and Data Collection

Qualitative data were drawn from a series of interviews conducted over this two-year period. Participants in the interviews included all of the key players involved with the implementation of Reading Recovery at the school and district levels:

- Reading Recovery-trained expert literacy teachers;
- the Reading Recovery teacher-trainers—known as teacher leaders—charged with training expert teachers and facilitating implementation at the school level;
- district administrators—known as site coordinators—who oversee Reading Recovery at the district level;
- principals of schools implementing Reading Recovery; and
- first-grade classroom teachers whose students participate in the intervention, and who are colleagues of the Reading Recovery-trained expert teachers.

A majority of the interviews were conducted via telephone; however, a sub-set of the interviews were conducted in person as part of a number of in-depth, field-based case studies of particular schools.

The qualitative data collection proceeded through a year-long inductive phase, during which key themes and questions were identified, followed by a year-long deductive phase. During this second phase, sampling and data
collection strategies were designed to facilitate deeper examination of principal ownership within the context of Reading Recovery.

All interview participants were sampled from the population of individuals involved with the national scale-up of Reading Recovery.

Sample sizes for both phases of the research, by participant category, are shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Sample Sizes for Phase I and Phase II Qualitative Research</th>
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<tbody>
<tr>
<td>Phase I Interviews</td>
</tr>
<tr>
<td>Reading Recovery-trained teachers</td>
</tr>
<tr>
<td>Principals</td>
</tr>
<tr>
<td>First grade classroom teachers</td>
</tr>
<tr>
<td>Reading Recovery teacher-trainers</td>
</tr>
<tr>
<td>District Supervisors</td>
</tr>
<tr>
<td>Phase II Interviews</td>
</tr>
<tr>
<td>Reading Recovery-trained teachers</td>
</tr>
<tr>
<td>Principals</td>
</tr>
<tr>
<td>First grade classroom teachers</td>
</tr>
<tr>
<td>Reading Recovery teacher-trainers</td>
</tr>
<tr>
<td>District Supervisors</td>
</tr>
</tbody>
</table>

Note: This table provides the total number of interviews for the study, including those conducted as part of the preliminary research Phase I; the triad research in Phase II; and the case-study research across both years.

As discussed in the Preface to this report, the sample for the proposed study is a sub-set of the sample for a much evaluation of Reading Recovery, which is currently being conducted by CPRE.
Phase I qualitative sample: Preliminary interviews

The sample for the Phase I (inductive) qualitative research includes Reading Recovery-trained teachers at schools involved with the federally funded scale-up of Reading Recovery, and principals of schools implementing Reading Recovery. These participants were randomly sampled from the population of individuals involved with the federally funded scale-up of Reading Recovery.

In addition, Phase I data were drawn from nine field-based case studies. A two-stage process was also used to sample the schools for the case studies: Purposive sampling was used initially to ensure representation of schools from different geographic regions and both rural and urban settings, and schools were randomly selected from within these groupings.

All participants in the case-study sample were clustered by school. The case-study component of the Phase I research included interview data from:

- Reading Recovery-trained teachers;
- teacher leaders, who train and support these teachers and troubleshoot school-level implementation;
- principals of the schools where these teachers are employed;
- first-grade classroom teachers who work in these nine schools;
- district-level site coordinators overseeing the Reading Recovery implementations at these schools.
**Phase II qualitative sample: Mini case studies**

A two-stage sampling process was used to develop the overall sample for the Phase II (deductive) qualitative research—the mini case studies. In the first stage, 30 Reading Recovery teachers were randomly sampled from the population of teachers receiving training support from the scale-up grant. In the second stage, the principals and teacher leaders who work in the same schools as the 30 randomly selected teachers were also contacted for interviews. Ultimately, this sampling strategy yielded interview data from:

- Reading Recovery-trained teachers;
- teacher leaders, who train and support these same teachers and troubleshoot implementation in their schools;
- principals of the schools where the trained teachers are employed.

Interview data from 10 case studies conducted during the 2012-13 school year are also included in the Phase II qualitative component of the study. These schools were sampled randomly, though efforts were made to target specific types of schools, including schools in urban areas. The case study data includes interviews with individuals from the same participant categories as the Phase I case studies.

**Qualitative data collection**

All qualitative data were collected by myself or other members of CPRE’s Reading Recovery research team via telephone or in-person interviews. In the first year of research for this dissertation as well as the larger CPRE evaluation,
broad interview protocols were developed by the research team to identify key roles, dynamics, and issues related to the implementation of Reading Recovery at the school level. For purposes of this sub-study, pertinent questions in Phase I explored the processes, players, and challenges involved in the school-level implementation and operation of Reading Recovery.

For the Phase II (deductive) research, I developed specific questions to probe issues related to principal ownership. These questions were embedded in CPRE’s structured interview protocols for both the telephone interviews and the case-study research.

Case-study interview data was collected on site by myself and other CPRE researchers. For each case study, a single researcher interviewed all key players involved with Reading Recovery at a given school.

Quantitative Sampling & Data Collection

The quantitative sample for the larger Reading Recovery evaluation includes all Reading Recovery-trained teachers, teacher leaders, site coordinators, and first-grade classroom teachers associated with schools involved in the randomized controlled trial portion of the national scale-up of Reading Recovery. Overall survey distribution and response totals are shown in Table 2.
Table 2

*Survey distribution and response totals*

<table>
<thead>
<tr>
<th></th>
<th>Total surveyed</th>
<th>Total responded</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR teachers</td>
<td>1989</td>
<td>1506</td>
<td>76%</td>
</tr>
<tr>
<td>1st grade teachers</td>
<td>986</td>
<td>599</td>
<td>61%</td>
</tr>
<tr>
<td>RR teacher leaders</td>
<td>261</td>
<td>210</td>
<td>80%</td>
</tr>
<tr>
<td>District supervisors</td>
<td>186</td>
<td>133</td>
<td>72%</td>
</tr>
</tbody>
</table>

The goal of the quantitative sampling for the proposed study was to obtain 360° perspectives on the principal of a given school by obtaining data from all four respondents associated with that school. This multi-respondent approach was used for two reasons: First, no single respondent has the perspective to speak to all of the latent variables in the hypothesized model. Second, prior research has shown that aggregating data “over modes of measurement cancels out method-specificity and may increase the reliability and validity of the measurement” (Pohl & Steyer, 2010, citing Epstein, 1983, 1986). To develop the sample for this study, all survey respondents were therefore matched at the school level, and only those buildings with multiple respondents were included in the analytic sample.

The Reading Recovery-trained teacher and first-grade classroom teacher are the most important data sources for the study as they provide insight on a majority of the latent constructs of interest. Conversely, the site coordinator provides data related to only one latent construct—the control antecedent. I therefore decided to prioritize those cases with full information from the Reading
Recovery-trained and first-grade classroom teachers, and 100 percent of the schools in the analytic sample have complete data from these respondents. This matching process yielded partial or complete data for 196 schools, which comprise the analytic sample for the proposed study.

The analytic sample of 196 schools represents 14% of the schools in the survey sample for CPRE’s Reading Recovery evaluation during the 2012-13 school year (N=1381). While this is a relatively small representation, the full breakdown of the analytic sample provided in *Chapter 6: Analysis* indicates that the schools in the analytic sample do not differ on any meaningful indicators from schools in the study overall.

Although principals were interviewed for the proposed study, they were not included in the sample for the SEM analysis. This decision was made on the basis of prior research suggesting that principals’ own accounts of their leadership behaviors often do not align with the accounts of other building-level observers (Goldring, Huff, Pareja, & Spillane, 2008; Supovitz, Sirinides, & May, 2010). I determined principal insights would not provide an accurate reflection of the phenomena of interest.

All survey data were collected via Qualtrics online platform. The surveys were created and administered electronically by me and several other members of CPRE’s Reading Recovery research team. I developed all survey items for the measurement and investigation of principal ownership. The ownership-focused
items were embedded in the surveys distributed for CPRE’s Reading Recovery evaluation.

Defining the constructs of interest

As a first step to quantitative data collection, it was necessary to model the constructs of interest. This required a careful effort to define each hypothesized construct. While the antecedents and manifestations of ownership have been described in prior work, the theoretical conceptualization of ownership that will be applied in this project has, to my knowledge, never been used in a study of principals or schools. As a result, I adapted existing definitions of each of the latent constructs of interest to the context of school reform generally, and to Reading Recovery implementation in particular.

The development of these construct definitions was informed by several sources. First, I drew on the theoretical and empirical literature on ownership, which provided general “baseline” definitions for each construct (Avey et al., 2009; Ceja & Tàpies, 2011; Mayhew et al., 2007; O'Driscoll et al., 2006; Pierce & Jussila, 2010, 2011; Pierce, Rubenfeld, & Morgan, 1991; Vandewalle et al., 1995; Wagner et al., 2003). The second source was prior research on school-reform implementation generally (Odden, 1991; Fullan 2000; Neumerski, 2012; Datnow 2000b; Cuban, 1982, 2013; Leithwood & Duke, 1999; Berman & McLaughlin, 1976) and, more specifically, research on principals’ roles and behaviors in the context of school-change efforts (Bamburg & Andrews, 1991;
Goldring & Pasternack, 1994; Hallinger, 2003; Heck, Larson, & Marcoulides, 1990; Mulford & Silins, 2003; Heck & Hallinger, 2010; Griffith, 2004; Leithwood & Jantzi, 1990; Leithwood & Duke, 1999). This literature was useful in distilling the broader definitions offered by the ownership literature to make them applicable to the context of school reform; put differently, it supported the conversion of the broadly defined ownership constructs into categories of things that actually occur in the context of school change. Finally, I drew heavily on the findings of the first-round interviews. These findings are detailed in Chapter 4: The Context of the Study. The preliminary work of identifying these findings permitted the translation of more general ideas about “things that happen in school reform” into specific phenomena that have been shown to occur during Reading Recovery implementation.

I tested and further refined the resulting construct definitions by sorting the key, pertinent qualitative findings from the Phase I research into groups based on the new construct definitions. For instance, one finding from the Phase I research is that some principals elect to bring Reading Recovery into their schools, choosing it above other literacy interventions, while other principals “inherit” Reading Recovery implementations from their predecessors or are required by their districts to use the intervention. Based on the definitions I developed, this finding clearly speaks to the antecedent construct of control. Through this testing process, I determined that all of the construct definitions were sufficiently specific and distinct to permit the easy categorization of the key Phase I findings.
pertaining to principals. This process also allowed me to refine the construct definitions by including specific information about what each construct does not encompass.

The resulting construct definitions are specific enough to encapsulate principals’ involvement with Reading Recovery, but also general enough to provide a foundation for future study of principal ownership in the context of other reforms.

The definitions for both the antecedent constructs and the behavioral manifestation constructs are included as Appendix A.

**Development of the survey measures**

The theory-driven process described above for the creation of construct definitions also informed the identification of discrete, sub-construct dimensions for each construct of interest. While useful for defining the latent constructs and guiding the development items for the measurement of each, the dimensions were not specified in the measurement model or the structural model.

To further increase the rigor of the development process prior to data collection, a doctoral student in education participated in an item/construct matching process. The student was given the construct definitions and asked to match the survey items with the constructs they intended to measure. All but two items were accurately matched with the constructs; the two mismatched items were dropped.
A breakdown of the dimensions, as they pertain to each construct and drive the development of specific survey items, is included as Appendix B.

Each of the constructs was measured via a series of Likert-type items, each asking respondents to indicate whether they strongly disagree, disagree, agree, or strongly agree with a particular statement about their principal’s involvement with Reading Recovery at their schools and their own experiences of the program and its impacts. A Likert response structure is widely used in social and behavioral research for the measurement of attitudes, beliefs, and practices.

The range of response options for the Likert-type items—with four response categories—was determined on the basis of Phase I research. Interview participants tended to draw relatively broad rather than fine-grained distinctions around principals’ behavior, around the extent of teacher collaboration around the reform, and around its influence on classroom practice. This suggested that four response options would be adequate to capture most people’s “mental representations” of the constructs of interest (Krosnick & Presser, 2010, p. 269). While the literature varies with respect to the implications of including more or fewer response options in a Likert-type item, in general, the research suggests that items with a “moderate” number of scale points—between roughly 3 and 7—yield better validity and reliability than those with fewer points, and that “validity is compromised by especially long scales.” (Krosnick & Presser, 2010, p. 273).
In addition, I elected to omit the “midpoint” option that is sometimes used in Likert-type items as a means to capture respondents’ ambivalence or indifference. Literature on survey design suggests that the inclusion of a midpoint response option can be useful in instances where respondents may not know the answer to a question or may not have an opinion on the issue under consideration, or where personal or sensitive matters are being examined. However, the literature further indicates that mid-points can introduce confusion, as the midpoint response may be interpreted differently by different observers (Bishop, 1987; Raaijmakers, van Hoof, Hart, Verboogt & Vollebergh, 2000; Harter, 1997), and that it may provide an easy “out” for respondents who would otherwise give the item more thought. Based in part on the interview findings, I determined that the teachers responding to the surveys were likely to have an opinion about all of the items, and that they would not perceive the questions as particularly personal or sensitive. Therefore, I determined that it was not necessary to introduce ambiguity by including a midpoint item.

A list of the survey items I developed is included as Appendix C to this document.
CHAPTER 6: Analysis Plan

This chapter details my analyses of both the quantitative and qualitative data for this study. This discussion proceeds chronologically, mirroring the sequence of qualitative and quantitative methods that comprise the study’s design. It begins with a discussion of my analysis of preliminary (Phase I) interview data, which guided the development of the primary data-collection instruments. It then proceeds through the SEM analysis of the survey data, which in turn guided the selection of schools for the mini case studies. Finally, it details the analysis of Phase II interview data and the development of the mini case studies.

Step One: Phase I Qualitative Data Analysis

Phase I data collection took place between Fall, 2011 and Spring, 2012. In collaboration with other members of CPRE’s Reading Recovery research team, I coded and analyzed transcripts from telephone interviews and field-based case studies during the summer and fall of 2012. The web-based qualitative analysis package Dedoose™ was used for all coding, and a broad coding scheme was applied to identify general themes around school-level roles and impacts related to Reading Recovery.
I then completed a secondary analysis of the CPRE team’s data, using inductive coding to identify themes related specifically to principals’ roles and engagement with Reading Recovery. Key themes that emerged were related to the following:

- how principals talk about and understand their role in RR implementation;
- how other school- and district-level players talk about and understand the principal’s role;
- how understanding of and engagement with Reading Recovery are expressed by principals and observed by others;
- the circumstances around Reading Recovery’s introduction to schools and districts, and the extent to which principals are involved in that introduction; and
- the range of management behaviors exhibited by principals around Reading Recovery.

I created Appendix B, detailing each ownership construct as it is expressed in the context of Reading Recovery, over the course of the Phase I data analysis. In addition, she developed the construct definitions included as Appendix A through this process. Both documents were later refined through the analysis of Phase II interview data.
As described in *Chapter 5: Methods*, I used the themes from the Phase I data to guide the development of interview protocols and survey items for Phase II data collection.

**Step Two: Quantitative Data Analysis**

The quantitative data analysis for the study comprised several main tasks: preliminary data preparation and initial item analysis; specifying and testing the hypothesized measurement model for principal ownership; and estimating and comparing the primary and alternative structural models posited by the conceptual framework.

**Preliminary analysis**

The preliminary analysis included data preparation, descriptive analysis of the population and sample characteristics, and item analysis. I used SAS™ version 9.3 to complete these tasks.

**Data preparation**

I cleaned the raw survey data from four separate surveys administered by CPRE, removing anomalies¹. I then created a building-level response file by merging survey panels and response files for each respondent category—

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¹ Duplicate responses were removed from the data set, as were responses generated by test distributions of the surveys, and responses that were unusable for purposes of the current study. Unusable responses included surveys submitted by first-grade teachers who had not completed the items pertaining to the constructs of interest; only those schools with complete data from a first-grade teacher were included in the analytic sample.
Reading Recovery teachers; first-grade teachers; teacher-trainers; and district site coordinators. In the resulting merged file, individual respondents are de-identified, and each observation is identified by a building number that is unique to each school. In some cases, multiple individuals from a given respondent category completed the survey for a given school; for instance, multiple Reading Recovery-trained teachers or first-grade classroom teachers responded from some schools. In these cases, the responses were averaged to provide a single value for that respondent category in that building. In order to maximize variation of the responses, averaged values were not rounded. Table 3 shows the number of individual responses per respondent category, by building, for the analytic sample of schools (N=196).

As Table 3 illustrates, survey data were available from Reading Recovery teachers at 1058 schools; from first-grade teachers at 210 schools; and from teacher-trainers and district supervisors associated with 550 and 244 schools, respectively. Only those schools with responses from multiple respondents—including at least one first-grade teacher and one Reading Recovery teacher—were included in the analytic sample. The resulting analytic sample contains 196 cases (schools).
Population & Sample Characteristics

The next step in the preliminary analysis was to assess the composition of the analytic sample and the extent to which it is representative of the preliminary sample, as well as the extent to which the preliminary sample is representative of the population of schools in the federally funded scale-up of Reading Recovery. This was important to understanding the generalizability of the study’s findings. As noted earlier, this analysis was critical because the number of schools with available data from both Reading Recovery-trained teachers and first-grade
classroom teachers (n=196) represents just 14% of the schools in the overall sample for CPRE’s 2012-13 surveys (N=1381).

I first examined the geographic distribution of schools in and out of the analytic sample. As Table 4 illustrates, this analysis revealed that, in both groups, a majority of schools were located in the Midwest, followed by the Southeast and the Mid-Atlantic region. This is consistent with patterns in Reading Recovery adoption generally (May et al, 2013). As I do not regard geographic equivalence of the in- and out-of-sample schools as important to external validity, I did not conduct sensitivity tests on this indicator.

Table 4

<table>
<thead>
<tr>
<th>Geographic Distribution of Schools in the Analytic Sample (N=196)</th>
<th>N</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Atlantic</td>
<td>15</td>
<td>7.7</td>
</tr>
<tr>
<td>Midwest</td>
<td>92</td>
<td>46.9</td>
</tr>
<tr>
<td>Northeast</td>
<td>13</td>
<td>6.6</td>
</tr>
<tr>
<td>Southeast</td>
<td>62</td>
<td>31.6</td>
</tr>
<tr>
<td>Southwest</td>
<td>9</td>
<td>4.6</td>
</tr>
<tr>
<td>West</td>
<td>5</td>
<td>2.6</td>
</tr>
</tbody>
</table>

I also examined characteristics of the schools in the analytic sample on several indicators she does consider significant in terms of external validity: school size (total number of students); school setting (rural, suburban, urban); percent of students eligible for free or reduced lunch; school-wide Title 1 eligibility; and percent minority students. Because prior research suggests that differences between the analytic sample and other respondents and/or non-respondents on these school and student characteristics could degrade the
study’s external validity, I conducted sensitivity analyses on each of these indicators using a combination of Kolmogorov-Smirnov tests and t-tests to examine differences in group means. This process revealed that the schools in the analytic sample do not differ significantly from the preliminary sample schools on any of the variables of interest. Table 5 provides an overview of schools in the analytic sample, as compared with the population of schools involved with the scale-up of Reading Recovery (survey respondents and non-respondents).

Table 5

*Comparison of In- and Out-of-Sample Schools*

<table>
<thead>
<tr>
<th></th>
<th>Schools in Analytic Sample</th>
<th>Out-of-sample schools</th>
<th>p-value for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean</td>
<td>n</td>
</tr>
<tr>
<td>Total students</td>
<td>185</td>
<td>500</td>
<td>4758</td>
</tr>
<tr>
<td>School Setting:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td>88</td>
<td>47.6</td>
<td>2042</td>
</tr>
<tr>
<td>suburban</td>
<td>54</td>
<td>29.2</td>
<td>1427</td>
</tr>
<tr>
<td>urban</td>
<td>43</td>
<td>23.2</td>
<td>1289</td>
</tr>
<tr>
<td>Title 1 eligibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eligible for free or</td>
<td>185</td>
<td>54</td>
<td>4758</td>
</tr>
<tr>
<td>reduced lunch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent minority students</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Full or partial demographic data was available for 185 out of 196 schools in the analytic sample.
** Data for this variable were unavailable from some of the 185 schools with full or partial demographic information.
The results of these analyses suggest that the schools in the analytic sample are equivalent to the overall population of schools involved in the federally funded scale-up. Data are not available to compare schools involved with the scale-up to schools that previously adopted Reading Recovery; however, I have no reason to believe that the two groups of schools differ on any of the measures reported above. It therefore stands to reason that the analytic sample for the study is representative of the population of U.S. schools that use Reading Recovery; there is no evidence to suggest otherwise.

Features of the Observations

I conducted an item analysis to examine the features of the response data. Where possible, I also compared item-level responses from respondents in the analytic-sample schools with responses from individuals whose schools were not included in the analytic sample. This analysis was not possible for all items: As noted above, schools with first-grade teacher respondents were prioritized in the sampling process. As a result, very few schools with first-grade-teacher responses were excluded from the analytic sample. The small resulting $n$ for out-of-sample responses made it impossible to conduct a valid comparison on those items—a majority of the items used for the SEM analysis—that were taken from the first-grade-teacher survey. However, it was possible to conduct this comparison for six of the 16 items used in the analysis—those taken from the Reading Recovery teacher, teacher leader, and district supervisor surveys. These analyses revealed that, for these six items, there are no significant
differences in the item-level data between the analytic sample and the out-of-sample survey responses.

A table showing the statistical features of each item and the sensitivity analysis findings, where available, is included as Appendix E to this document.

In addition to examining the features of the item-level data, I computed Cronbach’s coefficient alpha, which revealed good reliability for the items designed to measure each latent variable. Control was measured via three items ($\alpha = .64$); Knowledge via three items ($\alpha = .77$); Self-Investment via three items ($\alpha = .83$); Change Promotion via four items ($\alpha = .89$); and Teacher Collaboration via two items ($\alpha = .92$). Classroom practice was measured by a single indicator.

Construct validity was further investigated once the measurement model was fit; these findings will be discussed in Chapter 7: Quantitative Findings.

Each of the items included in this study consisted of a Likert scale, yielding polytomous categorical data with four or five response categories. The SEM analysis treats the variables as continuous because the underlying constructs are continuous in nature. The MLR estimator used for the analysis is robust to the deviations from normality that can occur with categorical data (more on this issue below). My decision to treat the data as continuous is consistent with recommendations for the treatment of polytomous categorical data (Muthén & Muthén, 2012).
Addressing SEM’s statistical assumptions

A number of statistical assumptions govern SEM analysis. The method assumes that the data are multivariate normal; that any missing data are handled appropriately; that the sample size is sufficiently large to permit convergence, proper solutions, and accurate parameter estimates and model fit statistics; that the model is specified correctly and in accordance with theory; and that the model equations are identified (Byrne, 2012; Bollen, 1989; Kline, 2010). I determined that this study satisfies each of these assumptions.

Multivariate Normality

Multivariate normality was assessed via a Q-Q plot of the standardized data against a standard normal distribution. Visual inspection of this plot revealed approximate normality. In addition, three tests of multivariate normality were performed. Mardia’s Kurtosis test (Mardia, 1970) produced a test statistic of 0.25 (p=0.8006). The Henze-Zirkler consistent test produced a test statistic of 1.05 (p=0.2935). Neither of these two tests provides evidence of multivariate non-normality. The third test, Mardia’s Skewness test (Mardia, 1980) produced a test statistic of 899.4 (p=0.0220), which is suggestive of deviation from multivariate normality with regard to skew. However, as discussed below, under Model Estimation, the estimator selected for this analysis, MLR, is robust to non-normality. As a result of both of these factors, I saw no compelling reason to normalize any of the data through transformation (Yuan & Bentler, 1998b, 1998c; Boomsma, 2000, p. 469).
**Missing Data**

The sampling strategy for this study—with its prioritization of schools that had responses from both first-grade classroom teachers and Reading Recovery-trained expert teachers—resulted in some missing data. One hundred percent of the schools in the analytic sample (n=196) have data from at least one Reading Recovery-trained teacher and at least one first-grade classroom teacher. However, not all of these schools also had complete response data from Reading Recovery teacher trainers and/or district-level site coordinators. Seventy percent (138 schools) have data from all respondents but the site coordinator, and 50 percent (99 schools) have data from all four respondents.

As noted above, I elected to use MLR, the robust full information maximum likelihood (FIML) estimator available in Mplus, to estimate the SEM model. FIML uses all available data to estimate the model, and has been demonstrated in multiple studies to yield better estimates than listwise deletion, pairwise deletion, or mean imputation methods (Finkbeiner, 1979; Wang & Wang, 2012; Enders & Bandalos, 2001; Boomsma, 2000). Using this estimation method, the full sample of schools with first-grade and Reading Recovery-teacher responses (n=196) was available for the analysis.

Additional detail about the treatment of missing data in the analysis is presented below, in the discussion of model estimation.
Sample size

Recommendations regarding sample size for SEM analyses are acknowledged to vary (Garson, 2012; Le & Wu, 2007; Kline, 2005; Boomsma, 2007). Wang & Wang (2012) write that:

... there is no consensus in the literature regarding what would be the appropriate sample size for SEM. Some evidence exists that simple SEM models could be meaningfully tested even if sample size is quite small (Hoyle, 1999; Hoyle and Kenny, 1999; Marsh and Hau, 1999), but usually, \( N = 100-150 \) is considered the minimum sample size for conducting SEM (Tinsley and Tinsely, 1987; Anderson and Gerbing, 1988; Ding, Velicer, and Harlow, 1995; Tabachnick and Fidell, 2001). Some researchers consider an even larger sample size for SEM, for example \( N = 200 \) (Hoogland and Boomsma, 1998; Boomsma and Hoogland, 2001; Kline, 2005). (location 6225)

The current study’s sample size of 196 falls negligibly short of this more stringent recommendation of 200 cases, and satisfies a second test of sample size for SEM, which recommends that the number of observations equal between five and 20 times the number of parameters to be estimated (Garson, 2012; Le & Wu, 2007). I therefore determined that the sample size was adequate to produce proper estimates of the model parameters.

Model Specification

An important assumption underlying SEM analysis is that the model is properly specified. This demands that both the measurement and structural components be justifiable by theory, and that both models be identifiable,
meaning that adequate information is available to produce a unique solution for each parameter to be estimated (Boomsma, 2000; Le & Wu, 2007; Klein, 2005; Bowen & Guo, 2012). The current study meets these criteria. The following discussion addresses the specification of both the measurement model and the structural model.

**Specification of the measurement model**

The specification of a model for the measurement of latent factors is the first step in SEM (Lei & Wu, 2007). Latent factors are unobserved variables that are hypothesized to exist based on theory, and supported by a set of observed indicator variables. The proper specification of this model is the foundation on which the structural model is built.

The measurement model for the current study was analyzed via confirmatory factor analysis (CFA) within the SEM framework. CFA is the appropriate factor-analysis technique in this case for several reasons. First, the measurement model for the project is based on *a priori* theory as well prior research on the implementation of Reading Recovery and instructional change in schools. CFA is generally preferred to exploratory factor analysis when latent constructs and indicator factor loadings are hypothesized based on theory or prior research (Wang & Wang, 2012; Bowen & Guo, 2012). In addition, CFA reduces measurement error because it uses more than one indicator to measure each latent factor. For these reasons, CFA is the standard approach to factor analysis within the SEM framework.
In the measurement model I specified for the current study, all but one of the six constructs of interest are latent factors. The outcome variable—self-reported changes in first grade teachers’ classroom practice—is measured by a single indicator; however, each of the other factors in the model is represented by a set of related items. The measurement model specifies a set of indicators for each of these latent factors. Table 6 illustrates the hypothesized relationships between each of the latent constructs of interest and its observed indicators.

Table 6

**Latent Variables with Corresponding Indicators and Indicator Characteristics**

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Indicator</th>
<th>n</th>
<th>Mean</th>
<th>Cronbach’s Alphas*</th>
<th>Item total correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Control</td>
<td>SC1</td>
<td>76</td>
<td>1.59</td>
<td>.39</td>
<td>.64</td>
</tr>
<tr>
<td></td>
<td>SC2</td>
<td>79</td>
<td>2.28</td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TL5</td>
<td>128</td>
<td>2.66</td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td>F2: Knowledge</td>
<td>RR1</td>
<td>196</td>
<td>2.84</td>
<td>.67</td>
<td>.77</td>
</tr>
<tr>
<td></td>
<td>RR2</td>
<td>196</td>
<td>2.67</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RR3</td>
<td>196</td>
<td>2.70</td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>F3: Self-Investment</td>
<td>FG1</td>
<td>196</td>
<td>2.59</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FG2</td>
<td>196</td>
<td>2.70</td>
<td>.82</td>
<td>.83</td>
</tr>
<tr>
<td></td>
<td>FG3</td>
<td>196</td>
<td>2.83</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>F4: Change Promotion</td>
<td>FG6</td>
<td>196</td>
<td>2.94</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FG8</td>
<td>196</td>
<td>2.78</td>
<td>.89</td>
<td>.89</td>
</tr>
<tr>
<td></td>
<td>FG9</td>
<td>196</td>
<td>2.75</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FG10</td>
<td>196</td>
<td>2.71</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>F5: Teacher Collaboration</td>
<td>C1</td>
<td>193</td>
<td>4.61</td>
<td>.87</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>193</td>
<td>5.08</td>
<td>.87</td>
<td></td>
</tr>
</tbody>
</table>

* standardized alphas
My initial hypothesis was agnostic as to the relationships between the three antecedent constructs—Control, Knowledge, and Self-Investment—including the extent to which they might mediate one another.

The Control factor, called F1 in the model, comprises three indicators drawn from two different surveys (district-level site coordinators and teacher trainers). The Knowledge factor, F2, comprises three indicators from a single survey (Reading Recovery-trained teachers). The Self-investment factor, F3, comprises three indicators from a single survey (first-grade classroom teachers). The Change Promotion factor, F4, comprises four indicators from the first-grade classroom teacher survey. The Teacher Collaboration factor, F4, is represented by two items from the first-grade classroom teacher survey. (As mentioned above, reported Classroom Practice is represented by a single indicator. This is not included in the measurement model.)

As discussed in Chapter 5: Methods, I computed Cronbach’s Alpha for each factor during the preliminary data analysis. All factors were found to have high internal consistency, though some indicators for F1, Control, have weak item-total correlations. This is discussed further in Chapter 7: Findings: SEM Analysis.

The design decision to use data from multiple surveys for this study offers important benefits in terms of the nature and extent of the insights it offers; however, it also brings a risk of introducing common-method variance. When present, common-method variance may be confounded with estimated
relationships, leading to the inflation of estimated coefficients. Although there are modeling approaches in SEM that can help compensate for this data structure, these multi-trait multi-method (MTMM) models are well known to be difficult to properly specify (Castro-Schilo, Grimm, & Widaman, 2013; Pohl & Steyer, 2010; Eid, Lischetzke, Nussbek, & Trierweiler, 2003). I attempted three different types of MTMM models, but the models were under-identified every time. As a result, a conventional model was specified.

Details about the process used to define the latent factors of interest and design the survey items for their measurement are included in Chapter 5: Methods.

Mplus™ Version 7 was used to fit the measurement model for the study, and the resultant fit indices suggest that the model is a good fit to the data. This finding is detailed in Chapter 7: Findings: SEM Analysis.

**Specification of the structural model**

Once the measurement model was found to be a good fit to the data, I added the hypothesized structural pathways. These pathways represent the relationships between the factors as they are posited by the model; the estimation process yields regression coefficients for each relationship. As with the measurement model, the structural (general SEM) model for the proposed study was specified based on a priori theory and Phase I research on Reading Recovery implementation. As described in Chapter 3: Conceptual Framework, the three ownership antecedents are presumed to contribute directly to principal
change-promotion behavior, which, in turn, are expected to contribute to collaboration between the Reading Recovery-trained teacher(s) and first-grade classroom teachers in the building. The reported influence of Reading Recovery on classroom teachers’ instructional practice is hypothesized to be directly related to this collaboration.

I determined that a single-level model was appropriate for the analysis. While the data for the study were obtained from multiple respondents per school, the analysis focused on the ownership phenomenon at a single level—that of the principal.

As noted previously, the goal of this study was to assess the plausibility of the hypothesized conceptual framework. This is the first step to understanding the contributions of principal ownership to the instructional-change process in schools. As a result, I elected not to include covariates for school or student characteristics, locale, or other factors that might complicate the evaluation of the framework’s fundamental plausibility. Future research should explore the extent to which the relationships examined here may vary across contexts and populations.

In the course of the analysis, I elected to make a minor post hoc adjustment to the model specification. Specifically, I chose to position Self-Investment as endogenous to the other two antecedents, Control and Knowledge, as reflected in Figure 3, rather than positioning all three as exogenous predictors. This change specifies that the impact of all three antecedents on principal

82
ownership is mediated by principals’ self-investment in the initiative. Post hoc modifications to a priori models are not generally recommended (Lei & Wu, 2007); in this case, however, the decision was validated by qualitative findings suggesting that Control and/or Knowledge lead to Self-investment (see Chapter 8: Findings: The Mini Case Studies). I regard this as a minor modification that, while driven by the data, does not depart from the basic hypothesis under examination: That the antecedents to ownership combine to produce ownership behavior.

Model identification

A final assumption of SEM concerns identification, or the ability to estimate every parameter. At the specification stage, it is recommended that researchers assess the model’s theoretical identifiability (Boomsma, 2007). Bollen (1989) recommends criteria for assessing theoretical identification: First, the model must contain as many or more known (e.g. observed) data points as it does parameters to be estimated. Second, the latent variables in the model must be scaled; this is generally accomplished either by assigning the latent factor a variance of one, or by fixing the loading of one indicator—the reference indicator—per latent factor to one, thus setting the variance of the factor equal to that of the indicator. I elected to use the latter approach to latent variable scaling, which is the conventional approach and the default in Mplus, for this analysis. I used Mplus’ default process for selecting the reference indicator for each latent factor; that is, the indicator listed first for each latent factor was used as the
reference. While there are a variety of methods for selecting a reference variable, the literature indicates that the choice of one indicator versus another to serve as the reference has little impact on model results when estimates are standardized:

Choice of indicator has no effect on the relative loadings or overall model fit. With respect to structural paths, selecting different reference indicators changes the unstandardized paths to and from the latent variable but does not affect either significance of paths or the size of the paths if the latent variable is rescaled to unit variance (Maruyama, 1998, p. 184).

I determined that necessary and sufficient conditions for theoretical identification were satisfied in both the measurement and structural models here. Empirical identification was confirmed through the estimation process, through the absences of improper solutions. In addition, the hypothesized model is recursive, meaning that all directional arrows point in the same direction and there are no feedback loops. Under the “Recursive Rule” (Bollen, 1989; Rigdon, 1995), recursive models are always identified (Garson, 2012; Curran & Bauer, 2013).

**Model Estimation**

The goal of the estimation procedure in SEM is to minimize the discrepancy between the observed variance/covariance matrix and the model-implied matrices (Lei & Wu, 2007). A variety of estimation methods are available in Mplus. Because of the missing data that resulted from the sampling process for the SEM analysis, I elected to use MLR, Mplus’ robust FIML estimator, to estimate both the measurement and the structural models.
FIML assumes that any missing data are both missing completely at random (MCAR)—which contends that missingness on a given variable is unrelated to any other variable—and missing at random (MAR), which allows missingness on a given variable to be related to other observed variables as long as they are not related to the unobserved phenomenon of interest (Wang & Wang, 2012). However, the MLR estimator selected for this analysis is robust to missing data when either condition—MCAR or MAR—is met. I find no evidence that the data for this study do not satisfy the MAR condition: The principal ownership items were just a small proportion of the items on the instruments; there is no reason to believe that respondents’ survey completion or non-completion was in any way related to principals’ levels of ownership.

Like SEM modeling generally, FIML estimation also assumes that the data are multivariate normal. As discussed earlier, two of three tests I performed for multivariate normality indicated that this condition was met. In addition, this assumption can be relaxed for this analysis because the MLR estimator is robust to non-normality. Linda Muthén, Mplus’ co-developer, confirms that “multivariate normality is not needed when using the MLR and MLM estimators” (L. Muthén, personal communication, February 6, 2008).

The results of the estimation step are discussed in Chapter 7: Findings: SEM Analysis.
Testing alternative models

In the primary hypothesized model, I posited that the relationship between principals’ ownership behavior and reported influence on classroom practice is fully mediated by teacher collaboration. This model was estimated using the process described above. In addition, I explored a nested alternative model, which includes a direct pathway between principal behavior and reported influence on classroom practice. This pathway represents any effect that is *not* mediated by teacher collaboration; in effect, it allows for the possibility that principal ownership behavior affects classroom practice in ways other than promoting teacher collaboration. Given that this is the first study of its kind, and that the broader leadership literature remains unclear as to the precise mechanisms by which principal leadership impacts instruction (Day et al., 2008; Bamburg & Andrews, 1991; Goldring & Pasternack, 1994; Hallinger, 2003), I determined that this alternative model should be considered.

I conducted two tests to determine whether the addition of the direct pathway significantly improved the model’s fit to the data: the Satorra-Bentler chi-square difference test (Satorra & Bentler, 2001), and a chi-square difference test using the loglikelihood. Both tests are appropriate for nested models estimated using the MLR estimator in Mplus (Muthén & Muthén, 2014). The difference between Satorra-Bentler test statistic $T$ of nested models is distributed chi-square with $df=1$ ($\chi^2=4.996$, $p<0.05$). The loglikelihood test statistic $TRd$ is distributed chi-square with $df=1$ ($\chi^2=3.94$, $p<0.05$). Both tests indicate that the addition of the
direct pathway between principal behavior and the reform’s reported influence on first-grade teachers’ classroom practice yields significant improvement in fit to the data despite the added complexity it introduces. This model will therefore be the focus of the discussion in Chapter 7: Findings: SEM Analysis.

Model Evaluation

Following estimation, I evaluated both the measurement model and, once structural pathways were added, the full SEM. This evaluation centered on a series of goodness-of-fit indices designed to test the null hypothesis underlying SEM, which contends that the model fits the data well. These goodness-of-fit indices include both incremental indices—which compare the specified model to a saturated baseline model—and absolute indices, “which measure the extent to which the specified model of interest reproduces the sample covariance matrix” (Lei & Wu, 2007, p. 37).

Recommendations vary as to which of a long list of available goodness-of-fit indices are most useful for SEM. Consistent with the recent literature on this issue (Jackson et al, 2009; Hu & Bentler, 1999; Schreiber, Stage, Nora, Barlow, & King, 2006; Lei & Wu, 2007), I chose to focus on two incremental indices—the Tucker-Lewis Index (TLI) (Tucker & Lewis, 1973) and the Comparative Fit Index (CFI) (Bentler, 1989)—and two absolute fit indices: standardized root mean square residual (SRMR) (Bentler, 1995) and RMSEA (Steiger & Lind, 1980). Most current recommendations suggest that good model fit is indicated by TLI
and CFI ≥ .90 (or .95 for best fit); SRMR ≤ .08; and RMSEA ≤ .06 (Jackson et al, 2009; Boomsma, 2007; Lei & Wu, 2007; Curran & Bauer, 2013).

In addition to these goodness-of-fit indices, I evaluated the chi-square statistic generated by the measurement and structural models. Once considered the key criterion in evaluating the fit of an SEM model, the chi-square test is now understood to be inconsistently reliable due to its vulnerability to sample size and other issues (Schreiber et al, 2006; Curran & Bauer, 2013). Therefore, while a significant p-value for chi-square would suggest good fit, a non-significant p-value does not necessarily mean the fit is poor. (In contrast with many other methods, the null hypothesis in SEM is that the model does fit the data well; therefore a non-significant p-value for the chi-square statistic is desirable.) The chi-square test is regarded as just one component of a comprehensive model evaluation process.

Once fit was assessed via the goodness-of-fit tests, I examined the model parameter estimates and estimated standard errors for correlations above 1.0, negative variances, or standard errors that are outsized relative to others. Any of these may be indicative of an improper solution (Boomsma, 2006; Schreiber et al, 2006; Garson, 2012; Curran & Bauer, 2013).

Since the scale of the indicator measures is not meaningful in this case, I used standardized estimates for model evaluation.
Model Interpretation

After evaluating both models for fit and proper solutions, I examined the magnitude of the parameter estimates generated by the full SEM, including the results of significance tests at the .05 level on individual parameters. The magnitude and direction of parameter estimates were interpreted in light of the hypothesized relationships detailed in Chapter 3: Conceptual Framework.

As a final step in the analysis, I conducted a mediational analysis via the model indirect command in Mplus to examine the total effects of all pathways between Change Promotion and Classroom Practice, and compare the specific indirect effect of the mediated pathway (Change Promotion ➔ Teacher Collaboration ➔ Classroom Practice) with the direct effect of Change Promotion on Classroom Practice.

Step Three: Phase II Qualitative Analysis

The third and final phase of the analysis for this project was the development of the three mini case studies based on Phase II interview data. As discussed in Chapter 5: Methods, Phase II data collection was deductive; I developed interview questions designed specifically to probe the ownership constructs and their impacts on the implementation of Reading Recovery. In addition, the preliminary Phase II qualitative sample was formed by recruiting key players associated with 30 randomly selected schools. The data were therefore well suited to the mini case study approach, which permits a deep, multi-
perspective look at how principal ownership operates in the schools in the analytic sample.

In the interests of integrating the qualitative and quantitative components of the study as fully as possible, I chose to use purposive sampling to construct the analytic sample for the mini case studies by allowing the SEM results to guide the selection of case study schools (Patton, 2001). Based on this strategy, there were seven schools to choose from for the mini case studies—these are the schools from which both quantitative and qualitative data were collected. From this group of seven schools, I elected to examine three in depth.

I used Mplus-generated factor scores for these seven schools to guide the sampling process for the mini case studies. A factor score represents the most likely value of a factor for a given school, given the school’s observed values on the factor indicators and the estimated model (Asparaouhov & Muthén, 2010). Factor scores in Mplus are standardized; each factor score therefore provides an indication of the extent to which a given school exhibits average, high, or low levels of any given construct. A high factor score for Knowledge, for instance, indicates that the principal of that particular school has more knowledge of Reading Recovery than is average for the sample (DiStefano, Zhu, & Mindrila, 2009).

For purposes of this discussion and my sampling decision-making, the actual numerical factor scores generated by Mplus are not relevant. I therefore replaced the factor scores with general categories—ranging from very low to very
high. This permitted me to look across the set of prospective case-study schools in order to choose the most informative and interesting combination for the case studies. Table 7 illustrates, in broad strokes, the distillation of the factor scores to general categories for each construct, and the range of construct levels that resulted, both within and between schools.

Table 7

*Levels of Each Ownership Construct in Prospective Case-Study Schools, as indicated by Mplus Factor Scores.*

<table>
<thead>
<tr>
<th>School #</th>
<th>Control</th>
<th>Knowledge</th>
<th>Self-Investment</th>
<th>Change Promotion</th>
<th>Teacher Collaboration</th>
<th>Classroom Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>low</td>
<td>average</td>
<td>low</td>
<td>very low</td>
<td>low</td>
<td>average</td>
</tr>
<tr>
<td>23</td>
<td>average</td>
<td>very high</td>
<td>average</td>
<td>low</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>3</td>
<td>average</td>
<td>very high</td>
<td>very high</td>
<td>very high</td>
<td>very high</td>
<td>high</td>
</tr>
<tr>
<td>7</td>
<td>very low</td>
<td>very high</td>
<td>average</td>
<td>low</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>22</td>
<td>low</td>
<td>very low</td>
<td>very low</td>
<td>very low</td>
<td>low</td>
<td>average</td>
</tr>
<tr>
<td>19</td>
<td>high</td>
<td>Low</td>
<td>high</td>
<td>average</td>
<td>low</td>
<td>very high</td>
</tr>
<tr>
<td>16</td>
<td>high</td>
<td>Low</td>
<td>average</td>
<td>average</td>
<td>average</td>
<td>high</td>
</tr>
</tbody>
</table>

This analysis of the factor scores for each of the seven schools led me to select three schools for the mini case studies: School number 3, school number 22, and school number 7. School number 3 and school number 22 were chosen because in each case the results of the SEM analysis are essentially consistent with the study’s hypothesis regarding the relationships between the constructs;
the case studies will therefore permit a closer examination of high- and low-ownership principals’ impact on the initiative and the school. School number 7 was selected because, in my estimation, its combination of construct levels raised interesting questions. These questions are discussed, along with the findings of the case studies generally, in Chapter 8: Findings: The Mini Case Studies.

Once the three schools were selected for the case studies, I coded the interview transcripts from all participants—the principal, Reading Recovery-trained teacher, and teacher trainer—from each school based on the constructs of interest to this study. All coding was completed using Dedoose. I then analyzed all of the coded data, by school, to develop as complete an understanding as possible about principal ownership of Reading Recovery in that school. The results of this analysis are a focus of Chapter 7: Findings: SEM Analysis.

After using them to select the case-study schools, I did not reference the results of the factor-score analysis again until after the case-study analysis and findings were complete. This enabled me to review the data and arrive at the findings as objectively as possible.
CHAPTER 7: Findings: The SEM Analysis

The analytic process described in Chapter 6: Analysis Plan revealed that both the hypothesized measurement model and the structural model are good fits to the data. Furthermore, the structural model confirms the statistical significance of all hypothesized relationships. These findings—which suggest that the conceptual framework posited by this study offers a plausible account of the role of principal ownership in the implementation of an instructional initiative—are detailed in this chapter.

Consistent with the process described in the preceding chapter, in assessing the results of the SEM analysis I first examined the fit and estimates of the measurement model, and the fit of the structural model. Evaluation and interpretation of the full SEM followed. The results of each step of this process are described here.

Measurement Model Fit

As described in the previous chapter, I drew on current literature to select a set of test statistics to guide the evaluation of model fit. These statistics—RMSEA, SRMR, CFI, TLI, and chi-square—were used to evaluate the fit of both models. The fit of the measurement model was first investigated alone, before structural components were added. As noted, this step-wise process is
recommended practice, and helps ensure that a proper measurement model undergirds the full SEM (Curran & Bauer, 2013).

The goodness-of-fit statistics indicate that the hypothesized measurement model fits the data well. This finding is supported by RMSEA=.049 (<.06); CFI=.964 (> .95); TLI=.953 (> .95); and SRMR=.063 (< .08). These results easily satisfy the fit criteria guidelines advocated by the bulk of the current literature (Jackson et al., 2009; Boomsma, 2007; Lei & Wu, 2007; Curran & Bauer, 2013; Schreiber et al., 2006). These guidelines are elaborated in the previous chapter.

The measurement model’s chi-square statistic of $\chi^2=118.368$ on 80 degrees of freedom ($p=0.0035$) suggests that the null hypothesis that the model fits the data well should be rejected, thus contradicting the indication of good fit offered by the other fit statistics. However, as previously noted, significant chi-square is no longer regarded as a conclusive test of model fit in SEM, and is generally outweighed in fit decisions by the other indices cited above (Schreiber et al., 2006; Garson, 2012; Boomsma, 2006). In addition, per current recommendations that the ratio of $\chi^2$ to model df not exceed 2 or 3 (Schreiber et al., 2006), this chi-square statistic is within reasonable bounds relative to the model degrees of freedom. The chi-square test therefore provides no persuasive evidence of poor fit.

Overall, these findings are highly suggestive of a good fit between the measurement model and the variance-covariance matrix for the data. This indicates that the model does not require re-specification, and that it provides
adequate basis for interpreting the pathways in the structural model (Curran & Bauer, 2013).

**Measurement Model Parameter Estimates**

As a next step to evaluating the measurement model, I examined parameter estimates and estimated standard errors. This inspection reveals that parameter estimates are within acceptable range. Aside from indicator SC2 loading on latent factor F1 (Control), all standardized factor loadings are of reasonable magnitude, supporting the hypothesized dimensionality of the ownership phenomenon. Estimated standard errors for the indicators loading on factors F2-F5 are reasonable in size and comparable to one another. The parameter estimates and estimated standard errors for the measurement model are shown in Table 8. This table displays, indicator by indicator, the loadings (standardized estimates) and standard errors for each latent factor. (The outcome variable, reported influence on Classroom Practice, is not a latent factor but rather represented by a single indicator. It is therefore not included in the measurement model.)

Table 8 also provides the two-tailed p-value for each estimate. As the table illustrates, the loadings on factors F2 through F5 are all statistically significant. The standard error estimates for latent factor F1, Control, are large relative to the other standard error estimates in the model, resulting in non-significant p-values for the factor loadings on F1. This, and the weak loading of indicator SC2, may indicate a problem with the measurement of the Control
construct. These issues may stem from the fact that there was significant missing data in the measurement of F1. This construct was measured exclusively by survey items taken from the two surveys that were not prioritized in the data-collection strategy (the teacher-trainer and district-level site coordinator surveys), and nearly all of the missing data in the model is concentrated in this latent factor.

Table 8

*Parameter Estimates and Estimated Standard Errors for the Measurement Model*

<table>
<thead>
<tr>
<th>BY</th>
<th>Standardized Estimate</th>
<th>Standard Error</th>
<th>Estimate/Stand. Error</th>
<th>Two-tailed p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC1</td>
<td>0.662</td>
<td>0.380</td>
<td>1.741</td>
<td>0.082</td>
</tr>
<tr>
<td>SC2</td>
<td>0.200</td>
<td>0.233</td>
<td>0.857</td>
<td>0.391</td>
</tr>
<tr>
<td>TL5</td>
<td>0.740</td>
<td>0.406</td>
<td>1.824</td>
<td>0.068</td>
</tr>
<tr>
<td><strong>F2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR1</td>
<td>0.792</td>
<td>0.055</td>
<td>14.472</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>RR2</td>
<td>0.556</td>
<td>0.090</td>
<td>6.174</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>RR3</td>
<td>0.898</td>
<td>0.047</td>
<td>19.266</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>F3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-investment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FG1</td>
<td>0.808</td>
<td>0.035</td>
<td>23.068</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FG2</td>
<td>0.671</td>
<td>0.054</td>
<td>12.427</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FG3</td>
<td>0.880</td>
<td>0.028</td>
<td>31.806</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>F4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Change promotion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FG6</td>
<td>0.875</td>
<td>0.027</td>
<td>32.487</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FG8</td>
<td>0.752</td>
<td>0.042</td>
<td>30.148</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FG9</td>
<td>0.861</td>
<td>0.029</td>
<td>30.148</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FG10</td>
<td>0.820</td>
<td>0.035</td>
<td>23.586</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>F5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Teacher Collaboration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>0.735</td>
<td>0.078</td>
<td>9.430</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>C2</td>
<td>0.831</td>
<td>0.073</td>
<td>11.373</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Viewed together, the findings represented in Table 8 suggest that while the parameter estimates for the measurement model are generally reasonable, there is a need for stronger measures of Control in future research. This underscores the importance of the qualitative research to bolster this study’s findings with respect to Control. However, the literature suggests that weak loadings on a single factor are not necessarily detrimental to interpretability, given good overall fit (Garson, 2012). It is therefore appropriate to proceed to discussion of the full SEM.

**Structural Model Fit**

After determining that the measurement model fit the data well, I specified the structural components and evaluated the fit of the structural model using the same goodness-of-fit statistics. This inspection revealed that the structural model also fits the data well, as indicated by the following goodness-of-fit statistics: RMSEA=.044 (<.06); CFI=.968 (> .95); TLI=.961 (> .95); and SRMR=.066 (<.08). \( \chi^2 = 134.840 \) on 98 degrees of freedom (p=0.0081). While significant, as noted above this chi-square statistic is not necessarily indicative of poor fit, particularly given the strength of the other fit indices and the fact that the ratio of \( \chi^2 \) to model df is less than 2 (Schreiber et al, 2006).

These findings indicate that the structural model, like the measurement model, is a good fit to the data. Barring any improper solutions, the parameter estimates for the full SEM are interpretable (Curran & Bauer, 2013).
Evaluating the Full SEM

The final step in evaluating the model involved inspection of the parameter estimates for the full SEM—with both measurement and structural components included. Table 9 presents the results of this inspection. All parameter estimates are within acceptable range, and all estimated pathway coefficients are statistically significant, suggesting that the hypothesized relationships are, indeed, plausible. Estimated standard errors for the parameter estimates are within reasonable range.

Table 9

| Parameter Estimates and Estimated Standard Errors for the Structural Components |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|--------|
| ON                             | Standardized Estimate | Standard Error | Estimate/St. Error | Two-tailed p-value | R²   |
| F3                             |                          |                |                  |                  |       |
| Self-investment                | F1                          0.290  | 0.116  | 2.491             | .013              | .28   |
|                                | F2                          0.364  | 0.092  | 3.963             | <.001             |       |
| F4                             | Change Promotion            |                  |                  |                  |       |
|                                | F3                          0.819  | 0.043  | 18.938            | <.001             | .6    |
| F5                             | Teacher Collabor.           |                  |                  |                  |       |
|                                | F4                          0.561  | 0.077  | 7.279             | <.001             | .314  |
| I3                             | Classroom Practice          |                  |                  |                  |       |
|                                | F5                          0.538  | 0.094  | 5.750             | <.001             | .47   |
|                                | F4                          0.222  | 0.089  | 2.497             | .013              |       |
Appendix F provides the parameter estimates and estimated standard errors for the full SEM.

Consistent with the findings of the measurement model, the estimated standard error for F1 (Control) is high relative to the other estimates. This is consistent with other indications that the measurement of this factor was relatively weak. This finding points, again, to the need for stronger measures of Control in the future and underscores the utility of the qualitative component of this study in investigating Control, in particular.

Inspection of the point estimates reveals no indication of improper solution. There are no improper estimates (i.e. negative variances or correlations above one). There is no indication of multicollinearity among the predictor variables, as correlations between the predictors are all of reasonable magnitude.

R-squared values for the factors indicate that the model explains 41 percent of the variance in influence on Classroom Practice; 31 percent of the variance in Teacher Collaboration; 67 percent of the variance in Change-Promotion behavior; and 28 percent of the variance in Self-Investment (Boomsma, 2000; Schreiber et al 2006). This, again, supports the plausibility of the assertion at the heart of my conceptual framework: that a principal’s ownership behavior is meaningfully related to changes in classroom practice.

As noted in Chapter 6: Analysis Plan, I conducted two tests comparing the fully mediated model represented in the conceptual framework with an alternative
model that includes a direct pathway from principal behavior to teachers’ instructional practice. The findings of both tests indicated that the alternative model yields significant improvement in fit to the data, suggesting that principals’ ownership behavior influences teachers’ practice not only through changes in teacher collaboration, but via other, unidentified mechanisms as well. This latter model—that which includes a direct pathway from Change Promotion to reported influence on Classroom Practice—was used for the analysis. As part of the evaluation of the full SEM, I therefore conducted a mediational analysis to examine both the total effects of the model on Classroom Practice and the portion of the total effect that is mediated by Teacher Collaboration.

The mediational analysis reveals statistically significant direct effects from Change Promotion to Classroom Practice (b=.222, p=.013), and statistically significant indirect effects via Teacher Collaboration (b=.301, p<.001). These findings suggest that principal ownership of an instructional initiative impacts classroom practice both through the hypothesized mediator, Teacher Collaboration, and through other, unspecified mechanisms. However, they indicate that more of the effect is mediated than unmediated.

The findings of this analysis are presented in Table 10. The “Total Indirect” line represents the portion of the total effect of principal behavior on Classroom Practice that is mediated by Teacher Collaboration. The “Direct” line represents the portion that proceeds via other, unspecified means. These estimates sum to the total estimated impact of Change Promotion on Classroom Practice.
Appendix G details the total, total indirect, and direct effects for the entire structural model.

**Interpreting the Full SEM**

The full SEM is represented graphically in Figure 3. In the diagram, which was generated by Mplus Version 7, latent factors are represented by circles. Control is represented as F1; Knowledge as F2; Self-Investment as F3; Change Promotion as F4; and Teacher Collaboration as F5. All observed variables are represented by boxes. This includes both the indicators for the latent factors, and the observed outcome variable, reported influence on Classroom Practice, which was measured by a single indicator. Arrows from indicator variables to latent factors represent factor loadings.

In Figure 3, the directional arrows represent freely estimated parameters along the following pathways: from F1 (Control) and F2 (Knowledge) to F3 (Self-investment); from F3 to F4 (Change Promotion); from F4 to F5 (Teacher Collaboration); from F5 to I3 (Classroom Practice); and the unmediated pathway from F4 to I3. Arrows between the factors indicate the direction of influence.

### Table 10

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Estimate/Stand. Error</th>
<th>Two-tailed p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.523</td>
<td>0.059</td>
<td>8.923</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total Indirect</td>
<td>0.301</td>
<td>0.079</td>
<td>3.828</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Direct</td>
<td>0.222</td>
<td>0.089</td>
<td>2.497</td>
<td>.013</td>
</tr>
</tbody>
</table>
specified in the model, and estimated standardized regression coefficients are indicated. Residual variances of the endogenous variables (F3, F4, F5) and variances of exogenous variables are also freely estimated.

The parameter estimates for the structural paths connecting each of the latent factors of interest (Control, Knowledge, Self-investment, Change-Promotion, Teacher Collaboration) and the outcome variable (influence on Classroom Practice) are interpretable as simultaneously-derived regression coefficients. Each estimate represents the relationship between the dependent and independent variables in that portion of the model. For instance, the coefficient for the pathway between F1 (Control) and F3 (Self-Investment) is .29. This indicates that a 1-unit increase in a principal’s Control over the Reading Recovery program in her school is associated with a .29 increase in her Self-Investment in the initiative. (While coefficients’ standardized scale makes direct interpretation challenging, it is still possible to assess the relative contributions of the various paths in the structural model in this way.)

Figure 3 also reflects my finding that F3, Self-Investment, mediates the effect of F1, Control, and F2, Knowledge, on Change Promotion. And, as discussed above, it represents both the direct pathways from F4, Change Promotion, to I3, Classroom Practice, and the pathway mediated by F5, Teacher Collaboration.

The findings detailed in this section, and represented in Figure 3, point toward a number of key determinations. First, they indicate that for the 196
schools involved in this study, the theorized antecedents to ownership are related to the ownership behavior of interest, principals’ Change Promotion activity on behalf of the instructional reform (in this case, Reading Recovery).

Second, these findings indicate that principals’ Self-Investment mediates the impact of the other two antecedents on their Change Promotion behavior. This suggests that neither Control nor Knowledge is sufficient to ensure changes in principals’ behavior, and that even both of these factors combined may not influence Change Promotion unless they are accompanied by a change in Self-Investment.

Third, the findings reveal that Change-Promotion behavior on the part of the principal is strongly related to teacher collaboration, which is, in turn, related to teachers’ reports of a reform’s influence on their Classroom Practice. Comparing the model estimates, shown in Table 9 and Figure 3, with the results of the mediation analysis, show in Table 10, reveals that the influence of Teacher Collaboration on Classroom Practice is not solely explained by principals’ Change Promotion in these 196 schools, and that Teacher Collaboration is not solely the result of Change Promotion. As prior theory suggests, other factors not accounted for by this model also impact these phenomena (hypothetically, these other factors may include principals’ direct interaction with teachers about the reform, or principals’ choice of curricula that support the program’s instructional goals). In addition, the mediational analysis reveals that while the direct pathway is significant, it is not as strong as the indirect pathway. This
suggests that more of the impact of ownership on Classroom Practice is attributable to increases in Teacher Collaboration than to other, unidentified mechanisms.

Overall, the findings of my evaluation of the full SEM support the hypothesis of this study, and suggest that principal ownership played a meaningful role in the extent to which Reading Recovery impacted the Classroom Practices of teachers in these 196 schools.
Figure 3. Full SEM, including both measurement and structural elements
CHAPTER 8: Findings: The Mini Case Studies

This chapter presents the findings of the three mini case studies. As described in Chapter 5: Methods and Chapter 6: Analysis, I selected the three schools profiled here from among seven schools from which both qualitative and quantitative data were collected. The case-study schools were selected on the basis of their Mplus-generated factor scores, and chosen for the extent to which they promised to magnify and elucidate relationships evidenced in the quantitative data. Because the goal of the case studies is to explore the principal ownership phenomenon as it operates within a school, the findings of the cases are discussed separately.

Each case study provides brief background/contextual information about the school and its Reading Recovery implementation, followed by my findings regarding each of the ownership constructs and the hypothesized school-level outcomes of principal ownership. Next, the extent to which the study’s findings support or conflict with the hypothesized relationships of interest is discussed. (Note: In each case, the discussion of Classroom Practice is limited by the absence of qualitative data from the first-grade teachers in those schools. First-grade teachers from many schools were interviewed. However, by chance, none of those schools received enough survey responses to be included in the analytic sample for the SEM study. Therefore, there were no schools that had both complete survey data and interview data from the first-grade teachers.)
Each case study ends with a discussion of the extent to which its findings resonate with the Mplus-generated factor scores for that particular school. This discussion was added after the other case-study findings had been generated; as noted previously, I did not refer to the schools’ factor scores while analyzing the data or developing findings.

The implications of these findings and their resonance with the results of the SEM study are elaborated in Chapter 9: Discussion.

Table 7 (located on page 91 of this document) provides an overview of the factor scores for each of the schools discussed here.

**Case Study: Springfield Elementary**

Springfield Elementary (School #3 In Table 7) is located in a small Midwestern city. Its setting is urban. It serves roughly 500 students in grades K-5. The school’s student body is roughly 60 percent minority. More than 80 percent of the students are eligible for free or reduced lunch. The principal and Reading Recovery teacher note that the school’s student body is highly transient, and the principal reports that there is high staff turnover in the school.

Springfield Elementary has been using Reading Recovery for more than a dozen years (while many of the schools involved in the federally funded scale-up are new to Reading Recovery, many others have existing implementations and are using grant funds to train new teachers for the program). The current Reading Recovery teacher is in her second year in the position. She was a

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2 All school names are pseudonyms.
teacher in the school for five years prior to becoming Reading Recovery-trained. There are two other Reading Recovery-trained teachers in the building.

The principal of Springfield Elementary has been in that role for seven years, prior to which she was principal of another school in the same district.

**Principal’s Control**

The interview data for Springfield Elementary suggest that the principal has a high level of control with regard to the intervention. She did not choose Reading Recovery and was not involved in the decision to introduce it in her district or her school; the school’s Reading Recovery implementation predates her principalship. However, she has the ability to select teachers for Reading Recovery training, and control over whether to grow or shrink the program. Last year, she eliminated a Reading Recovery position for financial reasons; this year, she is sending two new staff members to training.

While the principal of Springfield Elementary is an advocate of Reading Recovery and has no immediate plans to discontinue the program, she acknowledges that it is a question she must continually evaluate. She reports:

“If we get to the point where we have to decide between cutting a [classroom] literacy teacher and cutting a Reading Recovery teacher, I know that the Reading Recovery teacher will have to be the person, just because of the sheer number of students [classroom teachers] serve.”
While the district supports Reading Recovery, if the principal of Springfield Elementary decides it is no longer a fit for her building, she has the autonomy to cut the program entirely. “Nobody can really say no,” she explains.

**Principal’s Knowledge**

While not a trained expert in Reading Recovery, the principal of Springfield Elementary exhibits high levels of knowledge about the program. A former reading teacher, she takes pride in her knowledge about literacy instruction in general, and the Reading Recovery teacher-trainer reports that the principal’s instructional understanding of Reading Recovery has grown through her exposure to the program.

Springfield Elementary’s principal reports that she observes Reading Recovery lessons regularly, and that she is learning what to look for when she does. “I work pretty closely with the [teacher-trainer],” she explains. “She can always give good guidelines about what I should be listening for, what I should be seeing. Are we pushing the kids hard enough?”

As evidence of her growing knowledge, the principal of Springfield Elementary uses the language of Reading Recovery when speaking about both the program itself and her school’s literacy efforts more generally.

Has the student been at a text level for [too long]? You know, in Reading Recovery you really shouldn’t stay too long at a text level, you need to be moving and moving. How long are we staying and what are our next steps? Sometimes we get really generic with our next steps, so being really specific about how are we gonna prompt this child along? What prompts are we using?
Principal’s Self-Investment

The Reading Recovery-trained teacher interviewed for this study expressed concerns about the extent to which her principal prioritizes Reading Recovery. This concern is grounded in the fact that the principal eliminated a Reading Recovery position the previous school year. “I got sent a clear message by her not filling that Reading Recovery position last year that it isn’t a high priority for her,” she says.

Indeed, the principal of Springfield Elementary notes that, in her mind, trimming the school’s program must considered when money is tight. However, other evidence points to high levels of self-investment on the part of this principal. Despite losing one position last year, the school has a robust implementation with several trained teachers and two new teachers currently in training. The principal describes a commitment to keeping the positions filled when funding permits. She observes that, due to the high teacher turnover in the building, “we are constantly training new Reading Recovery teachers.”

The principal of Springfield Elementary reports significant personal involvement with the day-to-day operation of the program, and speaks of her own efforts to shepherd the program and ensure its success. She requests biweekly progress data from Reading Recovery lessons, and monitors it closely. And, she reports:

I try to be involved in not only just the scheduling and ensuring that we’re taking kids [to their RR lessons] during times that they need to be taken, but also in communicating progress with parents, or lack of progress, and the importance of doing the nightly homework. I [am involved with] ensuring that,
when a student is missing or when a student is tardy, that we’re making attempts during other times during the day to pick that student up [for their lesson] if they come in late.

The Reading Recovery-trained teacher interviewed for this study and the teacher-trainer who supports the school’s program both corroborate these accounts, describing the principal’s participation in the selection of students to receive Reading Recovery, and her attendance at monthly meetings designed to promote ongoing communication between Reading Recovery-trained teachers and first-grade classroom teachers.

“I am pleased with the leadership in that building,” the trainer reports. She calls the principal’s personal involvement with Reading Recovery over the past several years “a huge turnaround” and attributes the change to the principal’s deepening instructional knowledge about Reading Recovery.

For her part, the principal speaks of Reading Recovery in glowing terms:

When you have a good Reading Recovery teacher there just isn’t anything that is replaceable for that. I have seen my Reading Recovery teachers do amazing things with kids that … I just didn’t even know if they were capable of doing the things that they’ve done.

The principal of Springfield Elementary reports working to spread her enthusiasm for the program by making sure that teachers in her building are aware of Reading Recovery’s impacts on the students it serves. “I’m just trying to expand it a little bit to help them see the benefit,” she explains. “I think just a little PR in that area helps a bit too.”
Principal’s Change-Promotion Behavior

The findings from Springfield Elementary suggest that the principal engages in a high level of change-promotion behavior. Specifically, she intentionally positions Reading Recovery-trained staff to maximize their impact on other teachers’ instructional knowledge and practice, and she works to align her school’s curricula and literacy programming with the principles of Reading Recovery. Accounts from the Reading Recovery-trained teacher interviewed for this study and the teacher-trainer who supports Springfield Elementary, as well as from the principal herself, support this finding.

The principal of Springfield Elementary reports intentional efforts to spread Reading Recovery-trained teachers’ expertise to their colleagues. One way she accomplishes this is by involving the expert teachers in professional development sessions with other staff:

We did an in-service with second grade teachers about the first four levels of text reading and how easy they are to get stuck in, and why a second grader shouldn’t be in them. We really worked with that group for a couple of hours to help move an entire group of kids to the next level to get them going again. All of [the Reading Recovery teacher’s] training and all of her background really benefits our school in situations like that.

Reading Recovery teachers in Springfield Elementary also double as literacy co-teachers in the regular first-grade classroom. The decision to pair the teachers this intensively was the principal’s, and she made it for the explicit purpose of increasing the first-grade teachers’ exposure to the program. “I want [the Reading Recovery teachers] to work with those same Reading Recovery
kids in their regular literacy groups so that the teacher can see what they are doing,” she explains.

School-wide, Springfield Elementary uses a balanced literacy curriculum. Instruction throughout the school is based on authentic literacy—there are no basal readers in the building—and leveled texts are used by all students during classroom instruction. Each of these instructional components is understood to align closely with Reading Recovery (May et al, 2013). The school’s principal reports that she has programmed these features intentionally, and with Reading Recovery in mind:

I see when we’re in the classroom and just working with words, the writing, the retelling, the concepts of print, all of those basic things that we start with in first grade or kindergarten, then I see all of those components within Reading Recovery and I think that’s a good tie-in, which is why that communication with that classroom teacher is so important.

Finally, the principal of Springfield Elementary strategically designs the building-wide schedule not only to protect Reading Recovery lesson time and pair expert, trained teachers with their peers in the classroom, but also to facilitate plenty of meeting time for Reading Recovery-trained teachers and other staff. “I’ve got like 900 papers in front of me because of our scheduling,” she says. “It’s very tedious, but it’s very intentional”

Teacher Collaboration

By all accounts, teacher collaboration around Reading Recovery is quite high at Springfield Elementary. The trained teacher interviewed for this study reports frequent interaction with her colleagues. By contrast with many other
schools—even some others with high levels of teacher collaboration (May et al, 2013)—the collaboration here is particularly expansive: Reading Recovery-trained staff work with teachers at all grade levels to share strategies and support all students’ learning, whether they participate in Reading Recovery lessons or not.

The Reading Recovery teacher and teacher-trainer associated with Springfield Elementary both credit the principal for facilitating this collaboration. However, the personal commitment of one particular Reading Recovery teacher also appears to be a factor. The teacher-trainer describes the Reading Recovery teacher as “a go-getter” and notes that she has taken the initiative to increase collaboration with other teachers in the school. The monthly meetings between Reading Recovery and first-grade classroom teachers are one example. The Reading Recovery teacher reports:

Last year we would meet sometimes but not necessarily just to discuss the progress [the students are] making, like we have this year. And so I think this year since we are meeting there’s a little extra push and maybe even a little extra peer pressure that will keep the kids moving along. We can’t slack off. And so we’re sort-of pushing each other, and then giving ideas to each other.

While the principal supports and often attends these meetings, it was the trained teacher who suggested that they be implemented: “I desperately wanted to share [what I know] with them, so that they wouldn’t have that lack of understanding. So, yeah, that was just me.”
Influence on Classroom Practice

Because no first-grade teachers from Springfield Elementary were interviewed, data on the reported influence of Reading Recovery on first-grade teachers’ classroom practice is unavailable.

Resonance with Hypothesis and Quantitative Findings

The factor-score analysis of Springfield Elementary reveals average levels of Control; very high levels of Knowledge, Self-Investment, Change Promotion, and Teacher Collaboration; and high levels of reported influence on Classroom Practice. This is highly consistent with the findings of the case study. Both sets of findings support the hypothesized relationships of interest to this study.

Case Study 2: Westside School

Westside School (School #22 in Table 7) is located in a rural area in a Midwestern state. The school serves 400 students in pre-K through fifth grade, of whom just 10 percent qualify for free or reduced lunch. The school’s student body is 95 percent white.

Westside has just one Reading Recovery-trained teacher currently. She is in her second year in that position, and replaced a teacher who retired from the role. She held classroom teaching roles at other schools before assuming her current position. In addition to her Reading Recovery role at Westside, she works as an interventionist, providing support to groups of students in both literacy and math. Like Springfield Elementary, this school has used Reading Recovery for a
number of years; the implementation predates the current teacher’s tenure by several years.

**Principal’s Control**

There is insufficient qualitative data to fully assess the principal’s level of control over the Reading Recovery implementation at Westside. It is a district-wide intervention, and the school’s principal reports that she was instrumental in convincing the district to adopt it. However, both the principal and the Reading Recovery teacher-trainer who supports the school indicate that the program is now mandated at the district level. This suggests that the principal would not have the option of discontinuing it if she wanted to, which would indicate a low level of control. However, the data do not make this explicit.

**Principal’s Knowledge**

The Reading Recovery teacher interviewed for this study indicated that the principal of Westside has some procedural understanding of the student-selection process—participating in that process is her primary involvement with Reading Recovery each year. However, most evidence suggests that the principal's level of knowledge about Reading Recovery is low.

“I've never had a conversation about literacy with that principal,” reports the teacher-trainer. She notes that many other principals she works with are quite conversant about literacy, and a few are even Reading Recovery-trained, so the principal of Westside is atypical for her district.
In conversation, the principal uses general language to describe the intervention, noting that she has observed lessons a few times:

I think it’s a very good structure in the lesson. I feel that through that process she can really diagnose what those deficiencies are and then it can be targeted—direct instruction, whether it’s the letters, it’s the words, the sounds. I also like that writing is incorporated into it as well. It’s got that cross-curricular component there.

**Principal’s Self-Investment**

Findings related to this principal's self-investment in Reading Recovery are mixed, but again suggest low levels of investment. She is an enthusiastic supporter of Reading Recovery, describing it as “a phenomenal program” and “a very high priority.”

However, by all accounts the principal’s personal involvement with the program is very low. She indicates that she has no role in the program’s day-to-day operation—this is confirmed by the Reading Recovery teacher. The principal reports that she has occasionally attended staff meetings related to the program, or parent meetings in which a child’s progress in Reading Recovery was discussed, but she describes her role in those meetings as to “sit in and listen.”

Similarly, the teacher-trainer notes that the principal attended a meeting related to the selection of Reading Recovery students at Westside, but says, “I don’t think she said more than one or two things.”

The Reading Recovery teacher at Westside reports that there is little or no communication between her principal and the teacher-trainer. Despite the trainer’s frequent visits to the school, she says, “I don’t think there is communication between them, from what I know.” The trainer confirms this
limited communication, and reports that the principal’s engagement with Reading Recovery in general is quite low:

She’s just one of those principals that I’ve never… she’s never come to an ongoing professional development, or you know watched a teacher behind the glass, in the time that I’ve worked with her.

**Principal’s Change-Promotion Behavior**

The interview data suggest that the principal of Westside exhibits very low levels of change-promotion behavior. Asked whether she communicates with anyone in the building about Reading Recovery, beyond the Reading Recovery teacher, she responds: “Not really that I can think of off the top of my head, no.”

The Reading Recovery teacher reports that she makes a policy of reaching out to the first-grade teachers in the school “at least one time a week, whether it is face-to-face or through email.” She indicates, however, that this communication happens on her own time and through her own initiative; her principal does not facilitate contact of any kind between the trained teacher and other staff. While the first grade teachers do meet regularly, she says, “I can’t join due to schedule conflicts … I don’t have that extra time to go down and meet when the first-grade teachers meet.”

These reports are consistent with the principal’s own remarks. She does not see the RRT as having an instructional leadership role. Asked about whether the Reading Recovery teacher works with other staff around instruction, she talks about “hiring another person to do that.” She elaborates:

If money were no option and I could do whatever I wanted to do, it would be wonderful to have that Reading Recovery teacher and then a reading interventionist… This person could go in and observe teachers teaching
reading, be able to co-teach together, problem-solve. That would be the ideal, just to kind-of have that instructional coach type of role.

**Teacher Collaboration**

The Reading Recovery teacher at Westside reports working hard to keep open lines of communication with the first-grade teachers in her building. The goal of that communication, she says, is not to spread her expertise to other teachers, but rather to ensure consistent support for Reading Recovery students.

[The classroom teachers’] role and my role together is to communicate often, and for me to communicate the type of strategies, and the book level, and what the student is doing in my room and to echo it in the classroom. And so their role is to follow through and practice the same type of things that we’re doing so that the student is getting it in many different aspects of the day.

With limited logistical support from the principal, however, the Reading Recovery teacher reports that maintaining regular communication is a challenge: “I wish it could be more of a consistent, ‘this is the time we’re going to meet to discuss’. I wish it could be that but I haven’t been able to figure that out.”

While she regards the first-grade teachers as supportive of her work with their students, the Reading Recovery teacher at Westside adds that “they don’t ask me any questions about it.” And she has little or no interaction with other teachers in the building about Reading Recovery.

“I wish they would come and watch a lesson,” she says. “I think they just need to know what happens in that 30 minutes time.”
Influence on Classroom Practice

The extent of Reading Recovery’s influence on classroom instruction at Westside is unclear from the qualitative data. No first-grade teachers from this school were interviewed. The Reading Recovery teacher reports that she shares some strategies with the first-grade teachers, but does not know whether they are using them. “I couldn’t answer that,” she says. “I haven’t been able to observe them.”

Asked whether she thought other teachers in the building understand the instructional principles behind Reading Recovery, or how its instruction might be useful in the regular classroom, she replies, “If they haven’t been trained, they probably don’t understand it.”

Resonance with Hypothesis and Quantitative Findings

The factor-score analysis for Westside reveals low levels of Control and Teacher Collaboration; very low Knowledge, Self-Investment, and Change Promotion; and average influence on Classroom Practice. The case study largely supports these findings, though the average score for influence on Classroom Practice is not explained; it indicates a higher level of impact on classroom instruction than the interviews would suggest.

The findings of both the qualitative and quantitative research on Westside support most of the hypothesized relationships of interest to this study. However, the relatively high reported influence on Classroom Practice seen in the survey data is, again, somewhat inconsistent.
Case Study: J.Q. Adams Elementary

J.Q. Adams Elementary (School #7 in Table 7) is a large K-5 elementary school in an urban Midwestern setting. Seventy percent of the roughly 500-member student body is eligible for free or reduced lunch. The population is roughly 45 percent minority.

J.Q. Adams has two Reading Recovery teachers. The teacher interviewed for this study is in her second year in that role, which is also her second year at the school. She is a certified literacy specialist who previously taught early literacy in other schools. The principal is in her second year in the building, having worked previously as an administrator at another school in the district.

The school’s Reading Recovery implementation is the product of a strong district-level commitment to the program. Throughout the district, all schools have one Reading Recovery teacher for every two first-grade classrooms. The site coordinator who oversees the district’s implementation is Reading Recovery-trained and a strong and influential advocate for the program.

Principal’s Control

Interviews with key players involved with the Reading Recovery implementation at J.Q. Adams suggest that the principal has little control over key aspects of the program in her building. As mentioned above, Reading Recovery is mandated at the district level; all schools must use the intervention, and must abide by district policies governing its implementation, and principals are held accountable for the outcomes of their Reading Recovery programs.
While principals in J.Q. Adams’s district are involved in the hiring of Reading Recovery teachers for their schools, they are required to maintain a district-specified ratio of Reading Recovery teachers to first-grade classrooms. Trimming or eliminating the program for financial or instructional reasons is not an option. The Reading Recovery teacher explains that “our school district as a whole places a very, very big emphasis on Reading Recovery.”

**Principal’s Knowledge**

Both the Reading Recovery teacher and the teacher-trainer associated with J.Q. Adams report that the principal has a high level of knowledge, both procedural and instructional, about Reading Recovery, and a strong grounding in literacy in general.

“As far as [literacy] curriculum, she is very, very strong in that area,” says the teacher-trainer. “She would know what good reading and writing and everything would look like. So I would give her a top notch for that.”

The principal herself indicates that her solid understanding of Reading Recovery stems in part from the district’s strong support for the program. She reports that the district-level site coordinator has overseen the institution of a number of processes to support the district’s use of Reading Recovery; these include trainings and observation protocols designed to help principals monitor their schools’ Reading Recovery programs. All principals in the district are expected to comply with these activities.
“We have a “look-for” page, here are some things you would look for when you appraise the reading recovery teachers. Here are some things to look for in the lesson,” she explains.

These supports, along with regular contact with the Reading Recovery teachers in her building, have given her a strong understanding of the program’s goals and methods.

**Principal’s Self-Investment**

Findings related to the principal’s self-investment in the Reading Recovery program at J.Q. Adams are mixed. On one hand, the interviews reveal that the principal engages with the program in ways that would suggest high self-investment. She attends key meetings related to the operation of the Reading Recovery program in her school. She observes Reading Recovery lessons regularly and protects the teachers from disruptions to their lesson schedules.

On the other hand, there are indications that her actual self-investment is lower. For example, the principal explains that much of her current focus is on another reading program that is currently being implemented in the school; as a result, her day-to-day involvement with Reading Recovery is limited and confined primarily to beginning- and end-of-cycle meetings about student placement, and district-mandated classroom observations.

Both the Reading Recovery teacher and the principal herself mention the district’s focus on the rates at which Reading Recovery students “discontinue”—Reading Recovery’s term for successfully achieving text-level growth goals at
completion of the program. The principal has felt pressure, she explains, to improve the discontinuation rates at J.Q. Adams. The Reading Recovery teacher expresses frustration that her principal's interest in the program is focused around discontinuation rates rather than students' growth in literacy:

The conversations with [my principal] always begin with: “How many kids are you gonna discontinue? We've got to get our discontinuing rate up. We've got to get kids discontinued.” … [A student] may have gone from a level one to a level 11, but if she didn’t pass a 12, she didn’t discontinue… In my eyes, I see that in 16 weeks she moved 10 levels in text and her vocabulary grew by, you know, from three words to 50.

**Principal's Change-Promotion Behavior**

Findings on the principal's change-promotion behavior relative to Reading Recovery are similarly mixed. More specifically, the principal's own accounts in this area conflict to some extent with the Reading Recovery teacher's observations.

For her part, the principal describes frequent efforts to facilitate contact between other teachers and the Reading Recovery teacher, with the express goal of increasing the classroom teachers' literacy knowledge:

When I do formal observations, I might see something [in a classroom and] then I will say, “you know what, the Reading Recovery teacher, I noticed last week they had this great strategy they were using. Would you be interested in getting to go and observe?” And [the teachers say] “Oh yeah, I'd love to.” And so then we make arrangements for them to go and observe. And that's even a third or fourth grade teacher who might want to go and observe something that a Reading Recovery teacher is doing, which I would cover and encourage.

In addition, the principal explains that she pursues a school-wide instructional agenda that is well aligned with Reading Recovery, and has
instituted a system of weekly professional learning community meetings that include Reading Recovery-trained staff.

However, the Reading Recovery teacher expresses frustration that the principal hasn’t done more to ensure that the progress data generated through Reading Recovery lessons is integrated into school-wide processes and decision-making, or that classroom teachers integrate feedback from Reading Recovery into their own instruction. Observing that the classroom teachers are not highly receptive to her input, the teacher wishes for more active principal support in these areas:

What I would like is for somehow that data to be shared out a little more efficiently with the classroom teachers so they can revise their instruction in the classroom to support what I have been doing. I haven’t been real successful in communicating where my students are with me versus where they are in the real classroom and kind-of getting that to balance out a little better. I’m finding there’s a big discrepancy, and I’m not sure why.

**Teacher Collaboration**

The Reading Recovery teacher reports that while she has regular contact with the first-grade team, meaningful collaboration is difficult. More specifically, she reports that her colleagues seem loath to integrate her suggests about instruction, or to work with her to ensure that Reading Recovery students receive consistent service throughout the day:

I’ve had some trouble with making things balance in the classroom. Like if I’m doing a level 12 book with a kiddo, sometimes in the classroom they’re in a reading group that’s on a level six, and that’s too much of a discrepancy, in my opinion. And so I’ve been wrestling with ways, throughout the school year, to try and figure out how to get on the same page with the classroom teachers.
The Reading Recovery teacher notes a dissonance between her experience with classroom teachers and their outward communication about Reading Recovery, both within the school and to parents and other stakeholders. On a number of occasions, she has heard her colleagues speak glowingly about the program and its impact on students. “Ironically, for all the discrepancies that we have, they speak very highly of our program,” she says. “So, that’s a good thing, I guess, but it kind-of puzzles me. At the same time it kind-of puzzles me.”

**Influence on Classroom Practice**

No interview data from first-grade teachers are available for J.Q. Adams. The principal of J.Q. Adams reports that classroom teachers do incorporate the strategies they learn from Reading Recovery into their own instruction. Once again, however, her reports conflict with those of the Reading Recovery teacher. Asked if her colleagues incorporate their understandings from Reading Recovery into their own instruction, she says:

> I think if they really, really understood the program real well, there’d probably be a little more cooperation, in terms of seeing our data as valid and using that to help drive their instruction as well as ours. I think they have a basic understanding of it.

**Resonance with Quantitative Findings**

The factor-score analysis for J.Q. Adams reveals very low Control; very high Knowledge; average Self-Investment; low Change-Promotion and Teacher Collaboration; and high influence on Classroom Practice. These findings are mostly consistent with the results of the case study. However, quantitative
findings on both Change-Promotion and Teacher Collaboration were somewhat higher than the conflicting qualitative data might suggest. In addition, the high factor score for influence on Classroom Practice is consistent with the principal’s accounts on this issue, but not those of the Reading Recovery teacher.

Unlike those of the other two mini case studies, J.Q. Adams’s quantitative findings do not appear to support the study’s hypothesis. A discussion of the implications of this discrepancy, and of the insights that may be gained through examination of the inconsistencies between J.Q. Adams’s qualitative and quantitative findings, can be found in Chapter 9: Discussion.
CHAPTER 9: Discussion

The conceptual framework presented in this study hypothesizes that, in the context of an instructional initiative, a principal’s ownership behavior influences teachers’ collaboration, and that this collaboration produces changes in classroom practice. Principals’ ownership behavior, it hypothesizes, is influenced by three antecedents to ownership: Control, Knowledge, and Self-Investment relative to the instructional program.

This conceptual model for principal ownership makes several assertions:

1) It underscores the importance of principal leadership to teachers’ classroom practice.

2) It offers specificity regarding the kinds of behaviors principal ownership produces, and the teacher-level impacts of those behaviors.

3) By examining both mediated and direct pathways, it clarifies the mechanisms by which principal actions impact teacher instruction.

4) It sheds light on the role of antecedents in the development of ownership behavior in principals.

The research described in the preceding pages tested this hypothesized framework through a mixed-methods examination of principal ownership, as it is manifested in the context of the implementation of Reading Recovery. The
quantitative portion of the study comprises an analysis, via structural equation modeling, of the relationships and pathways between the hypothesized principal ownership constructs and teacher outcomes in 196 schools across the U.S. The qualitative portion consists of three mini case studies of particular schools, each selected from within the SEM sample for its potential to magnify and elucidate the quantitative findings.

The findings of both portions of the study support my hypothesis. The SEM analysis reveals statistically significant pathways between the ownership antecedents and principals’ ownership behavior; between the ownership behavior and teacher collaboration, and between teacher collaboration and reported influence on first-grade teachers’ classroom practice. It also reveals a significant direct pathway from principals’ ownership behavior to the program’s reported influence in the classroom, suggesting that teacher collaboration was not the only mechanism by which principals’ behavior facilitated the reform’s impact on teachers’ instruction in these 196 schools.

For the reasons detailed below, in the Limitations section of this chapter, it is important not to overstate the significance of these exploratory findings. More research is needed to confirm these results before more conclusive statements can be made about the role of principal ownership in instructional reform. However, the SEM analysis finds that the hypothesis represented by my conceptual framework is plausible.
The case studies also largely support the assertions of the conceptual framework. The case study on Springfield Elementary presents a portrait of the hypothesized relationships in action: A principal with very high levels of Control, Knowledge, and Self-Investment relative to Reading Recovery engaged in high levels of Change-Promotion behavior. High levels of teacher collaboration and high influence on Classroom Practice result. These findings are consistent not only with Springfield Elementary’s survey data, but with the ownership hypothesis as a whole. Westside’s low-ownership case is largely illustrative of the hypothesized relationships, as well.

Though its findings are preliminary, this study contributes to research on principal leadership, on policy implementation, and on psychological ownership. It speaks to overlapping scholarship traditions that are deeply interested in both the consequences and the causes of principals’ leadership behavior (Hallinger, 2003, 2005; Gentilucci & Muto, 2007; Griffith, 2004; Leithwood, Anderson, Mascal, & Strauss, 2010). Ultimately, it suggests that ownership theory offers useful insights for policy-makers and those charged with translating policy to school-level action, and that it represents a worthy avenue for future research in educational leadership and policy.

A New Pathway for Principal Effects

My research is informed by the literature, discussed in Chapter 2: Literature Review, on the mediated nature of principal effects (Hallinger & Leithwood, 1994; Hallinger & Heck, 1996; Day, Sammons, Hopkins, Leithwood,
and Kington; 2008). My findings affirm the conclusion of the bulk of this prior research—that principal leadership impacts teaching and learning in schools mostly indirectly, through its influence on various school-level mediators. Indeed, the SEM analysis revealed that that an indirect pathway via the hypothesized mediator examined in this study—teacher collaboration—accounts for a majority of the effect of principals’ ownership behavior on classroom practice. Along with supporting the indirect-effects hypothesis generally, this research highlights the significance of one specific and promising pathway for influencing classroom practice: Both quantitatively and qualitatively, the analysis detailed in this dissertation supports the hypothesis that principals with higher levels of ownership are more effective stewards of instructional reform, and that their effectiveness stems specifically from their efficacy at facilitating teacher collaboration.

The importance of teacher collaboration as a mediator for principal effects has been identified in prior work (Goddard, 2005; Mulford & Silins, 2003; Silins & Mulford, 2002). My study extends this research by establishing principal ownership as a driver for that collaboration. My work therefore reinforces prior findings about both the power of teacher collaboration as a component of the implementation process, and the role of the principal in facilitating it. It also suggests that principals’ levels of ownership may be a meaningful predictor of their effectiveness at facilitating “collective teacher efficacy” (Mulford & Silins, 2003) and, ultimately, at improving teaching and learning.
These findings reinforce and extend the lessons of the existing literature—including recent research on transformational leadership (Griffith, 2004; Leithwood & Jantzi, 1990; Leithwood & Duke, 1999; Marks & Printy, 2003)—that identifies the facilitation of teacher collaboration as a key task of principals and an important lever for instructional change.

**Antecedents to Ownership: Setting the Stage for Change**

Along with clarifying the utility of principal ownership as a lens on leadership and implementation, my research represents a meaningful extension of prior work on the antecedents to principal leadership (Pitner, 1988; Hallinger & Heck, 1996; Hallinger & Murphy, 1986; Scott & Teddlie, 1987; Glasman & Fuller; 1992; Cheng, 1994) by examining *how ownership develops*. The study demonstrates that three specific antecedents—control over the implementation; knowledge about the program; and self-investment in the processes that support its operation—impact principals’ change-promotion behavior toward an instructional initiative. By ensuring that principals have both control over key decisions about the program and deep knowledge of its goals and processes, my results suggest, a district may effectively cultivate principals’ self-investment and change-promotion behavior and, by extension, support the initiative’s impact on classroom instruction.

I observe that while either Control or Knowledge can lead to Self-Investment, principals of the schools with the strongest Reading Recovery implementations have high levels of both. In addition, I observe qualitatively that
while Knowledge can develop over time through contact with the program (the Springfield Elementary case offers an example), Control—as a function of district-level policy and leadership—is largely invariant. Districts that mandate the program or control its staffing centrally may therefore do so at the detriment of principal ownership.

As an example, the case study on J.Q. Adams reveals a very strong, mandatory district-wide implementation of Reading Recovery that leaves principals little autonomy over the program’s operation in their buildings. Although the principal is very knowledgeable about Reading Recovery, both sets of data suggest relatively low Self-Investment, Change Promotion, and Teacher Collaboration at this school. The portrait that emerges, qualitatively, is of a principal who is going through the motions; she understands her district’s priorities and puts her focus on the elements of the implementation for which she expects to be held accountable. The case study findings suggest that the principal's lack of Control over the implementation in J.Q. Adams is preventing her from fully investing in Reading Recovery,

My research therefore highlights questions the respective contributions of the three antecedents and, more broadly, about the dangers of centralized programming when it comes to cultivating ownership.

**A New Twist on Psychological Ownership**

Along with its contributions to the study of education, this work adds to the scholarship on psychological ownership first by demonstrating its relevance to
the study of education and, second, by interrogating the relationships between the three antecedents to ownership. This study’s empirical finding that Self-Investment mediates the effects of Control and Knowledge on Change Promotion behavior represents a refinement of the prior thinking with regard to the antecedents to ownership (Mayhew et al., 2007; Pierce & Jussila, 2010, 2011; Pierce et al., 2003).

As this finding arose from the study’s data, it warrants further investigation through future research. However, it is well supported by the qualitative research in this study. I consistently observed that principals with high levels of Self-Investment also had high levels of Control and/or Knowledge. This is evident from the factor score analysis results presented on page 91, and arose consistently from the preliminary interviews as well. In no case was a principal found to have high Self-Investment without having at least one of the other two antecedents in place.

While future study may conclude that this finding regarding the relationship between the three antecedents was spurious—perhaps the result of specific features of this particular sample or measurement process—it may represent a valid finding revealed through the use of SEM, which has not been used in prior research on psychological ownership.

**Lessons for Districts and Program Developers**

Though preliminary, this study’s conclusions offer provocative and potentially useful lessons for districts and policy-makers—lessons that build on
classic implementation theory (Lipsky, 1971; Berman & McLaughlin, 1976) by reinforcing the local nature of reform and the role of site-level buy-in and control in reforms that are externally introduced.

On one level, my findings speak to the utility of principal ownership as an asset for the implementation of instructional change, and suggest that its cultivation is worthy of effort. Indeed, the findings of this work indicate that where changing classroom practice is a goal, facilitating principal ownership should be an explicit objective. For policy-makers and program developers, this may mean a shift in the focus of implementation efforts from training and directing teachers to securing investment from principals.

And it may mean more than that: While prior research offers clues about the processes of program implementation at the school level, my findings about the role of the antecedents to ownership indicate that key determinants of an initiative’s success may play out well before it is even introduced in schools. This suggests that implementers should strive to ensure that the antecedents to ownership—particularly Control and Knowledge—are in place early in the implementation process. Thus, district leaders and program developers might set the stage for reform implementation by preparing principals to facilitate reform implementation in schools by including them in some form of professional development that increases principals’ understanding of the reforms they are expected to support. District and program leaders might also consider what particular roles principals play in instructional reforms, even if those roles are
indirect. Additionally, they might think through and provide guidance about what aspects of a reform are adaptable, so that principals can situate the reforms more securely within their contexts, and which aspects of reform principals must be implemented as designed. For district and program leaders, this may mean striking a careful balance between facilitating principals’ learning and flexibility, while retaining appropriate specificity.

Limitations

The study described in the preceding pages is exploratory in nature. To my knowledge there is no prior research applying psychological ownership theory to schools or school leadership. The study used newly developed instruments that were piloted within this project, and its sample size was relatively small. For these and other reasons, the findings should be regarded as preliminary and merely suggestive of the plausibility of the underlying hypothesis, rather than as evidence of its viability.

The instruments developed for the measurement of the latent constructs of interest, while rooted in well-established theory, are new. Although I employed a rigorous development process, the items were not independently validated prior to their use; in effect, the instruments were piloted within the study. The low factor loadings noted in Chapter 6: Findings: SEM Analysis for latent factor F1, Control, may stem from problems with the items used to measure that construct in particular. With more time and opportunity, stronger and more reliable
measures could be developed that would better serve the goal of confirming these preliminary results.

Similarly, this study, by design, incorporates survey data collected from multiple respondents at each school. Some degree of common-method variance may be present as a result of this approach. Some modeling strategies have been shown to address non-independence of errors resulting from the use of multi-trait multi-method data in SEM (Marsh & Bailey, 1991; Figueredo, Ferketich & Knapp, 1991; Lance & Sloan, 1993; Saris & Alberts, 2003). However, because of problems with identification—a common issue with MTMM models (Pohl & Steyer, 2010; Eid, Lischetzke, Nussbeck, & Trierweiler, 2003)—I was not able to apply these strategies to the construction of the measurement model. Therefore, a conventional specification was used. It is unknown whether, or how much, common-method variance may factor into the findings presented here. However, it is possible that this issue may confound the estimated relationships, inflating the magnitude of the estimates.

In addition to these methodological issues, some limitations related to the study’s design must be considered. For instance: Each of the schools profiled in a mini case study was found to have a Reading Recovery teacher who, to a greater or lesser extent, takes personal responsibility for facilitating Teacher Collaboration around the initiative and ensuring the program’s impact on classroom instruction. This suggests that an energetic Reading Recovery teacher’s influence may confound the principal’s influence on both collaboration
and classroom impact. Ideally, the SEM model used for this study would address this possible confound by including Reading Recovery teachers’ change-facilitation activity as a covariate. Because clear measures of Reading Recovery teachers’ influence were not available for use in this study, however, I relied on qualitative methods to examine this issue. Future research should include this factor from the survey design stage. Other possible confounds—related to teachers’ opinions of the instructional initiative or of the principals’ leadership generally—should also be considered. Data related to these issues were not available for this study.

An additional limitation of the study stems from the fact that the outcome variables—Teacher Collaboration and influence on Classroom Practice—were measured via teachers’ self-reports. It is possible that teachers may not have accurately reported on their own collaboration and/or their own classroom instruction. For instance, they may have been inclined to overstate the extent to which they have incorporated Reading Recovery strategies into their own practice. As noted, this may be the case with J.Q. Adams school. Again, the mixed-methods design of this study helps to ensure that these issues are considered, but it does not address any bias they may introduce to the SEM analysis.

Finally, the generalizability of this study’s findings may be limited by the fact that the project focuses on one instructional intervention—Reading Recovery. It is possible that features of Reading Recovery’s implementation may be
substantively different from other initiatives, and that these differences may limit the extent to which ownership patterns that exist in the context of Reading Recovery implementation apply in other situations.

**Framing Future Inquiry**

Viewed together, the SEM analysis and the case studies described in this dissertation elucidate a number of conclusions. Chief among these is the recognition that the framework under study here should not be viewed as a closed system. When the qualitative lens is applied, meaningful factors that are obscured in the SEM analysis come to light, and vice versa.

At Westside, for instance, survey data and case study findings both point to very low principal ownership and Teacher Collaboration, yet the factor scores drawn from the survey data reveal average levels of influence on Classroom Practice—greater impact on classroom instruction than the hypothesized model would predict, given the low scores for the other constructs. The SEM analysis designed for this study cannot explain this incongruity (more on this in the *Limitations* section of this chapter). However, the case study analysis reveals a Reading Recovery teacher who is working hard to compensate for her principal’s shortcomings; she has created her own systems to facilitate collaboration in the absence of principal support. It is reasonable to hypothesize that her efforts are salvaging the program’s impact on classroom instruction.

J.Q. Adams offers another puzzling example. As mentioned earlier, the case study reveals low levels of principal ownership and a district-mandated and
controlled Reading Recovery program. However, the school’s factor scores point to high Instructional Impact—a puzzling finding in light of this overall picture, and one that raises critical questions: Is the principal’s high Knowledge impacting instruction through some mechanism not captured in the hypothesized model? Or is the Reading Recovery teacher reaching her colleagues more effectively than she believes? Or, are the classroom teachers, like their principal, well versed in the impact Reading Recovery is expected to have on their instruction, and therefore providing what they believe to be the “right” answers to survey questions? Is some combination of all of these factors in effect?

While they cannot be answered here with any certainty, these and other questions highlighted by the juxtaposition of this study’s qualitative and quantitative components suggest directions for future study, and underscore the value of a mixed-methods approach for a study of this kind.

For these and other reasons, cross-validation of this study’s findings is essential; the relatively small sample available for the SEM analysis made it impossible to reserve a sub-set of the observations for confirmatory analysis. The principal ownership phenomenon explored here should also be applied relative to other instructional programs, and with the addition of covariates to examine the variability of these relationships with differences in contexts or populations. Efforts should be undertaken to more rigorously validate instruments for measuring the ownership constructs in the context of instructional
implementations. The instruments developed for this study should provide a useful starting place for this work.

It is also important to note that this study focuses on just one of many theoretically valid manifestations of ownership—change promotion. Principal ownership in the context of an instructional initiative may also manifest in other ways not explored in this project. Future research should therefore focus on other manifestations of ownership and their contributions to understanding principals’ behavior.

In addition, this cross-sectional study provides a moment-in-time perspective on the phenomenon of principal ownership. It would be valuable to explore principal ownership via longitudinal research that examines changes in the various constructs over time.

Future work should also examine the relationship between principal ownership and student learning. While this was beyond the scope of the current study, it is the next step for understanding ownership’s impacts more deeply, and for exploring its relationship to variation in school-level program effects. A growing body of research focuses on impacts as a function of program implementation (Century, Rudnick, & Freeman, 2010), seeking to understand not only whether particular school-improvement initiatives are effective, but also why they succeed or fail to achieve impacts (Bauman, Stein & Ireys, 1991; Summerfelt, 2003). With its introduction of psychological ownership as a plausible force in school improvement, my research advances a new framework
for understanding both successes and failures in instructional change. In doing so, it lays the groundwork for future examination of ownership as a predictor of variation in school-level impacts.
Appendix A: Construct Definitions

The latent constructs represented in the conceptual model for this analysis are defined as follow:

**Control**, a hypothesized antecedent to ownership, is defined as decision-making authority and autonomy with respect to major decisions about the instructional initiative. These decisions include the adoption and maintenance of Reading Recovery and the selection of staff. The Control domain does not include involvement in the day-to-day operation of the programs. The emphasis of this domain is on *autonomy*.

**Knowledge**, a hypothesized antecedent to ownership, is defined as understanding the initiative from an instructional and/or operational standpoint. This includes an understanding of the goals and processes of the initiative, but does not include knowledge of day-to-day occurrences or details related to its operation in the school. The emphasis of this domain is on *understanding*.

**Self-investment**, a hypothesized antecedent to ownership, is defined as personal caring about, engagement with, and attention to the initiative. Self-investment is presumed to be manifested in communication or decisions that mark the initiative as a personal priority, or in personal attention to details its operation in the school. The emphasis of this domain is on *engagement*. 
Change promotion, a hypothesized behavioral manifestation of ownership, is defined as behavior that is intended to, or has the effect of, steering the school or district in the direction of Reading Recovery, or making instructional activities align more closely with its approach. This includes making decisions or taking steps that support the spread of Reading Recovery philosophy or practice.
## Appendix B: Hypothesized Dimensions of the Ownership Constructs

<table>
<thead>
<tr>
<th>Hypothesized dimensions</th>
<th>Questions</th>
<th>QUANT data sources</th>
<th>QUAL data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td>Did Principal choose RR?</td>
<td>Was she involved in bringing RR to the school?</td>
<td>SC; TL</td>
</tr>
<tr>
<td></td>
<td>Does P make the key decisions about RR in her building?</td>
<td>Does she select the RR teachers? Does she decide whether to maintain the intervention?</td>
<td>TL; RRT SC; TL; RRT</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td>Does P understand RR?</td>
<td>Is she trained in RR? Does she use the language of RR? Can she speak concretely about how RR complements or conflicts with other instruction?</td>
<td>TL 1st; TL; RRT TL RRT 1st</td>
</tr>
<tr>
<td></td>
<td>Does P seek to understand RR better?</td>
<td>Does she observe RR lessons? Does she talk about RR with the TL? Does she attend workshops, conferences? Does she read RR literature?</td>
<td>RRT TL; RRT TL; RRT TL; RRT TL; RRT</td>
</tr>
<tr>
<td><strong>Self-Investment</strong></td>
<td>Does P have a stake in the success of RR?</td>
<td>Does she communicate to others that RR is a personal priority? Does she communicate the belief that RR is the best intervention available?</td>
<td>1st; RRT 1st; RRT</td>
</tr>
<tr>
<td><strong>Ownership behavior</strong></td>
<td>Change Promotion</td>
<td>Does P seek to alter instruction school-wide in ways that better align it with RR?</td>
<td>Does she facilitate teachers’ exposure to RR? Does she prioritize alignment with RR when making decisions about curricula or interventions? Has she eliminated instructional elements she regards as not well aligned with RR? Does she position RRT as instructional leader? Has she created systems or structures to integrate RR progress data with school decision-making? Does she encourage other teachers to incorporate RR instructional techniques in their classrooms?</td>
</tr>
</tbody>
</table>

SC= District Site Coordinator; TL=Reading Recovery teacher-trainer; RRT=Reading Recovery teacher; 1st=First-grade classroom teacher; P=Principal
## Appendix C: Constructs and Corresponding Survey Items

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
</tr>
<tr>
<td>SC1 District site coordinator survey</td>
<td>Does the principal of this school have the authority to discontinue Reading Recovery at his or her discretion?</td>
</tr>
<tr>
<td>SC2 District site coordinator survey</td>
<td>How involved is the principal of this school in the selection of Reading Recovery teachers who work in the building?</td>
</tr>
<tr>
<td>TL5 Teacher-trainer survey</td>
<td>Please indicate the extent to which you agree with the following statement: The principal of this school has the autonomy to decide whether or not to keep Reading Recovery.</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>RR1 Reading Recovery teacher survey</td>
<td>Please indicate the extent to which you agree or disagree with the following statements: My principal can describe how Reading Recovery is different from other approaches to literacy instruction.</td>
</tr>
<tr>
<td>RR2 Reading Recovery teacher survey</td>
<td>Please indicate the extent to which you agree or disagree with the following statements: When my principal talks about Reading Recovery, he/she uses the language of Reading Recovery.</td>
</tr>
<tr>
<td>RR3 Reading Recovery teacher survey</td>
<td>Please indicate the extent to which you agree or disagree with the following statements: My principal has limited knowledge about Reading Recovery.</td>
</tr>
<tr>
<td><strong>Self-investment</strong></td>
<td></td>
</tr>
<tr>
<td>FG1 Classroom teacher survey</td>
<td>FAV: Please indicate your level of agreement with the following statements about your principal’s involvement with Reading Recovery at your school: Reading Recovery is a favorite project of my principal.</td>
</tr>
<tr>
<td>FG2 Classroom teacher survey</td>
<td>FAV: Please indicate your level of agreement with the following statements about your principal’s involvement with Reading Recovery at your school: My principal pays attention to whether my students get to their Reading Recovery lessons every day.</td>
</tr>
<tr>
<td>Instrument</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Change Promotion</td>
<td><strong>FG3</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about your principal’s involvement with Reading Recovery: My principal is very involved with how Reading Recovery data is used in our school.</td>
</tr>
<tr>
<td></td>
<td><strong>FG6</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about your principal’s expectations with regard to Reading Recovery: My principal encourages me to incorporate Reading Recovery strategies in my own teaching.</td>
</tr>
<tr>
<td></td>
<td><strong>FG8</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about your principal’s expectations with regard to Reading Recovery: First-grade teachers at my school are expected to use Reading Recovery data to inform classroom instruction.</td>
</tr>
<tr>
<td></td>
<td><strong>FG9</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about your principal’s expectations with regard to Reading Recovery: Aligning other literacy instruction with Reading Recovery is important to my principal.</td>
</tr>
<tr>
<td></td>
<td><strong>FG10</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about your principal’s expectations with regard to Reading Recovery: My principal expects me to learn from the Reading Recovery teacher.</td>
</tr>
<tr>
<td>Teacher Collaboration</td>
<td><strong>C1</strong> Classroom teacher survey On average, how often do you communicate with the Reading Recovery teacher(s) who work(s) with your students about the following: strategies that can be used in the regular classroom to the benefit of all students.</td>
</tr>
<tr>
<td></td>
<td><strong>C2</strong> Classroom teacher survey On average, how often do you communicate with the Reading Recovery teacher(s) who work(s) with your students about the following: ways I can support RR students’ learning in the regular classroom.</td>
</tr>
<tr>
<td>Classroom Practice</td>
<td><strong>I3</strong> Classroom teacher survey Please indicate your level of agreement with the following statements about Reading Recovery: Reading Recovery has influenced my instructional practices.</td>
</tr>
</tbody>
</table>
## Appendix D: Overview of Data Collection and Analysis

<table>
<thead>
<tr>
<th>Phase</th>
<th>Procedures</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDUCTIVE</strong>&lt;br&gt;qualitative data collection</td>
<td>• field-based case studies (n=9)&lt;br&gt;• phone interviews with RR teachers (n=31) and principals (n=8)&lt;br&gt;• focus groups with teacher leaders (n=34)</td>
<td>• qualitative data from all key participants in school-level implementation of RR</td>
</tr>
<tr>
<td>qualitative data analysis</td>
<td>• inductive coding re: principal’s role &amp; activities</td>
<td>• themes for instruments to be used in deductive phase</td>
</tr>
<tr>
<td>qualitative sampling &amp; instrument development</td>
<td>• Random sampling of RR teachers for 360° telephone interviews&lt;br&gt;• Recruitment of other participants from randomly sampled schools&lt;br&gt;• Development of interview protocols</td>
<td>• protocols for round-two case-study interviews and 360° phone interviews focused on principal ownership</td>
</tr>
<tr>
<td>quantitative sampling &amp; instrument development</td>
<td>• construction of survey items for measuring constructs related to principal ownership and first-grade teacher uptake of RR practices/beliefs</td>
<td>• items for measuring key constructs</td>
</tr>
<tr>
<td><strong>DEDUCTIVE</strong>&lt;br&gt;qualitative data collection</td>
<td>• field-based case studies (n=10. All new sites)&lt;br&gt;• telephone interviews with principals (n=30); RR teachers (n=30); and teacher leaders (n=30)</td>
<td>• qualitative data from all key participants at 10 case-study sites&lt;br&gt;• qualitative data from 30 “triads” providing a 360° perspective on principal ownership of RR</td>
</tr>
<tr>
<td>quantitative data collection</td>
<td>• survey administration via Qualtrics</td>
<td>• 360° survey data from RR teachers; teacher; site coordinators; and first-grade teachers associated with 196 schools/principals</td>
</tr>
<tr>
<td>quantitative data analysis</td>
<td>• preliminary analysis&lt;br&gt;• confirmatory factor analysis&lt;br&gt;• structural analysis</td>
<td>• factor loadings &amp; alphas&lt;br&gt;• descriptive statistics&lt;br&gt;• analyses of hypothesized structural relationships&lt;br&gt;• factor scores for qualitative sampling</td>
</tr>
<tr>
<td>qualitative data analysis</td>
<td>• deductive coding and thematic analysis&lt;br&gt;• cross-case thematic analysis</td>
<td>• qualitative themes</td>
</tr>
<tr>
<td>integration of quantitative &amp; qualitative findings</td>
<td>• interpretation and explanation of the quantitative and qualitative results</td>
<td>• discussion&lt;br&gt;• implications&lt;br&gt;• future research</td>
</tr>
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</table>
### Appendix E: Item-Level Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Analytic Sample responses: Descriptive statistics*</th>
<th>Out-of-sample responses: Descriptive statistics*</th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>ANTECEDENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC1</td>
<td>76</td>
<td>1.59</td>
</tr>
<tr>
<td>SC2</td>
<td>79</td>
<td>2.28</td>
</tr>
<tr>
<td>TL5</td>
<td>128</td>
<td>2.66</td>
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<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR1</td>
<td>196</td>
<td>2.84</td>
</tr>
<tr>
<td>RR2</td>
<td>196</td>
<td>2.67</td>
</tr>
<tr>
<td>RR3</td>
<td>196</td>
<td>2.70</td>
</tr>
<tr>
<td>Self-investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FG1</td>
<td>196</td>
<td>2.59</td>
</tr>
<tr>
<td>FG2</td>
<td>196</td>
<td>2.70</td>
</tr>
<tr>
<td>FG3</td>
<td>196</td>
<td>2.83</td>
</tr>
<tr>
<td><strong>BEHAVIOR</strong></td>
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<tr>
<td>Change Promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FG6</td>
<td>196</td>
<td>2.94</td>
</tr>
<tr>
<td>FG8</td>
<td>196</td>
<td>2.78</td>
</tr>
<tr>
<td>FG9</td>
<td>196</td>
<td>2.75</td>
</tr>
<tr>
<td>FG10</td>
<td>196</td>
<td>2.71</td>
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<tr>
<td><strong>OUTCOME INDICATORS</strong></td>
<td></td>
<td></td>
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<tr>
<td>Collaboration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>193</td>
<td>4.61</td>
</tr>
<tr>
<td>C2</td>
<td>193</td>
<td>5.08</td>
</tr>
<tr>
<td>Classroom Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>196</td>
<td>3.09</td>
</tr>
</tbody>
</table>

* Statistics provided refer to schools, not respondents. In some cases, a school is represented by an average of multiple responses.

** Because of the sampling strategy, very few buildings with first-grade teacher respondents were left out of the analytic sample.

*** The number of schools with first-grade responses that are not in the analytic sample is too small to permit valid comparison.
## Appendix F: Parameter Estimates for the Full SEM

<table>
<thead>
<tr>
<th></th>
<th>Standardized Estimate</th>
<th>Standard Error</th>
<th>Estimate/Stand. Error</th>
<th>Two-tailed p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC1</td>
<td>0.662</td>
<td>0.380</td>
<td>1.741</td>
<td>0.082</td>
</tr>
<tr>
<td>SC2</td>
<td>0.200</td>
<td>0.233</td>
<td>0.857</td>
<td>0.391</td>
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<tr>
<td>TL5</td>
<td>0.740</td>
<td>0.406</td>
<td>1.824</td>
<td>0.068</td>
</tr>
<tr>
<td><strong>F2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR1</td>
<td>0.792</td>
<td>0.055</td>
<td>14.472</td>
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<tr>
<td>RR2</td>
<td>0.556</td>
<td>0.090</td>
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<tr>
<td>RR3</td>
<td>0.898</td>
<td>0.047</td>
<td>19.266</td>
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<tr>
<td><strong>F3</strong></td>
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</tr>
<tr>
<td><strong>Self-investment</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>FG1</td>
<td>0.808</td>
<td>0.035</td>
<td>23.068</td>
<td>&lt;.001</td>
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<tr>
<td>FG2</td>
<td>0.671</td>
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<tr>
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<td>0.028</td>
<td>31.806</td>
<td>&lt;.001</td>
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<tr>
<td><strong>F4</strong></td>
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<td></td>
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<tr>
<td><strong>Change promotion</strong></td>
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</tr>
<tr>
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<td>0.875</td>
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<td>FG8</td>
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<tr>
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<tr>
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<tr>
<td><strong>F5</strong></td>
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<tr>
<td><strong>Teacher Collaboration</strong></td>
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<tr>
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<td>11.373</td>
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<tr>
<td><strong>ON</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F3</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Self-investment</strong></td>
<td></td>
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</tr>
<tr>
<td>F1</td>
<td>0.290</td>
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<td>F2</td>
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<tr>
<td><strong>F4</strong></td>
<td></td>
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<td><strong>Change Promotion</strong></td>
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<tr>
<td>F3</td>
<td>0.819</td>
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<tr>
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<tr>
<td><strong>I3</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Classroom Practice</strong></td>
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<tr>
<td>F5</td>
<td>0.538</td>
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<td>0.222</td>
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</table>

* observed indicator loadings on latent factors
** regression pathways between latent factors (F1-F5) and the observed outcome (I3)
## Appendix G: Direct, Indirect, and Total Effects

<table>
<thead>
<tr>
<th>Effects from F1 to I3</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Estimate/Standard Error</th>
<th>Two-tailed p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>0.124</td>
<td>0.051</td>
<td>2.457</td>
<td>0.014</td>
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<tr>
<td>Total</td>
<td>0.124</td>
<td>0.051</td>
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<td>0.014</td>
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<tr>
<td>Total Indirect</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Effects from F2 to I3</td>
<td></td>
<td></td>
<td></td>
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</tr>
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### Appendix G (continued)

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F1=Control  F2=Knowledge  F3=Self-investment  F4=Change Promotion  
F5=Teacher Collaboration  I3=Influence on Classroom Practice
References


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Neumerski, C. M. (2012). Rethinking instructional leadership, a review: What do we know about principal, teacher, and coach instructional leadership, and where should we go from here? *Educational Administration Quarterly.*


Waters, T., Marzano, R. J., & McNulty, B. (2003). *Balanced leadership: What 30 years of research tells us about the effect of leadership on student achievement*. Mid-continent Research for Education and Learning Aurora, CO.


