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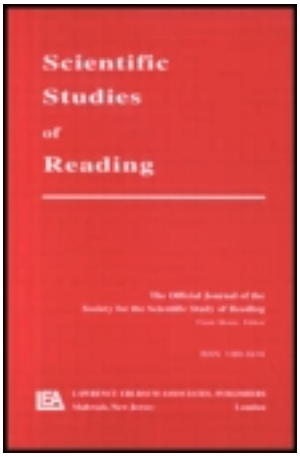

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Embracing the Complexity of Instruction: A Study of the Effects of Teachers' Instruction on Students' Reading Comprehension

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Embracing the Complexity of Instruction: A Study of the Effects of Teachers' Instruction on Students' Reading Comprehension

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The purpose of this study was to determine whether third-grade teachers' instructional actions during reading comprehension lessons contributed to their students' reading comprehension achievement. Our framework focused on teachers' emphasis on three dimensions of instruction (pedagogical structure, teacher-directed instruction, and support for student learning), as observed in comprehension lessons across a year. Third-grade teachers' instruction was analyzed first by measuring their latent propensity to engage in instructional actions in the three dimensions and then by using these latent variables in a multilevel model to examine their students' gains in reading comprehension. Results provided support for the theoretical dimensions, taking into account contextual variables including lesson, student, and teacher characteristics; teachers' engagement in teacher-directed instruction and their support for student learning significantly contributed to their students' reading comprehension. Results suggest that analysis of teachers' instructional actions within and across lessons is a promising approach for the study of effective reading instruction.

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A long-standing question in educational research is the extent to which it is possible to identify features of teachers' instruction that are associated with students' gains in reading over the course of a year (e.g., Hoffman, 1991; Shavelson, Webb, & Burstein, 1986). Although past studies (including meta-analyses) have found that some measures of instruction have accounted for students' achievement gains (e.g., Brophy & Good, 1986; Seidel & Shavelson, 2007; Taylor, Pearson, Peterson, & Rodriguez, 2003), the current goal of ensuring that teachers are well prepared to teach students, particularly in high-poverty schools, has placed this question once again on center stage. As instruction tends to be domain specific and affected by social and organizational classroom factors (Porter & Brophy, 1988; Seidel & Shavelson, 2007), we focus specifically on reading comprehension in early elementary classrooms with an interest in determining whether teachers' instructional actions during lessons on reading comprehension relate to improvements in their students' reading comprehension achievement.

Our theoretical framework has several distinctive features. First, as just suggested, we study teachers' instruction actions within the context of lessons on reading comprehension. Second, we examine instructional actions in three theoretical dimensions that have been previously identified as key components of effective instruction. Third, because, in theory, extensiveness of use of actions in these dimensions is influenced by the context in which teachers teach specific lessons, we take features of lessons, characteristics of students, and characteristics of the teachers into account. Our theoretical framework and method of study have provided a way to embrace the complexity of reading instruction. In what follows, we first explain how we contextualize instruction in reading lessons, identify key dimensions of reading instruction, and study the relation of teachers' instructional actions in these dimensions within lessons. We then turn to a report of the study we carried out to examine the extent to which teachers' reading comprehension instruction contributes to their students' reading achievement.

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A FRAMEWORK FOR ANALYSIS OF INSTRUCTION IN READING COMPREHENSION

In theory, students' comprehension development is influenced by the instruction in reading comprehension that the teacher provides. However, teachers adjust how they teach, depending on what they are teaching and to whom (Barr & Dreben, 1983; Stodolsky, 1990). As they plan and teach lessons, they take into account students' knowledge and skills that affect their response to lessons in reading comprehension. This view of reading comprehension instruction reflects

ecological models of development, such as those proposed by Bronfenbrenner (e.g., Bronfenbrenner, 1979) and Sameroff (e.g., Sameroff & Friese, 2000). Based on these models, we see a student's progress in learning to read in each elementary year as dependent not just on his or her innate capabilities but also on features of the classroom environment to which the student is exposed, such as the knowledge of the teacher, the composition of the class, and the curriculum. In an effort to capture transactional aspects of teachers' teaching and students' learning, we study comprehension lessons by taking into account characteristics of students that might affect such instruction.

The teacher organizes and carries out instruction—setting and clarifying the purpose of a lesson, organizing the classroom for instruction, selecting and carrying out instructional actions and learning activities, and evaluating students' progress toward learning goals. The extent to which teachers are flexible and adaptive in designing and carrying out reading lessons depends on their understanding of reading and reading processes (e.g., linguistic, cognitive, and social processes involved in learning to read; Snow, Griffin, & Burns, 2005). Shulman (1987) described instruction as transforming the teacher's knowledge of the subject area into "pedagogical representations and actions" (p. 7). He went on to say that "there are ways of talking, showing, enacting, or otherwise representing ideas so that the unknowing can come to know, those without understanding can comprehend and discern, the unskilled can become adept" (p. 7). Connecting content to learners requires that teachers be flexible—that they modify their teaching to accommodate their students, the curriculum, and other relevant contextual factors (Bransford, Derry, Berliner, & Hammerness, 2005). Teachers' knowledge about reading and reading instruction is likely to affect the nature and quality of instruction and students' reading achievement (e.g., Foorman & Moats, 2004; McCutchen et al., 2002).

With regard to important student characteristics, the results of previous studies suggest that teachers are likely to use more explicit instruction in classes with a high percentage of students from disadvantaged backgrounds (Connor, Morrison, & Petrella, 2004; Crowe, Connor, & Petscher, 2009). Although students from high-poverty backgrounds come to school with less well-developed language and literacy than their peers, reading instruction has the potential to affect their growth in reading, beyond that predicted by child and family variables such as poverty (e.g., Kainz & Vernon-Feagans, 2007).

Other characteristics of lessons are likely to influence teachers' instruction—the nature of concepts or processes being taught, the materials, the time available for the lesson, and so on. A question of interest is the extent to which teachers' instructional actions tend to be similar across lessons, even when the content, materials, and activities change (see Rowan & Correnti, 2009).

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DIMENSIONS OF READING INSTRUCTION

Dating back to the mid-20th century, researchers have reported studies of effective instruction that hone in on central dimensions of teachers' instruction (e.g., Brophy & Good, 1986; Gage, 1978). These include the structure or overall organization of lesson, the literacy content and how it will be delivered, and steps taken to ensure that students are engaged and learning (Porter & Brophy, 1988). Early studies of instruction often emphasized organization of the classroom as a critical feature—that is, aspects of classroom management that contribute to students' opportunities to learn (e.g., Brophy, 1986; Brophy & Good, 1986; Rosenshine & Stevens, 1984). They also emphasized the importance of "active teaching" (Brophy, 1986) and of teachers' responsiveness to students' needs (Rosenshine, 1983). Assessment of these three dimensions of instruction, as observed in teachers' lessons on reading comprehension, might distinguish more and less effective reading instruction.

We refer to the three dimensions as pedagogical structure, teacher-directed instruction, and support for students' learning. What follows is an explanation of each dimension and the instructional actions that we have selected to represent each one; Appendix A lists the instruction actions in each dimension and gives examples.

The first of the dimensions focuses on teachers' actions that contribute to the *pedagogical structure* (PS) of reading lessons. Although many researchers have seen organization as related to classroom management (e.g., having a smooth-running classroom with few interruptions; for example, Brophy & Good, 1986; Rosenshine, 1983), our focus is on actions that teachers take to help students' understand the purpose and structure of a given lesson. These actions include providing an explanation of what the students will be learning and why and providing clear directions for activities. In the words of Porter and Brophy (1988), "Effective teachers are clear about what they intend to accomplish through their instruction, and they keep these goals in mind both in designing the instruction and in communicating its purpose to the students" (p. 81).

The second dimension is *teacher-directed instruction* (TDI). This dimension includes actions that teachers take to ensure effective learning and practice of literacy skills and knowledge—that is, the presentation of content in a way that promotes learning (e.g., Brophy, 1986). Active instruction and the academic emphasis of instruction are similar terms used by other researchers (e.g., Brophy, 1986; Rosenshine & Stevens, 1984). Instructional actions that focus on conveying literacy concepts and building students' reading skills or processes include the following: providing explanations (e.g., explaining text features), modeling the strategies that good comprehenders use to understand texts, and providing guided practice (e.g., Duffy, 2002; Duffy, Roehler, & Rackliffe, 1986; Porter & Brophy, 1988; Roehler & Duffy, 1991; Rosenshine & Stevens, 1984; Taylor et al., 2003).

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In short, this dimension taps teachers' understanding of how to present literacy content and processes to students.

The third dimension is *support for student learning* (SSL). This entails actions on the part of the teacher to engage students in the lessons, assess their response to the content and activity of a lesson, and make use of students' skills, strategies, and knowledge (Guthrie & Knowles, 2001; Paris & Carpenter, 2004). Effective teachers use instructional actions to promote students' active involvement in literacy tasks and to help them understand and regulate their own reading (e.g., Perry, VandeKamp, Mercer, & Nordby, 2002). According to Porter and Brophy (1988), "effective teachers continuously monitor their students' understanding of presentations and responses to assignments. They routinely provide timely and detailed feedback, but not necessarily in the same ways for all students" (p. 82). Instructional actions in this dimension include providing students with feedback about their reading and making sure that students have opportunities to ask questions and contribute ideas.

In delivering instruction and adapting planned lessons, teachers make choices about what to emphasize. Presumably, teachers' instruction reflects their in-the-moment decisions, based on students' response not only to the lesson but also to practicalities that are part of teaching in school classrooms (e.g., time runs out, a visitor arrives). The context is likely to affect the emphasis teachers place on each of the dimensions during a specific lesson. Studies of effective early reading instruction suggest that effective teachers combine teacher-directed instruction with guided activities for students to apply their reading and writing skills (e.g., Hoffman, 1991; Pressley, Rankin, & Yokoi, 1996). Similarly, McGhie-Richmond, Underwood, and Jordan (2007) found that teachers used instructional actions that characterize both transmission and constructivist styles. Similarly, Taylor and her colleagues (2003) found that effective teachers were likely to use a coaching style but at the same time structured learning activities to enhance the cognitive challenge for the students.

Thus, we study comprehension instruction within the context of the lesson by examining teachers' emphasis on instructional actions in each of the three dimensions. This approach to characterizing teachers' reading comprehension instruction represents an important change, as most previous studies have examined the effects of teachers' behaviors on reading outcomes by counting and aggregating particular actions (e.g., coaching) across a day of instruction and sometimes across multiple days of observation. As Hoffman (1991) pointed out in his review of research on effective reading instruction,

> The simple counts of behaviors and their correlation to achievement outcomes have yielded an enormous amount of data but not much insight into teaching, schooling and learning. The lens of science has been focused on such a small area that the meaningfulness of the behaviors observed is lost without reference to the surrounding context. (p. 945)

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Like Hoffman, we see the need for studies of teachers' comprehension instruction that take a more nuanced approach than the use of simple aggregates or averages of behaviors to focus on dimensions believed to be central to effective instruction within the context of lessons on reading comprehension.

HOW TO STUDY INSTRUCTION IN COMPREHENSION LESSONS?

Our approach to studying effective instruction in teachers' reading comprehension lessons involved two steps. We first studied instructional actions within dimensions as they were present in observed comprehension lessons on 4 days of observation of the literacy block across a year. We define lessons as discrete events with the purpose of teaching reading comprehension to a given group. First, to take into account each teacher's emphasis on each of the three dimensions within lessons, we carried out a multilevel, multidimensional analysis. That is, we embedded instructional actions within dimensions in the context of each lesson, taking into account lesson features (e.g., duration) and including characteristics of the class (e.g., presence of students who are English language learners) and the teacher (e.g., teachers' performance on a test of reading knowledge). The second step involved using the latent variable representing each teacher's instruction in each dimension (the results from the aforementioned analysis) to examine the extent to which these contributed to students' reading achievement. This approach addressed problems encountered by other researchers seeking to determine why some teachers' instruction is more effective than others.

One such study is Taylor et al. (2003); these researchers examined aspects of instruction that fostered higher level thinking, encouraged independent use of word reading and comprehension strategies, provided student support, and promoted students' active involvement in literacy tasks. Their observation system involved coding of 19 variables related to instruction; the researchers examined the influence of content variables (e.g., phonics) and instructional actions (e.g., telling or modeling) on students' reading achievement. Results showed that higher order questions and modeling contributed to students' growth in reading in Grades 2 to 5. An important finding was that many of the variables related to student outcomes were infrequently observed, and this included higher order questions. For instance, modeling was observed in 3 to 5% of the segments. The researchers wisely pointed out that the relation of frequency of occurrence and effects on long-term growth needed further examination. We address this issue through examining instructional actions within dimensions, as they are used in lessons on reading comprehension.

Other studies have analyzed data from systematic observations by summing the presence of certain features across the entire time spent observing instruction and then carrying out factor analysis (or similar techniques) to characterize

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aspects of teachers' literacy instruction (e.g., Foorman et al., 2006; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). The purpose is often to collect information on literacy instruction, in general (e.g., purposes, activities, products), without a specific focus on teachers' instructional actions. In Foorman et al. (2006), the observation measure used time sampling to record 8 categories for instructional format (e.g., whole class) and 20 categories for content (e.g., word work, previewing a text before reading). The content categories included both literacy content/purpose (e.g., vocabulary) and pedagogical features (e.g., giving directions and preparing for instruction). The data were analyzed by summing the frequencies of the time allocation variables across all of the observations (four times a year) for each teacher. A principal components analysis yielded seven components that included a mix of different instructional and content characteristics. However, the researchers found that the time allocation components alone did not significantly account for students' achievement gains. One possible explanation is that differences in instruction in particular literacy areas (e.g., phonics, vocabulary) are likely to be obscured when they are averaged across all lessons and observations.

Pianta and his colleagues (2008) studied the relation of emotional and instructional support and student's reading achievement in a large-scale, longitudinal study. Their observations involved time-sampling, during which observers kept notes which informed their global ratings of emotional and instructional support in first-, third-, and fifth-grade classrooms; global ratings were based on a set of 7-point rating scales. Global ratings at the classroom level that focused on instruction included productive use of time (e.g., efficient transitions) and richness of instructional methods (e.g., encouragement of discussion). Two factor composites (emotional support and instructional support) were examined to determine the extent to which they contributed to students' growth in reading over time. Results showed that the ratings of instructional support did not account for variance in first, third, or fifth graders' gains in reading achievement.[1] The researchers did find significant effects of emotional support at all three grade levels. The results showed the importance of teachers' sensitivity to students' needs and confirmed our decision that support for student learning was a critical dimension of teachers' instruction, although teacher behaviors that represented this dimension in our framework were more related to support for learning than support for emotional well-being.

Connor and her colleagues used a different approach to examine the extent to which the content emphasis and management of instruction (teacher managed vs. student managed) were related to students' reading and language outcomes (e.g., Connor et al., 2004; Connor, Morrison, & Underwood, 2008). In Connor et al.

[1] Similar findings are reported in Hamre and Pianta (2005) and Pianta, Belsky, Houts, and Morrison (2007).

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(2008), results showed that students who started first grade with little knowledge of word reading made stronger gains by the end of second grade if they spent more time in teacher-managed, code-focused instruction. Because Connor and colleagues focused on the appropriateness of instruction for individual students, they collapsed instructional activities into two categories (teacher managed or student managed). As our purpose is to understand the effects of teachers' instructional actions on students' reading comprehension, we grouped instructional actions within dimensions in reading comprehension lessons. However, like Connor et al. (2008) we examine students' prior achievement as a factor in teachers' emphasis on particular dimensions of instruction.

To summarize, our framework breaks new ground by using lesson as a unit of analysis, by focusing on teachers' instructional actions in three theoretical dimensions, and by using methods of data analysis that take multiple influences on instructional actions into account. We carried out a multivariate, multidimensional measurement model that made it possible to examine together the instructional actions within the three dimensions of reading instruction; variation in teaching as it occurs over the course of the school year; and various features of students, classrooms, and schools that shape reading instruction. Contextual variables that might influence how teachers teach reading comprehension were taken into account; these included teachers' degree attainment and performance on a measure of teacher knowledge (Snow et al., 2005) and information about students aggregated at the level of the classroom (e.g., prior reading achievement, English language status). We addressed two research questions: How well can we measure each theoretical dimension of comprehension instruction? Which characteristics of classrooms (teachers and students) are associated with reading instruction characterized by each of the three dimensions?

This done, we used the results of the measurement model to investigate the extent to which each teacher's relative emphasis on each of the three dimensions within lessons, as previously described (a latent variable), was associated with student achievement. The research questions for the achievement model were as follows: To what extent did teachers' observed instructional actions along each of the scaled dimensions (estimated by the measurement model) account for students' reading comprehension performance? To what extent did teachers' instructional actions modify the relationship between student characteristics (e.g., poverty indicators) and achievement in reading comprehension? We describe the method of the study and then present each of these analyses in turn.

METHOD

Participants

The data for this study were drawn from a larger study of instruction in second- and third-grade classrooms in Reading First (RF) schools in a midwestern state.

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Schools participating in RF were characterized by high poverty and a history of low reading achievement. We recruited six districts with RF schools and carried out four observations of the literacy block of 88 second- and third-grade teachers in 19 schools in these districts. For the present study, we focus on the 44 teachers who taught third grade. Of these, 91% were female, 21% were non-White, and 52% had a master's degree. On average, these teachers had more than 13 years of teaching experience (range = 1–39 years).

The average class we observed had 22 students (range = 13–28). Roughly 36% of the students in the classroom were racial minority students (non-White and non-Asian; range = 0–100%). Eligibility for free or reduced price lunch (FRL) in the classrooms ranged from 12% to 100% with a mean of 73%; on average, 18% of the students were of limited English proficiency (range = 0–100%).

We encountered a small amount of missing data at both the teacher and student levels (approximately 2% at the teacher level and 12% at the student level). Although unverifiable directly, our missing data analyses suggested that there was no relation between missing data and either achievement or instructional practice. Rather than remove cases with incomplete data, we employed the missing at random (Rubin, 1976) assumption and used multiple imputation to address missing data (e.g., Raghunathan, Lepkowski, Van Hoewyk, & Solenberger, 2001).

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Observation Data

Automated Classroom Observation System for Reading is a system designed to code the presence of features of early elementary reading instruction. The data collection system involved a program on a PC tablet with a number of automatic coding and data management features. Coding was carried out in 5-min intervals; during that interval, the observer recorded the following fields: purpose of the lesson, the grouping arrangement (e.g., whole class), materials used in the lesson, instructional actions, word meaning actions, and average number of students actively engaged in the lesson. The observer could designate a change in activity to indicate the start of a new lesson within a 5-min interval. Observers used text boxes to record notes about the content of instruction.

After two training sessions and opportunities to compare observers' coding of videotaped lessons, we assigned two observers to carry out observations in each participating school. On an initial visit to a classroom (and one other time during the year), the observers coded the instruction for the entire literacy block (90 min to 2 hr) independently. We assessed interobserver reliability in two ways. The first was agreement on the number of lessons and the purpose of each lesson. Across six pairs of observers (one of the 11 observers is a member of two observer pairs), overall agreement was 88%. Second, we compared the agreement of code assignment across all fields and all options within each field. Overall agreement was 87.2% with a range of 80% to 96% agreement.

In the first stage of data analysis, the literacy block was divided into lessons, which were identified by purpose (e.g., phonics) and grouping (i.e., if phonics lessons were taught to more than one group, each was considered a separate lesson). Time for each lesson was compiled by summing over intervals and subintervals. In selecting lessons for this study, we included comprehension lessons that involved texts and included lessons taught to the whole class, a small group, or an individual. These selection criteria yielded 287 comprehension lessons that constituted about 27% of the total number of third-grade lessons (accounting for 23% of the instructional time). (For purposes of comparison, 8.7% of all the lessons were phonics; 12% were vocabulary; 29% were guided reading/small-group lessons.) The average duration of the comprehension lessons was 19.3 min (17.07 *SD*). Analysis of the proportion of lessons in which each of the instructional actions in the three dimensions (as shown in Table 1) shows that TDI actions were present in a high proportion of lessons; more variable were the actions in PS and SSL.

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TABLE 1
Proportion of Instructional Action in the Three Dimensions in Comprehension Lessons

Theoretical Dimension	*Instructional Action*	*Proportion of Lessons Action Was Used*[a]
Pedagogical structure (PS)	PS1: Explaining the purpose of the lesson	0.36
	PS2: Explaining the value/relevance of the lesson	0.09
	PS3: Giving directions for activity	0.78
	PS4: Providing a wrap up or summary of what has been accomplished	0.13
Teacher-directed instruction (TDI)	TDI1: Telling	0.77
	TDI2: Modeling/Coaching	0.61
	TDI3: Asking questions for evaluation	0.85
	TDI4: Providing practice or review activities	0.69
Support for student learning (SSL)	SSL1: Fostering discussion	0.29
	SSL2: Assessing students' work; providing feedback	0.22
	SSL3: Gives students an opportunity to ask questions	0.10

[a] $n = 287$.

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Teachers' Knowledge and Professional Background

Measures of teacher's educational background and experience were included because of their potential to be related to a teacher's decisions about how to teach reading comprehension. These included the area of bachelor degree specialization, the attainment of a master's degree, the area of master's degree, and the number of years a teacher had taught previously. We also included data from surveys that teachers had completed while participating in the evaluation of RF. One survey, administered in the spring, was a measure of teachers' knowledge, entitled Teachers' Knowledge of Reading and Reading Practices (TKRRP); the measure is made up of 22 items focused on teachers' knowledge about reading (Carlisle, Johnson, Phelps, & Rowan, 2008). The measure includes items of foundational skills (e.g., phonemic awareness) as well as comprehension. The scale had an item response theory reliability of 0.76.

Second, teachers completed surveys about their instructional practices. One focused on the extent to which teachers designed instruction to meet the needs of students in their classroom. The survey items are provided in Appendix B. Three additional survey items provided relevant information on teachers' practice: "In this school year, about how often have you followed the sequence of instruction suggested in the comprehensive reading program?" (hereafter, Comprehensive reading program usage); "In this school year, about how often have you provided explicit instruction (e.g., modeling, demonstrations, examples)?" (hereafter, Explicit instruction usage); and "In this school year, about how often have you used student data to guide lesson planning?" (hereafter, Student data usage). These self-reported practices provided balance to TKRRP, which assessed content knowledge embedded in classroom scenarios.

Students' Reading Achievement

The Iowa Tests of Basic Skills (ITBS) reading comprehension standard score was used as the measure of students' reading achievement. This test requires students to select responses to questions that follow short passages. Test reliability for the reading comprehension subtest in Grade 3 was 0.91 (computed with Kuder-Richardson Formula 20; Hoover, Dunbar, & Frisbe, 2003). In addition, three measures were used to control for prior reading achievement: the ITBS Comprehension subtest from the previous two years and their fall Oral Reading Fluency (ORF) score from the Dynamic Indicators of Basic Literacy (DIBELS; https://dibels.uoregon.edu).

Measurement Model Method

The purposes of the measurement model were (a) to summarize each teacher's enacted instruction in reading comprehension lessons along three theoretical

dimensions and (b) to examine the extent to which classroom and teacher and student characteristics were related to teachers' instruction. We were particularly interested in the extent to which teachers' knowledge was related to each dimension.

Data analysis. This analysis was guided by several assumptions. The first is that teachers' propensities to employ various instructional actions are shaped by various contexts that can change across different observations across the school year. The second is that the instructional actions measure different, distinct dimensions of instruction. The third is that although the dimensions are distinct, they are interrelated and influence one another. These considerations, combined with the nested nature of the data (i.e., lessons grouped within teachers), led us to employ a multivariate, multilevel Rasch measurement model (Kelcey, Carlisle, Berebitsky, & Phelps, 2009). To characterize teachers' enacted instruction, we used the observed instructional actions to estimate each teacher's latent location on each of the three dimensions.

This approach has certain advantages over other methods of statistical analysis, such as summing occurrences of instructional action across a day's observation. First, the multivariate component enables modeling of the interrelations between the instructional actions that comprise each of the hypothesized dimensions to measure practice. Thus, emphasis of any one dimension is dependent on the emphasis of the other dimensions, controlling for various classroom and school variables. Second, the use of random effects addresses the dependency among instructional actions within a lesson and a teacher. Third, a multilevel structure allows us to assess the variation in instructional actions among classrooms and lessons, as well as the association of various student, classroom, and school characteristics with the instructional actions. The multilevel structure also includes a control for the time of year the lesson was taught, thus taking into account how instruction can vary across a school year. Finally, the measurement aspect of our approach provides a way to understand the use of instructional actions within lessons for each teacher along an interval scale on each of the hypothesized dimensions. We are able to model how instructional actions interact with each other, the characteristics of a lesson, and characteristics of the teachers and students (Kelcey et al., 2009).

The model consisted of three structured levels. The first level was a measurement model, describing how the instructional actions were related to the hypothesized dimensions. The second, or lesson, level addressed the dependency among instructional actions within a lesson and examined the relationship between instructional actions and characteristics of the lesson. We explored variables at the lesson level to control for the context in which the instruction occurred, including the duration of the lesson and the number of days since the

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beginning of the year that the observation occurred. The third level represented teachers and classrooms, addressing the lack of independence among lessons within a teacher while exploring the relationship between the instructional actions and characteristics of the teachers and their classrooms. The teacher variables included responses to survey questions that provided self-report about reading instruction practices. In addition, we tested the extent to which teachers' knowledge was related to each of the instructional dimensions. As this analysis involved multiple hypothesis tests (teacher knowledge on each dimension), we adjusted the significance levels using a sequential Bonferroni correction (e.g., Abdi, 2007). We controlled for measures of the student composition of the class by aggregating student demographic data. These were the percentage of minority students (non-White and non-Asian), the percentage of students qualifying for FRL, the percentage of students designated as special education, the percent of students designated as Limited English Proficient (LEP), and the number of students in the classroom.

To review, the measurement model generated a summary of each teacher's level of enacted instruction for each dimension. These summaries (or latent scores) provided an index of the teachers' emphasis on the instructional actions in that dimension, controlling for classroom and school variables. These latent scores were then used to assess the relation of enacted practice with students' achievement.

The measurement model equation is as follows:

Level 1:

$$\eta_{ijk} = D_{TDI\,ijk}(\pi_{TDI\,pjk} + \sum_{m=1}^{4} \alpha_{TDI\,mjk} a_{TDImijk}) + D_{SSL\,ijk}(\pi_{SSL\,jk} + \sum_{m=1}^{3} \alpha_{SSL\,mjk} a_{SSL\,mijk})$$

$$+ D_{PS\,ijk}(\pi_{PS\,jk} + \sum_{m=1}^{4} \alpha_{PS\,mjk} a_{PS\,mijk}) \quad (1)$$

where D is an indicator taking on a value of 1 if the ith item is in the scale that measures practice trait p, 0 otherwise

π_{pjki} is the log odds of employing an instructional action in observation j in teacher k to the reference item within practice trait type p

a_{pmijk}=1 if item i is the mth item within scale p, 0 otherwise

α_{pmjk} is the discrepancy between the log odds of employing an instructional action for the mth item in scale p for teacher k and the reference item within that scale, holding constant π_{pjk}

Level 2:

$$\pi_{TDI\,jk} = \beta_{0\ TDI\,k} + \sum_{s=1}^{2} \beta_{s\ TDI\,k} X_{sk} + u_{TDI\,jk}$$

$$\pi_{SSLjk} = \beta_{0\ SSLk} + \sum_{s=1}^{2} \beta_{s\ SSLk} X_{sk} + u_{SSLjk}$$

$$\pi_{PSjk} = \beta_{0\ PSk} + \sum_{s=1}^{2} \beta_{s\ PSk} X_{sk} + u_{PSjk}$$

$$\alpha_{pmjk} = \alpha_{pmk} for\, p = TDI, SSL, PS; m = 1, ...10 \quad (2)$$

Level 3:

$$\beta_{0pk} = \gamma_{00p} + \sum_{n=1}^{N} \gamma_{p0n} W_{nk} + r_{pk}$$

$$\beta_{pmk} = \gamma_{pmk} + \sum_{n=1}^{N} \gamma_{pmn} k W_{nk} + r_{pmnk} \quad (3)$$

Achievement Model Methods

The second phase of the data analysis focused on the question of whether each of the measures of teachers' enacted instruction accounted for significant variation in students' reading comprehension, when taking into account various student- and teacher-level variables, including several measures of prior achievement. Previous research has shown that the effectiveness of teachers and their instructional practices vary by students' socioeconomic economic status (SES) and prior achievement (e.g., Nye, Konstantopoulos, & Hedges, 2004). In particular, there tends to be more variation and larger teacher effects among low SES or low-achieving classrooms than high SES or high-achieving classrooms. Accordingly, we examined the extent to which teachers' instructional actions in reading comprehension modified the relationship of students' achievement with both prior achievement and their eligibility for FRL.

Data analysis. To estimate the association of teachers' instructional approaches with student achievement, we modeled student performance on ITBS Reading Comprehension, using a hierarchical random intercept and slope linear model (e.g., Raudenbush & Bryk, 2002). Accordingly, we retained nine null hypotheses (i.e., three measures of practice on the intercept and three on each of two slopes—one being prior achievement and one being FRL). As in the measurement model, the use of multiple hypotheses required the use of a sequential Bonferroni correction to adjust the significance levels (e.g., Abdi, 2007).

All independent Level 1 and Level 2 variables were centered around their respective grand means. At Level 1, we included seven student covariates. The

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first two variables were allowed to vary randomly and their slopes were modeled: (π_1) represented eligibility for FRL and (π_2) represented the spring 2007 ITBS reading comprehension score. The final five variables included both demographic dummy variables and prior achievement continuous measures: (π_3) indicated minority status (non-White and non-Asian), (π_4) indicated LEP, (π_5) indicated special education status, (π_6) represented the fall 2007 ORF score, and (π_7) represented the spring 2006 ITBS reading comprehension score.[2] The general form of the model at Level 1 was

$$Y_{ij} = \pi_{0j} + \sum_{p=1}^{n=7} \pi_p X_{pij} + \varepsilon_{ij}, \tag{4}$$

where Y is the 2008 ITBS reading comprehension score, representing the appropriate reading outcome, π_{0j} is the average student score adjusted for the student variables, X, and π_p are the variable's corresponding coefficients, whereas ε_{ij} has a normal distribution with mean zero and variance σ^2. At Level 2, we modeled the adjusted average, π_{0j}, using teacher and classroom variables. Before testing our hypotheses, we adjusted for relevant imbalances on teacher-level characteristics, using forward stepwise regression. The control variables we considered were the same set of teacher experience and education measures and survey responses, including the measure of teacher knowledge, used in the measurement model.

The form of the model at Level 2 was

$$\begin{aligned}
\pi_{0j} &= \beta_{00} + \sum_{q=1}^{Q} \beta_{0q} W_{qj} + \beta_{0Q+1} PS_j + \beta_{0Q+2} TDI_j + \beta_{0Q+3} SSL_j + r_{0j} \\
\pi_{1j} &= \beta_{10} + \sum_{q=1}^{Q} \beta_{1q} W_{qj} + \beta_{1Q+1} PS_j + \beta_{1Q+2} TDI_j + \beta_{1Q+3} SSL_j + r_{1j} \\
\pi_{2j} &= \beta_{20} + \sum_{q=1}^{Q} \beta_{2q} W_{qj} + \beta_{2Q+1} PS_j + \beta_{2Q+2} TDI_j + \beta_{2Q+3} SSL_j + r_{2j},
\end{aligned} \tag{5}$$

where β_{00} is the average adjusted achievement for a teacher's class; β_{q0} is average effect of covariate W_{qj} on adjusted achievement; and PS_j, TDI_j, and SSL_j are the

[2]For the dummy variables, the reference group represented students not eligible for free/reduced price lunch, White or Asian students, English proficient students, and students not designated as special education.

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teachers' latent locations on the three dimensions of instruction with corresponding coefficients $\beta_{.Q+1}$ to $\beta_{.Q+3}$. Moreover, $r_{.j}$ is the random effect of teacher j and has a normal distribution with mean zero and variance τ_π.

RESULTS

Measurement Model

A key assumption in our analysis was that the instructional actions measure different dimensions of instruction. We investigated this assumption by assessing the estimated covariance structure of the model. If the dimensions correlated very close to 1 or −1, then the constructs would be considered identical. The magnitude of the correlations of pairs of the three dimensions (shown in Table 2) indicates that the dimensions are distinguishable. Furthermore, examination of the variance decomposition between the lesson and teacher levels for each of the three dimensions (also shown in Table 2) provides support for the assumption that the dimensions are distinct. Across all three dimensions, there was more variation at the lesson than the teacher level, but the range of variation indicated that the dimensions were different from each other.

We also studied whether the instructional actions were appropriately grouped into the three dimensions. In a Rasch model, each action should have a similar slope. By visually analyzing the item characteristic curves and utilizing statistical tests (likelihood ratio test and Bayesian Information Criterion), we established that the instructional actions in both the TDI and SSL dimensions were well grouped. However, one action in the PS dimension, "Provides a wrap-up or summary," did not align with the others. We dropped this instructional action from all analyses because it could not consistently discriminate in a way that was similar to the other instructional actions in that dimension.

TABLE 2
Correlations Between Instructional Dimensions at the Teacher Level and Variance Components of Instructional Dimensions

	Correlations Between Dimensions			*Unconditional Variance Components*		*Final Variance Components*	
	TDI	*SSL*	*PS*	τ_π *(Lesson)*	τ_β *(Teacher)*	τ_π *(Lesson)*	τ_β *(Teacher)*
TDI	—			1.37*	0.73*	0.72*	0.09*
SSL	−0.07	—		1.42*	0.42*	0.99*	0.05
PS	−0.48	0.18	—	3.68*	1.12*	2.65*	0.09

Note. TDI = teacher-directed instruction; SSL = support for student learning; PS = pedagogical structure.

*$p < .05$.

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TABLE 3
Results of the Multivariate, Multilevel Rasch Measurement Model

	Coefficient (SE)		
	TDI	*SSL*	*PS*
Teacher level			
Intercept	0.13 (1.56)	0.52 (1.71)	6.60 (2.28)*
Master's	0.52 (0.22)*	−0.36 (0.24)	0.19 (0.31)
Teacher knowledge	−0.30 (0.12)*	0.44 (0.14)*	0.41 (0.17)*
Student data usage	0.32 (0.15)*	−0.26 (0.17)	−0.04 (0.22)
Comprehensive reading program usage	−0.14 (0.26)	0.12 (0.27)	−0.98 (0.36)*
Explicit instruction usage	0.98 (0.44)*	−1.20 (0.47)*	−0.12 (0.62)
% free/reduced lunch	−3.09 (0.49)*	1.18 (0.50)*	−0.04 (0.64)
% minority	1.52 (0.29)*	−1.15 (0.33)*	−1.67 (0.42)*
Average prior ability	−0.03 (0.01)*	0.04 (0.01)*	−0.01 (0.01)
Lesson level			
Lesson duration	0.06 (0.01)*	0.03 (0.01)*	0.07 (0.01)*
Observation period	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)

Note. TDI = teacher-directed instruction; SSL = support for student learning; PS = pedagogical structure.

*$p = .05$. For the Teacher Knowledge measure, the asterisk indicates significance at the $p = .05$ level after adjusting p values using a sequential Bonferroni correction.

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In carrying out the measurement model, we examined the relation of a number of lesson-level and teacher-level variables and the three theoretical dimensions of reading instruction (see Table 3). With regard to characteristics of lessons, results showed that lesson duration positively influenced the propensity of using instructional actions in each of the three dimensions. As might be expected, the longer a lesson, the more opportunity there was to carry out instructional actions. However, the time of year in which the observation took place was not significantly associated with any of the latent dimensions.

With regard to teacher characteristics and knowledge, results showed that teacher knowledge had a significant association with all three dimensions; however, the direction of the association was not constant across the three dimensions. A teacher with a higher teacher knowledge score was more likely to emphasize PS and SSL but less likely to engage in TDI. Having a master's degree increased the likelihood that a teacher emphasized TDI. With regard to teachers' self-reported practices, teachers who were more likely to follow closely the comprehensive reading program were less likely to provide PS for their students; in contrast, this variable was not correlated with either of the other dimensions. Teachers who reported frequently using explicit instruction on the survey items were more likely to use more instructional actions in the TDI dimension and less likely to

provide SSL. Similarly, teachers who reported frequent use of student assessments to guide lessons tended to use more TDI.

At the teacher level, the percentage of minority students in the class was associated with each of the three instructional dimensions, albeit not always in the same way. A classroom with more minority students increased the likelihood of the use of TDI while decreasing the likelihood of providing PS or SSL. A higher proportion of minority students in the classroom increased the odds that a teacher would use TDI and decreased the odds that a teacher would provide SSL. On the other hand, the percentage of FRL students had the reverse effect: classes with higher percentages of FRL students were less likely to have lessons that emphasized TDI and more likely to have a teacher who emphasized SSL. Finally, in classes with a higher average entering ability (as measured by mean class performance on the fall ORF DIBELS subtest), teachers had a lower probability of using TDI but a higher probability of emphasizing SSL.

The measurement model explained fairly large portions of the variability in teachers' instructional actions. At the teacher level, the contextual model was able to explain roughly 90% of the variance in each dimension of instructional practice. Similarly, but to a lesser extent, the contextual model for the variation in instruction among lessons was able to explain roughly 30 to 50% of the variation, depending on the dimension (see Table 3).

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Achievement Model

Using fully unconditional models, we partitioned the variance in students' ITBS reading comprehension outcome into two components, representing the variance between teachers and between students within classrooms.

As shown in Table 4, the intraclass correlations indicate that the majority of variation in student achievement was attributed to the students within classrooms (83.9%). Variation in this component often reflects such factors as natural aptitude, motivation, and family support, but it also includes measurement error. The teacher level contributed the remainder of the variation (16.1%).

TABLE 4
Variance Components for the Achievement Model

Component	*Final Model*	*Unconditional Model*	*Intercept Reliability (λ)*
Teachers (r)	0.003	70.60	0.79
Students (ε)	169.05	367.77	—
ICC	<.01	0.16	

Note. ICC = intraclass correlations.

The estimates of our final achievement model, including the three dimensions of instruction, are shown in Table 5. Results showed that, as expected, students who had higher scores on all three measures of prior achievement (2007 ITBS comprehension, 2006 ITBS comprehension, and fall 2007 DIBELS ORF) performed better on the 2008 ITBS comprehension test. At the student level, the results indicated that LEP students scored lower on average than their peers.

The indices of teachers' enacted instruction for two of the dimensions (TDI and SSL) were significantly and positively associated with student achievement in reading comprehension. Holding other factors constant, a 1 standard deviation increase in a teacher's use of TDI was associated with a 0.17 standard deviation gain in students' reading comprehension achievement over a 1-year period. The effect size for SSL was smaller; a 1 standard deviation increase in SSL usage was associated with a 0.08 standard deviation increase in student achievement. In addition, two self-reports of teachers' instructional practice showed positive association with student's achievement: frequency of use of the comprehensive program and of differentiated instruction. When the teacher had a master's degree specializing in reading/literacy, students had, on average, higher achievement on ITBS reading comprehension, after controlling for all other variables in the model.

In examining the results of the slope models, we found that two of the instructional dimensions significantly modified the relationship between FRL and achievement. In particular, higher levels of both TDI and SSL tended to increase reading comprehension achievement more for students eligible for FRL than for students not eligible for FRL. These results are shown in Figure 1 for TDI and Figure 2 for SSL.

Teachers' knowledge on TKRRP also modified the association between FRL and student achievement. The results suggest that higher knowledge teachers were, on average, more effective with students not eligible for FRL. The relationship between the 2007 ITBS comprehension slope and performance on 2008 ITBS reading comprehension was also significantly modified by a teacher's position on both the latent TDI and SSL dimensions. Students with higher scores on their pretest tended to perform better on the assessment if they were in classrooms with teachers who used more TDI and SSL. The same pattern held for usage of the comprehensive program: Students scoring higher on the pre-test received a boost when the teacher said he or she followed the program.

Of additional interest is the residual variation at the teacher level, after adjusting for variables included in the final model (reported in Table 3). The model did a good job of explaining variability in instruction among teachers but less so for the variability in instruction among lessons. The variation at Level 2 was reduced from a significant value of 70.6 to an insignificant level ($p > .05$) of 0.003. Almost all of the variation at Level 2 was explained, which suggests that the covariates included in this model leave very little additional variation to be explained by unmeasured covariates. However, our sample size is small, and it is likely that

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TABLE 5
Results of the Achievement Model

	Coefficient (SE)
Intercept	−0.01 (0.05)
Years teaching experience	0.00 (0.00)
Master's: Reading/Literacy	0.31 (0.13)*
Teacher knowledge	0.02 (0.04)
Comprehensive reading program usage	0.13 (0.04)
Differentiated instruction	0.10 (0.03)*
TDI	0.17 (0.05)*
SSL	0.08 (0.06)*
PS	0.04 (0.05)
FRL status (π_1)	
Intercept	−0.09 (0.13)
Years teaching experience	−0.01 (0.01)
Master's: Reading/Literacy	0.03 (0.30)
Teacher knowledge	−0.23 (0.08)*
Comprehensive reading program usage	0.11 (0.09)
Differentiated instruction	−0.14 (0.08)
TDI	0.42 (0.12)*
SSL	0.38 (0.13)*
PS	0.20 (0.10)
ITBS 2007 RC score (π_2)	
Intercept	0.19 (0.05)*
Years teaching experience	−0.00 (0.00)
Master's: Reading/Literacy	0.22 (0.14)
Teacher knowledge	−0.03 (0.03)
Comprehensive reading program usage	0.10 (0.04)*
Differentiated instruction	−0.03 (0.03)
TDI	0.15 (0.04)*
SSL	0.15 (0.05)*
PS	0.05 (0.04)
Minority (π_3)	−0.13 (0.09)
Limited English proficient (π_4)	−0.19 (0.08)*
Special education (π_5)	−0.10 (0.08)
Fall 2007 ORF score (π_6)	0.39 (0.03)*
ITBS 2006 RC score (π_7)	0.07 (0.03)*

Note. TDI = teacher-directed instruction; SSL = support for student learning; PS = pedagogical structure; FRL = free or reduced price lunch; ITBS = Iowa Tests of Basic Skills; RC = reading comprehension; ORF = Oral Reading Fluency.

*$p > .05$. For the TDI, SSL, and PS measures, the askerisk indicates significance at the $p = .05$ level after adjusting p values using a sequential Bonferroni correction.

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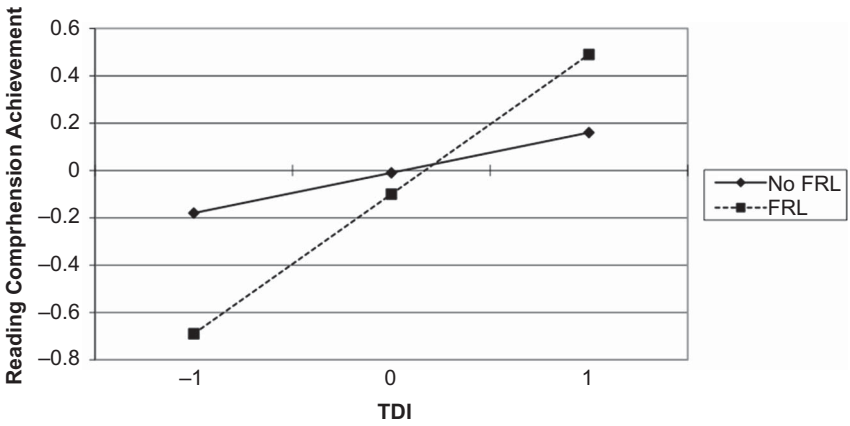

FIGURE 1 Interaction of reading comprehension achievement and teacher-directed instruction (TDI) emphasis by students' eligibility for free or reduced price lunch (FRL). *Note.* The TDI values are standardized coefficients.

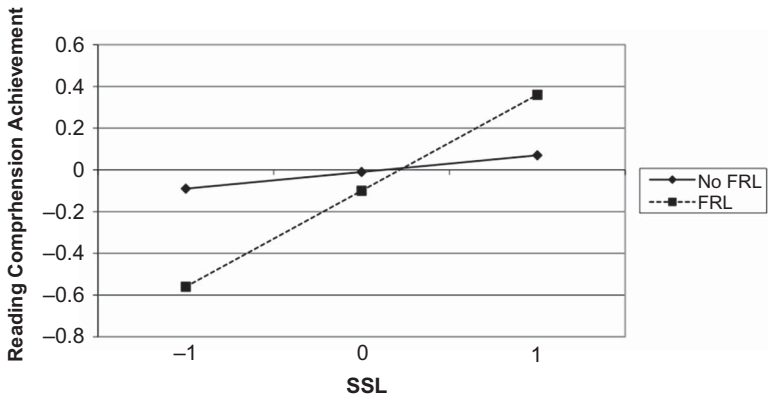

FIGURE 2 Interaction of reading comprehension achievement and support for student learning (SSL) emphasis by students' eligibility for free or reduced price lunch (FRL). *Note.* The SSL values are standardized coefficients.

with a larger sample size, the variation in teachers' instructional actions would be greater.

DISCUSSION

The purpose of this study was to determine whether teachers' instructional actions in teaching reading comprehension lessons to their third graders contributed

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to their students' improvement in reading comprehension across the year. The study was motivated by the general perception among educators and researchers that teachers' instruction (both what and how they teach) affects their students' academic progress. Few studies have identified instructional practices in early literacy that contribute to students' gains in reading, although few researchers have focused specifically on the ways that teachers select and combine instructional actions in teaching specific areas of literacy. In most other studies of teachers' instruction, judgments of quality of instruction, not teachers' actual instructional actions, have been found to explain variance in students' progress in reading (e.g., Cirino, Pollard-Durodola, Foorman, Carlson, & Francis, 2007; Hamre & Pianta, 2005; Pianta et al., 2008).

We focused specifically on observed teachers' instructional actions that represent three critical dimensions of instruction—PS (e.g., clarifying the purpose of a lesson), TDI (e.g., modeling), and SSL (e.g., fostering discussion). The results suggest that teachers' emphasis on two of the three dimensions (TDI and SSL) accounted for significant variance in students' reading comprehension achievement. Further, results confirmed several key expectations, such as a significant relation between teachers' knowledge and emphasis on actions in the three dimensions. Overall, the findings suggest that our framework and analytic methods offer a promising approach to identifying the instructional actions effective elementary teachers use when they teach lessons in specific areas, such as reading comprehension.

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Analysis of Reading Comprehension Instruction

Our first step was development of a theoretical framework that contextualized teachers' instructional actions within lessons on reading comprehension. In early elementary classrooms, the lesson is a natural unit of instruction, as teachers prepare for and teach lessons that have a particular goal, using particular materials and methods of instruction (e.g., Stodolsky, 1990). The three dimensions of instruction we chose to study (PS, TDI, and SSL) were derived from previous studies of effective early reading instruction. Our observations of instruction included the entire literacy block in 44 third-grade classrooms four times during the year. From these, we identified 287 comprehension lessons taught by these teachers; these constituted about one fourth of all their lessons.

Our first step involved examining instructional actions within each dimension in these lessons, taking into account the influence of lesson features, student characteristics, and teachers' characteristics. The analysis was a multilevel, multidimensional measurement model that yielded a number of interesting and relevant findings. First, results suggest that we could measure each of the three dimensions with a set of indicators that fit each scale. We also found that within each dimension, all instructional actions discriminated similarly with the exception of one

instructional action under PS ("Providing a wrap-up of the lesson"); this item was eliminated from the analyses in order to construct a proper Rasch scale. Second, at the lesson level, lesson duration contributed significantly to the extensive use of instructional actions in each dimension. This stands to reason, as longer lessons provide more opportunity to use a variety of methods. One finding at this level that we had not anticipated was that the time of the observation did not contribute significantly, suggesting that lessons taught early in the year did not differ significantly from those later in the year. Although this result suggests that the ways each teacher taught comprehension lessons was reasonably stable, others have found significant variation among occurrences (e.g., Rowan & Correnti, 2009). This, then, is an important topic for further study.

Third, at the teacher level, we found that teacher knowledge contributed to each dimension. This contribution was positive for SSL and PS but negative for TDI; the negative relation of teacher knowledge and TDI is perplexing. One possible explanation is that instructional actions in the TDI dimension (e.g., modeling) are prevalent for both knowledgeable and less knowledgeable teachers but that more knowledgeable teachers are less likely to emphasize actions in the TDI dimension. A second possible explanation is that less knowledgeable teachers might work in higher poverty contexts, where TDI dimensions are more likely to be emphasized. A Some researchers have suggested that teachers' content knowledge about reading contributes to their use of explicit instruction (e.g., Foorman & Moats, 2004), whereas others have suggested that knowledgeable teachers are less reliant on specific teaching routines, which might include instructional actions in the TDI dimension (e.g., Bransford et al., 2005).

Another important finding was that certain characteristics of students in their class affected teachers' instruction. This is somewhat similar to findings reported by Hamre and Pianta (2005), which indicated that quality of reading instruction contributed to narrowing the achievement gap for students at risk. We found that teachers tended to use more instructional actions in the TDI dimension and fewer in SSL and PS dimensions when there were more minority students in their class. With regard to the extensive use of TDI, Smith, Lee, and Newmann (2001) found that didactic instruction (roughly comparable to TDI) was more frequently used in schools with high percentages of minority students. These researchers also found that a higher percentage of time providing interactive learning experiences was also associated with significant gains in students' reading. These results suggest the value of examining different dimensions of instruction concurrently in specific types of lessons, rather than isolating particular instructional methods for study, especially if the goal is overall profiles of effective instruction (e.g., Pressley et al., 2001).

With regard to variation in instructional actions, our findings were like those of other researchers (e.g., Pianta et al., 2007; Rowan & Correnti, 2009; Taylor et al., 2003) in showing extreme variability in the use of particular instructional actions,

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as was apparent in Table 1. Our results are also similar to others in the relative scarcity of certain instructional actions, such as fostering discussion (e.g., Pianta et al., 2008). For example, in the PS dimension, teachers fairly often explained the purpose of the lesson (present in 36% of the lessons) but seldom explained the value of the literacy goal or activity to the students (observed in 9% of the lessons). Teachers frequently used instructional actions in the TDI dimension (e.g., modeling and coaching 61%) but less frequently used instructional actions in the SSL dimension (2.g., fostering discussion, 29%). One value of the measurement model was that it provided a way to capture teachers' relative preferences for using frequent and infrequent actions in different lesson contexts.

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Comprehension Instruction and Students' Gains in Reading

The major finding of our study is that third-grade teachers' relative emphasis on instruction in two of the three dimensions (TDI and SSL) contributed significantly to students' gains in reading achievement across the year, when accounting for prior achievement and both teacher and student characteristics. To put these findings in perspective, recall that in recent studies, time-sampled variables and their aggregates related to teachers' instruction have not accounted for significant variance in their students' reading achievement (e.g., Foorman et al., 2006; Pianta et al., 2008). For example, Pianta et al. (2008) found that there was no effect for quantity of exposure to reading instruction or instructional support on first, third, or fifth graders' reading gains. This result seems counterintuitive, as in theory teachers' instructional actions ought to affect their students' reading achievement. For this reason, it was gratifying to find that teachers' emphasis on two dimensions of instruction in comprehension lessons, taking into account context and teacher and student characteristics, did contribute to students' reading comprehension achievement.

These findings are encouraging and suggest that our analytic approach holds promise for future study of effective elementary reading instruction. Along with this approach, other features of the study might have contributed to the outcome. One is the alignment of purpose of instruction and students' outcome, both focused on reading comprehension (e.g., Shavelson et al., 1986). A second feature is the focus on instructional actions that might be specific to literacy prevalent in the early elementary years; the need to study "curriculum specific" aspects of instruction was noted by Pianta et al. (2008) as one shortcoming of their observation system. A third feature is the focus on theoretical dimensions of instruction in reading comprehension. Because the measurement model yielded latent indices of enacted instruction for each of the three dimensions for each teacher, we were not faced with the problem Taylor et al. (2003) encountered; specifically, they found that higher level questions accounted significantly for student gains in reading, but because such questions were very infrequently observed, the researchers

found it hard to explain how these very uncommon questions could have had such a substantial effect on students' reading achievement.

It is important to recognize that teachers' instruction was represented in all three dimensions; these are not entirely independent of one another. The significant negative correlation of TDI and PS suggests that a teacher who tended to emphasize actions in the TDI dimension (e.g., telling, modeling) was unlikely to emphasize actions in the PS dimension (e.g., explaining the purpose of a lesson). It would be a mistake to think that the dimensions represent independent categories of teaching styles. Unlike Smith et al. (2001), our model does not classify teachers as a TDI, PS, or SSL teacher; instead, it quantifies the unique blend of instructional strategies used by each teacher.

From the achievement model another important finding is that certain teacher and student characteristics significantly affected reading outcomes, whereas others did not. With regard to teachers' knowledge, we found that the effect of teachers' knowledge on students' achievement was different from what we found in the measurement model. That is, whereas teachers' knowledge about reading significantly contributed to the three dimensions, it did not explain students' gains in reading over the year. This combination of findings suggests the importance of knowledge about reading in designing and carrying out comprehension lessons while not significantly contributing additionally to overall gains on a standardized reading achievement. Other studies we have carried out have (e.g., Carlisle, Correnti, Phelps, & Zeng, 2009) also found performance on a general measure of knowledge about reading to be weakly related to student outcomes, so the results of the present study reinforce the view that it is knowledge in practice that contributes to students' progress in reading.

With regard to student characteristics, we found that modeling the slopes of both the percentage of students qualifying for subsidized lunch (FRL) and the performance on the prior year's comprehension assessment provided additional insight into the influence of instruction on achievement. As Figures 1 and 2 show, FRL students benefited more than their non-FRL peers from being in classrooms where teachers were particularly invested in using TDI and providing SSL. The findings indicate that teachers' emphasis on instructional actions in the TDI and SSL dimensions was not equally effective for all students. This finding is compatible with the results of other studies (e.g., Connor et al., 2008) that suggest that students at higher achievement levels need less direction and focused explanation from teachers.

Limitations and Directions for Further Study

Our analyses of teachers' instructional actions in comprehension lessons have provided results that do show that what teachers do when they teach comprehension affects their students' progress in reading comprehension. Still, because

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of the limitations of the study, the major contribution might be the theoretical framework and the application of advanced statistical methods. For purposes of this initial study of our framework and analytic methods, we focused solely on comprehension lessons taught by third-grade teachers. However, we know that the nature and quality of instruction is likely to vary by area of reading (Barr & Dreeben, 1983), and so it will be important to apply this framework to lessons in other areas (e.g., phonics) and at other grade levels. Further research might also focus on the contextual variables that affect outcomes of reading lessons, not only student and teacher characteristics but also types of materials used in lessons (e.g., trade books, basal reading programs).

Our study has other limitations: the sample of teachers is small and drawn from relatively high-poverty, underachieving schools in one state. The targeted instructional actions were intentionally limited in number, leaving lots of room to explore others. Nonetheless, we do not think that there could ever be such a thing as a set of instructional actions that all teachers should use in all comprehension lessons for all students—and further research is needed to test this perspective. Certainly, we are in the beginning stages of the work we have undertaken to understand the relation of teachers' instructional actions and the effects these have on their students' reading performance.

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APPENDIX A

The Three Dimensions, as Represented by Specific Items and Examples

	The teacher:	*For example:*
Pedagogical structure	*Explains purpose of lesson.*	"Today we are going to learn how to use the table of contents in a book."
	Explains value/relevance of lesson (e.g., how it will be useful in the future).	"The table of contents is a very helpful way to find information. You will be using the Table of Contents in many books as you do research for your science reports."
	Gives directions for activity.	"Now that we have looked at the title and pictures, talk with your partner about what you already know about tides. Take notes to share with the class."
	Provides a wrap-up or summary[a] (reviews what the group has worked on, what has been learned, sometimes including feedback directed toward the group about progress in mastering a concept).	"So, let's go over the steps in writing a summary one last time."
Teacher-directed instruction	*Tells/explains* (includes explaining ideas, giving information, and providing explicit instruction).	The teacher might explain a procedure or strategy (e.g., how to summarize information in a passage) or provide background information
	Models/coaches. (Modeling occurs when the teacher shows the students how to carry out a procedure or a way of thinking, often explaining his/her thinking while carrying out	Modeling the process of using context to infer a word's meaning (e.g., "Persuade. I don't know what that means. Hmmm. Let's see if there are clues in the sentence. . . ."). Coaching:

(*Continued*)

APPENDIX A
(*Continued*)

	The teacher:	*For example:*
	out the procedure. Coaching occurs when the teacher gives the students suggestions, clues, or reminders.)	"Remember how you found clues to infer word meanings in the story we read yesterday? See if you can use the same process to understand that word that you are struggling with today."
	Asks questions for evaluation (asking questions for which the teacher knows the answer in order to assess students' understanding and provide feedback of some kind to student responses).	"Who is the main character? Where does the story take place?"
	Provides practice or review activities.	
Support for Student Learning	*Fosters or initiates discussion* (initiates discussion and engages students' thinking, providing them with opportunities to express their own ideas or their interpretations of a text).	The teacher might share ideas, remarks, or queries (e.g., "oh, what a good idea"). Such comments are used to monitor or extend the discussion, not to evaluate students' responses
	Assesses students' learning; provides feedback (assesses students' learning or performance and provides feedback for individual students. Feedback is typically based on the teacher's analysis of the student's performance in that lesson and might include suggestions for improvement or brief reteaching).	"Jean, I can understand that you are interested in the topic of the book you have chosen to read, but this book is too easy for you. Perhaps you could find another book that will be more challenging for you—one that will keep you interested."
	Gives students opportunity to ask questions (offers students opportunities to contribute ideas or ask questions; indicates that students might have problems understanding a concept, procedure, or activity or might have ideas or questions about the content).	"I can tell from your expression, Maria, that you are confused. What did I say or what did your classmates say about the meaning of that word that confused you?"

[a]As explained in the text, this item was deleted from the model.

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APPENDIX B

Survey Item Stems Included in the Models

In this school year, about how often have you . . .

- used student data to guide lesson planning?
- followed the sequence of instruction suggested in the comprehensive reading program?
- provided explicit instruction (e.g., modeling, demonstrations, examples)?

Differentiated Instruction Item Stems

- I make efforts to recognize all students' individual progress in reading.
- I provide several activities in class so that students can choose from among them.
- I use a wide range of assignments, materials, or activities matched to students' needs and skill levels.
- I use a wide range of assignments, materials, or activities matched to students' interests.
- I use flexible grouping in my classroom.
- I frequently use assessments to decide what my students need next.
- I am able to design instruction to meet the learning needs of all my students.
- I regularly offer students opportunities to choose learning activities, individuals to work with, or books to read.

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