ANALYZING TEACHER PARTICIPATION IN LITERACY COACHING ACTIVITIES

ABSTRACT

Many major urban districts have committed large investments to school-based professional development anchored in the work of literacy coaches. At base is a shared belief that instructional coaches are key levers for improvement. Yet, clinical accounts of the role of an instructional coach suggest that this is a complex practice to implement well. This article seeks to add to this literature through a theory-based quantitative investigation of literacy coaching as enacted in a mature school reform initiative. We examine teachers' actual exposure to Literacy Collaborative coaching and analyze the variability in this exposure both within and between schools. We theorize about the factors at both the individual and school organizational levels that might contribute to this observed variability and test the predictive power of these ideas using data from a longitudinal study of 250 teachers in 17 schools.

Allison Atteberry
UNIVERSITY OF VIRGINIA

Anthony S. Bryk
CARNEGIE FOUNDATION FOR THE ADVANCEMENT OF TEACHING AND LEARNING

MANY major urban districts, including New York, Boston, Chicago, Los Angeles, and San Diego, as well as entire states such as Florida, have committed large investments to school-based professional development anchored in the work of literacy coaches. At base here is a shared belief that instructional coaches are key levers for improvement. Yet, clinical and theoretical accounts about the role and responsibilities of an instructional coach, such as Bean and Carroll (2006), Showers and Joyce (1996), and Walpole and McKenna (2004), suggest that this is a complex practice to implement well. Qualitative

field accounts such as Neufeld and Roper (2003) and local program evaluations such as Barton and Lavrakas (2006) and Norton (2007) offer corroborating evidence in this regard.

This article seeks to add to this literature through a theory-based quantitative investigation of literacy coaching as enacted in a mature school reform initiative. The programmatic context for this research is the Literacy Collaborative (LC) model, which had been operational for over 15 years. We systematically examine teachers' actual exposure to professional development through classroom-based coaching and analyze the variability in this exposure both within and between schools. We theorize about the factors at both the individual and school organizational levels that might contribute to this observed variability, and test the predictive power of these ideas using data from a 4-year longitudinal study of program implementation by some 250 teachers in 17 schools in 8 different states.

Background on LC

LC seeks to improve children's literacy achievement in elementary schools through the introduction of a comprehensive literacy framework and supporting teachers to develop expertise in its classroom enactment. LC currently operates in over 500 schools and has been implemented in over 200 districts across 26 states, making it one of the larger literacy instructional improvement initiatives in the United States. Established in 1993, the LC program is organized around a set of pedagogic practices that are founded in the work of Clay (1979, 2004), Fountas and Pinnell (1996, 2001, 2006), and others. For many teachers, the LC program represents a profound intervention into their work. It seeks to change the basic materials, procedures, and social routines of instruction. Even more fundamentally, it poses a challenge to basic normative conceptions about how a teacher thinks about her work and relations to colleagues.

The cornerstone of LC is long-term teacher professional development coordinated by an on-site coach. The program posits that key to teacher development is the creation of multiple opportunities for teachers to reflect on their own teaching and to talk about their observations of children with a "more expert" other (i.e., the coach) (Norlander-Case, 1999). The LC relies on coaches working one to one in their teachers' classrooms—observing, modeling, and providing feedback to improve student learning over time.

In a typical implementation, a principal selects one of its teachers to take on the role of a literacy coach. Prior to any classroom coaching, these individuals are trained over the course of a full school year while still teaching in their schools. The LC training for coaches focuses on (1) deepening understanding of literacy theory and content; (2) enhancing coaches' own expertise in implementing the comprehensive literacy instructional practices; and (3) learning how best to support other teachers as they develop within this instructional model, engage in inquiry about their practice, and improve effectiveness over time. After the training year, the literacy coaches continue to teach students half time as they assume responsibility for carrying out school-based literacy professional development in the remainder of their time. The coach is responsible for coordinating the professional development of all K–2 teachers at the school, regardless of the school's size.

K–2 teachers are introduced to LC through an initial 40-hour workshop series. As teachers complete these workshops, individual classroom coaching begins. While coaches may take on other site-specific literacy activities at the direction of their principal (e.g., participation on a school improvement leadership team), by LC model design, one-to-one classroom coaching is their primary work responsibility.

According to program guidelines, teachers should ideally receive up to two coaching sessions per month, with this activity extending over multiple years. Given the constraints on the actual time available, however, coaches are often called upon to exercise discretion as to whom to coach, especially in schools with larger faculties. The program intends that all teachers receive coaching, but considerable variation in exposure to coaching may result because of the structural constraints of the total time allocated for coaching and faculty size. In addition, individual teacher considerations play a role as well. According to LC, the intensity of a coach's work with any individual teacher may depend on the teacher's openness to this relationship and some assessment as to the likelihood of advancing instructional improvement in a particular classroom. Probing this dynamic as it plays out in actual school practice is the focus of the analyses presented in this article.

Purpose of the Article

The link between instructional coaching and changes in student learning is predicated on a set of causal connections that we herein refer to as a *causal cascade*. First, a coach must establish relationships with her school-based colleagues and initiate work routines organized around her new role as a school-based professional developer. Second, teachers must regularly participate in the professional development activities that the coach initiates. Third, this participation must result in desired changes in teachers' classroom practice. Finally, assuming that these desired changes in instruction occur, significant improvements in student learning are expected. Each of these causal connections is under investigation as part of a larger project.

In this article, we consider the first crucial step in the causal cascade described above. Specifically, we examine the extent to which teachers in LC schools actually participate in one-to-one coaching. Research objectives include (1) documenting the scope, frequency, and distribution of coaching activities as practiced and (2) investigating why more coaching may have occurred for some teachers and in some schools. In order to explore the latter, we develop an activity theory–based framework for probing this variability. This framework recognizes both the individual agency of teachers and coaches, as well as the role of school context, in shaping participation in the professional development opportunities afforded in an LC school.

An Activity Theory Framework for Guiding Inquiry

We used activity theory to conceptualize how and why teachers' engagement in professional development with school-based literacy coaches might vary from classroom to classroom and school to school. Seminal contributions to activity theory are generally attributed to the Russian historical-cultural psychologist A. N. Leontjev (1974) (see also Leontjev, 1978, 1981). In applying these ideas to the present project, we have drawn heavily from elaborations of this theory by Cole

and Engeström (1993) and Engeström (1987, 1999). We also integrate within this general framework several key observations from the ecological change theory applied by Zhao and Frank (2003), and insights about the role of informal school social networks in the processes of innovation diffusion from Frank, Zhao, and Borman (2004). Activity theory draws our attention to what each individual agent brings to the relational dynamics of coaching and how this may be influenced by key aspects of local context.

Individual Agency of Literacy Coaches

We hypothesize that the nature of the enactment of the literacy coach role depends on three key background characteristics of the individuals who attempt to take on this role.[1] First is the *base expertise* that a novice literacy coach brings to this activity from prior training and professional experience. The work of LC coaching makes demands both on expertise in teaching children within a comprehensive literacy framework as well as on facility in working with other adults on improving their practice (Gibson, 2006). While the LC coach training program focuses on building coach knowledge and skills in both domains, it seems reasonable to expect that novice coaches with prior expertise in comprehensive literacy instruction and experience in the role of an adult educator will more readily engage the coaching role envisioned by LC (International Reading Association, 2004).

Second, the tasks involved in school-based coaching, as well as some aspects of the comprehensive literacy instructional framework itself, may be an entirely new undertaking for the individuals training to become coaches. Extensive prior research (Rogers, 2003) documents significant differences among individuals in their general willingness to engage in innovation (e.g., being an early versus a late adopter), and these basic differences in individual predispositions to innovate may have effects on LC implementation as well.

Third, coaching entails a new conception of their role relations with colleagues, in which coaches actively seek to improve the practice of peers. This task represents a fundamental challenge to traditional school norms of egalitarianism in which colleagues may help one another but only when that help is specifically requested (Lortie, 1975). Thus, we hypothesize that individual coaches will vary in their predisposition to take on such a "countercultural" role vis-à-vis school colleagues, and this too may influence the nature and degree of role enactment.

Individual Teacher Agency

We hypothesize that a similar set of individual background factors shape teacher engagement as well. First, a teacher's prior experience as a classroom teacher, as well as more specifically with comprehensive literacy, matters. The actual mechanics affecting individual participation, however, may be nuanced in this regard. Specifically, following on basic ideas developed in Cole and Engeström (1993) and consistent with observations from Coburn's (2004) study of changes in teachers' literacy practices, we hypothesize that a zone of proximal development operates here. A coach's professional development objectives must seem both ambitious while also attainable by teachers. Variability in individual teacher discernments about these

goals is likely to occur. For some teachers, the new instructional practices may appear too foreign and as a result simply be rejected out of hand. In contrast, other teachers may already have considerable prior experience in comprehensive literacy instruction. A novice coach may have little capacity to add value here and may choose to focus her attention elsewhere. In both of these scenarios, we would expect to observe less program engagement. On the other hand, a relatively novice teacher with aspirations for ambitious classroom practice may be maximally disposed to engage the efforts of a new school-based coach. Under these circumstances, extensive participation with an instructional coach seems likely.

Second, teachers' willingness to innovate—their readiness to try new practices and to be guided by an improvement orientation—is likely to shape how they participate in LC professional development (Eccles, 2002; Joyce & Showers, 2002). Teachers who are reticent to attempt new practices in their classrooms would presumably be less inclined to engage with a school-based coach.

Third, like coaches, teachers' conception of their role relations with colleagues will likely influence their response to LC activities. Successful one-to-one coaching requires, to some extent, that teachers reject the notion of working in isolation where colleagues rarely enter their classrooms or offer suggestions for improvement. We hypothesize that teachers vary in their openness to seeking out help from others and offering help in return. This predisposition to actively engage in the social relations of instructional improvement may predict how deeply teachers engage in the LC professional development.

The Influence of School Organizational Context

Finally, the individual agency for both coaches and teachers, as discussed above, may operate quite differently depending on the particularities of school context. In addition to the structural constraint imposed by limited coaching time and the structural demand emanating from faculty size noted earlier, we posit that four other organizational features interact here. The first two relate to the formal organization of schools; the second two tap more informal aspects of school life.

1. The exercise of formal leadership. Key in this regard is school leadership priorities and how these align with introducing the LC initiative. For example, it seems reasonable to expect that the LC program will be more actively engaged in schools where principals extend strong support. This support manifests itself in a variety of instrumental ways, such as allocating discretionary resources for the program, creating extra time for the professional development activities to occur, and nurturing a "safe zone" for teachers' experimentation with new practices in their classrooms.[2] More generally, principals may use the myriad of formal and informal interactions that they have with teachers to express support and encourage participation.[3]

2. Base social control mechanisms over teachers' work. Schools also possess established mechanisms that shape the social organization of instruction. These mechanisms can vary from loose coupling to the much tighter controls of bureaucracy or professional community (Rowan, 1990). In the loosely coupled school, individual teachers typically work in isolated classrooms and exercise considerable individual discretion in defining and carrying out the tasks of instruction (Bidwell, 1965; Meyer & Rowan, 1978; Weick, 1976). In the bureaucratic school, in contrast, administrators monitor teachers to ensure that they implement prescribed

curricula in prescribed ways (Fuhrman & Elmore, 1990). Still different, in professional communities, teachers work together to improve instruction by relying on a combination of shared goals for student learning, shared experiences within a common instructional system, and social interconnectedness (Kruse, Louis, & Bryk, 1995; McLaughlin & Talbert, 2001). In schools with strong professional communities, teachers are viewed as agents active in shaping their school's strategies for improvement.

Each control mechanism is typically associated with a set of underlying beliefs about instruction. In the case of loose coupling, instruction is seen as highly variable, impossible to specify, and dependent on particular teachers—that is, idiosyncratic. In contrast, under bureaucratic control instruction is viewed as routine and indeed specifiable in terms of observed behavior. In the case of professional community, however, instruction is understood as a complex practice that is contingent on local and moment-to-moment conditions.

Not surprisingly, some base social control mechanisms appear to be more conducive than others to a professional development initiative like LC. Specifically, the instruction at the heart of LC envisions teachers as problem solvers with access to knowledge that can support them in their work. It relies on a network of human relationships that not only develops professional knowledge but also makes it possible for peers to share core principles and hold each other accountable to common standards of practice (Elmore & Burney, 1997; Wenger, 1998). When teachers and school leaders work together toward shared goals and enact common strategies for achieving those goals, there is community "buy-in" to the improvement effort, even when such efforts require additional amounts of teachers' time and energy (Darling-Hammond & McLaughlin, 1996). Thus, we posit that a base state of professional community is more likely to nurture the development and take-up of the complex teaching practices that are the intentional focus of an LC coach (Kruse et al., 1995; Newmann, Marks, & Gamoran, 1996).

3. Relational trust across the informal social organization. Mutual vulnerability is a fundamental characteristic of adult work in schools. Classroom teachers remain dependent on diverse others—teacher colleagues, the school principal, and parents—in order to achieve efficacy in their teaching endeavors (Bryk & Schneider, 2002). A higher level of relational trust among faculty, with their principal, and with their new literacy coach should facilitate engagement with the LC program. Along similar lines, a high level of trust also allows informal teacher leaders within a faculty, if so disposed, to encourage colleagues and exert peer pressure to engage in the LC professional development.

4. Organizational norms. Norms shape how individuals think about and enact their roles within an organization. At the heart of the LC initiative is a conception of improving teaching as a problem in expertise development (Bryk et al., 2006). In principle, such expertise legitimates the role of a coach, but this is only the case when expertise is publicly acknowledged and valued within the school community. Of key concern in this regard is the norm of egalitarianism typically found in the loosely coupled school. Under this norm, status tends to be accorded based on seniority and loyalty rather than expertise per se (Lortie, 1975). Consequently, a professional development initiative such as LC, which marks a coach as someone of different status from other teachers based on acquired expertise, may not fare well in such contexts.

Along related lines, teachers in the loosely coupled school place high value on autonomous action in their classrooms and expect engagement in professional development and new instructional practices to be voluntary. The LC initiative, in contrast, seeks to create schoolwide participation within a common instructional system that is supported by mutual accountability. When a norm of autonomy prevails, however, advancing such collective action poses a formidable challenge.

In sum, a variety of structural and normative organizational features represent potentially critical considerations for both the role enactment of literacy coaches as well as how (or if) teachers respond to the professional development opportunities that coaches in turn create. The work of a novice coach should be facilitated in a school with positive preexisting work relations. In contrast, in schools where the base state of leadership and professional community are weak, coaches may encounter significant barriers to entering teachers' classrooms and engaging in the deeply personal work of one-to-one coaching.

Data Collection, Measures, and Method

Overview of Data Collection

This research project took place in 17 schools across eight states in the midwestern, southern, and eastern regions of the United States. The researchers selected schools for the study from a pool of schools that had previously expressed interest in implementing LC. A portion of the costs associated with training coaches was covered by project funds for any school that agreed to participate in the study. However, each school was still required to cover a portion of training costs, as well as all costs associated with "freeing" the teacher who became the coach during the 3 years of implementation. Because this entailed a significant financial commitment, the schools participating in the study were predisposed toward introducing LC coaching. Though this research project was initially designed and implemented in 18 schools, the analyses in this article are based on 17 schools. In one of the 18 study schools, the LC role was never implemented and no coaching occurred. As a result, this school was dropped from all final project analyses.

Some 250 K–2 teachers were working in these schools during the study, and most—about 94%—participated. During the first school year of the study, 2004–2005, coaches received training in their new role but did not offer any literacy professional development activities in their respective schools. Background survey data on teachers and schools were collected during this first year. (In addition, the first year served as a baseline or no-treatment period in an accelerated multicohort, longitudinal, value-added design for assessing effects on students. These results are reported elsewhere [Biancarosa, Bryk, & Dexter, 2010].) In the second, third, and fourth years of the study, literacy coaches offered school-based professional development for all K–2 teachers in their respective schools. Coaching logs that detail these activities provide the outcome data for the analyses reported on in this article.

Basic Teacher and Student Demographics

The size of eligible K–2 faculty varied from four teachers in a small primary school to a high of 23. Over 90% of the teachers in most schools were White and had on average about 10 years of teaching experience prior to initiation of LC. About half of the teachers (52%) remained in their schools for all 3 years of program implementation. This varied from a low of 23% in one school to a high of 81% in another. (See Table A1 in App. A for more detail on student and teacher demographics in the sample schools.)

Across the 17 schools, over 45% of the students were low income, 16% were African American, 6% Latino, and 7% Asian. Schools varied widely in their student composition. In several schools, more than 90% of students were White, while in other schools 30% or more students were African American or Latino. Similarly, the schools ranged in socioeconomic make-up, with the percentage of students receiving free or reduced-priced lunch ranging from a low of 19% to a high of 86%.

Measures Related to the Conceptual Framework

We described in the conceptual framework how aspects of individual agency and socio-organizational features may influence variations in the amount of coaching that occurs. We now map out how the elements of the conceptual framework were measured. Surveys of teachers and coaches administered before the onset of school-based coaching allowed us to create indicators for most aspects of the conceptual framework discussed above. Many of these measures were initially developed, field tested, and validated in studies by the Consortium on Chicago School Research (for review, see Bryk, Sebring, Allensworth, Luppescu, & Easton, 2009). Most were derived through Rasch rating scale analyses.[4] Complete documentation for all measures developed by the Consortium is available on the Web site. Documentation of all the measures developed specifically for this project is included in Appendix B.

Individual teacher and coach characteristics. According to the conceptual framework, both teachers' and coaches' engagement with each other may depend on (1) their own prior professional experiences, (2) their willingness to engage in innovation, and also (3) their conception of role relations with colleagues. First, to measure baseline experience and expertise for teachers, we surveyed individuals about their educational attainment and extent of teaching experience (in general, and specific to the school). We used these items to create categorical variables for the highest level of education attained (bachelor's degree, master's degree, doctorate), as well as an indicator of whether a teacher was more veteran (10+ years of classroom experience) or more novice (i.e., fewer than 10 years).[5] For coaches, items from their baseline survey inquired about prior expertise in children's literacy, specifically, their previous certifications, coursework, and professional development activities. We also inquired about the extent, if any, of experience working as an adult educator. Since expertise in both children's literacy as well as work as an adult educator are relevant to coaches' baseline expertise, we combined responses from six survey items into an overall measure of coaches' prior expertise called *LC prior training.*

Second, we used items from the teacher and coach surveys to construct two measures that relate to an individual's willingness to innovate. A direct measure for this subconstruct, called *orientation toward innovation*, consisted of seven survey items that asked about an individual's inclination to independently engage with innovations and to spread news of them to others. For example, teachers and coaches are asked whether they are usually one of the first people at the school to try new practices. We also constructed a related measure called *school commitment*. We hypothesized that willingness to innovate may also depend on the strength of an individual's affective tie to that school and its improvement efforts. The four questions in this measure ask teachers whether they look forward to going to work, would rather work somewhere else, and if they would recommend the school to parents.

Third, we sought to capture the extent to which teachers and coaches take an active stance in their role relations with colleagues. We combined responses from four survey items to construct a measure called *role conception*. Teachers who score low on this measure express reticence to initiate a professional interaction with a fellow teacher or to offer help to colleagues experiencing difficulty in their classrooms. In contrast, a high score on this measure indicates that a teacher considers it her role responsibility to reach out actively.

School context measures. We also administered a separate school context survey to all K–3 staff during the baseline year. This survey asked about various aspects of their school work environment. These survey data provided indicators for our four core organization-level constructs: (1) formal leadership, (2) base social control mechanisms over teachers' work, (3) teacher trust relations, and (4) organizational norms. Again, complete documentation for all measures developed by the consortium is available online, and documentation for all the measures developed specifically for this project is included in Appendix B.

First, in order to gain direct insight into whether the LC initiative was formally supported by school leadership, we asked coaches six questions about the extent to which they perceived that the program would be supported and valued in their school. We call the resulting measure *support for LC*. These items asked coaches about the extent to which their principal is supportive, if they are given adequate time to carry out their roles, and whether or not they anticipate that the faculty will be open to the LC program.

Second, as an indication of the social control mechanisms operating in the school, we combined teachers' responses to eight survey items that asked about the degree of teachers' control over their work. This measure, which we call *teacher influence in decision making*, assesses teachers' role (if any) in the selection of instructional materials, setting of school policy, in-service program planning, use of discretionary funds, and hiring of professional staff.

Third, in terms of characterizing each school's informal working environment, we used a measure of *teacher-teacher trust* based on five survey items. This captures the extent to which teachers in a school reported mutual respect for each other, for those who lead school improvement efforts, and for those that are experts at their craft. Questions also ask teachers whether they feel comfortable discussing their feelings and worries and really care about each other. High levels indicate that teachers trust and respect each other.

Finally, in order to indicate organizational norms, we created a composite measure called *professional community*. It consists of three subcomponents:

seven items inquired about the degree to which teachers engage one another in reflective dialogue about instruction and student learning. Another seven items asked about the perceived strength of a shared commitment among teachers to improve the school so that all students learn. This part of the survey asked teachers about how many colleagues feel responsible for students' academic and social development, set high standards for professional practice, and take responsibility for school improvement. Finally, four more items focused on the nature of collaboration among teachers around instruction. These three sub-component measures were combined to form an overall composite of the normative environment at the school as the LC initiative was introduced.

Together, the individual- and school-level survey data allow us to contextualize the variations in exposure to coaching in terms of differences that individuals might bring to this activity and the school context in which all of this occurs. Since all of these data were collected prior to any program implementation, they provide a picture of the preexisting conditions as coaching activity commenced.

Measure of Exposure to Coaching

Each literacy coach reported monthly through a Web site on the professional development activities they undertook at their school. These logs provided data on the frequency, activity type, and length of the individual coaching sessions each teacher received. Information on professional workshops offered by the coach (including topics covered and list of participants) was also recorded here. Since, as noted earlier, one-to-one coaching is considered the high-leverage activity in many school-based professional development initiatives such as LC, we focus our analyses in this article on the one-to-one coaching data.[6]

The Web site used by the LC coaches was designed to be quick and simple, taking a total of about 15–30 minutes per month. The site consisted of a set of drop-down menus to record details about each one-to-one coaching session and the topical focus and list of participating teachers in any workshop session offered. The participant lists in these drop-down menus were prepopulated and tailored to each individual school.[7]

Log data were collected for five semesters, beginning with the second semester of year 2, by which time all LC coaches had initiated their school-based role.[8] (Recall that year 1 was a training year for coaches and a baseline data collection year for the study.) The maximum number of semesters that any individual teacher was actually eligible for coaching depends on when he or she entered or left the school, as well as the grade level he or she taught each year.

Results and Discussion

The LC has published standards for coaching (Literacy Collaborative Trademark Committee, 2006). These standards detail the common structural components that should comprise a coaching session. They also set out an expectation that all teachers should participate and that each teacher should ideally receive about two coaching sessions per month. However, the realities of school life inevitably intrude, creating discrepancies between idealized program standards: coaching as intended versus coaching as actually experienced. Therefore, we first consider

details on the actual coaching that occurred in each school. Using the data collected on teachers' engagement in coaching, we characterize the scope, frequency, and distribution of coaching activities as experienced in these 17 study schools. In addition, we present a novel approach to visualizing variations in exposure to coaching over time both between teachers and between schools. As expected, we observed considerable variability in exposure to coaching both within and between schools. After this descriptive account, we examine possible teacher and school-level factors related to variations in the amount of coaching received by different teachers. We used the activity theory framework introduced earlier as an analytic guide for the latter exploration and implemented hierarchical linear modeling (HLM) to investigate what characteristics of teachers, schools, and coaches account for the marked variability in engagement coaching.

Descriptive Results: Variation in Exposure to Coaching

Eligible months for coaching. Each teacher could have received a maximum of five semesters of coaching during LC program implementation, depending upon his or her particular employment history at the school. Of the 249 teachers in this study, 30 were actually present and eligible for coaching for only one semester. Some 90 teachers were present and eligible for coaching two, three, or four semesters. The remaining 129 teachers—or about 52%—were present and eligible for coaching all five semesters. In aggregate, a total of 3,703 coaching sessions were recorded in these 17 schools.

The range in the total number of coaching sessions that any one teacher received across all five semesters of the study spans 0–43, with a median of 12. Some of this observed variability in exposure to coaching is simply a function of the number of semesters that each teacher was present in the school while LC coaching was being offered. Consequently, rather than considering the total number of coaching sessions received, we chose to focus our analysis instead on the number of coaching sessions received by each teacher per month that they were present in the school and teaching in one of the grades eligible for coaching (K–2). We refer to this as *coaching sessions per eligible month.*[9]

Prevalence of coaching. On average, teachers received 0.79 one-to-one coaching sessions per eligible month. The standard deviation of coaching sessions per month was 0.63. While some teachers received no coaching, others received 1.5 or more sessions per month (or around 13 coaching sessions in a 9-month school year).[10] The logs also indicate that the average coaching session lasts about 73 minutes, with a standard deviation of 20 minutes. Overall, these descriptive statistics document substantial variation among teachers in exposure to coaching, even after controlling for differences in eligibility.

Coaching coverage. Overall, coaches engaged about 80% of the eligible K–2 staff at any given time; however, there was marked variability across schools. The percent of the teachers involved increased over the course of the study. During the first two semesters of program implementation, only three of the coaches were working with more than half the eligible teachers in the schools. Coaching coverage increased on average by about 40% beginning in the third semester of the study (spring 2006), and during the last three semesters of the study all but two coaches were working with at least 90% of the eligible teachers. Furthermore,
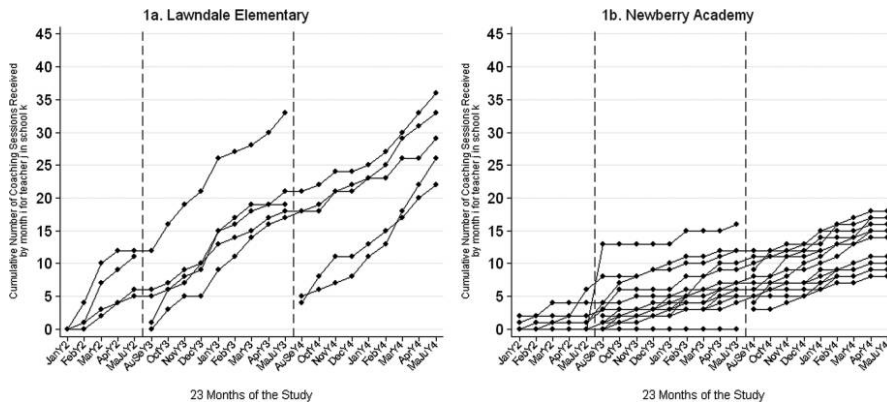
Figure 1. Cumulative number of coaching sessions each teacher received.

as one might expect, the proportion of eligible staff being coached was inversely related to the number of K–2 teachers in the school. The bivariate correlation between K–2 staff size and coaching coverage was −0.46.

A first look at variability among teachers and schools. Figure 1 illustrates the different patterns of coaching within two sample schools—Lawndale and Newberry. This comparison serves to underscore that there is a great deal of variation within schools in how much coaching teachers received in comparison to other teachers in the same school. The type of variability captured in Figure 1 corresponds to the teacher level of the HLM models we will present later in this article, and a close descriptive examination serves to illuminate the kind and degree of variability these models will seek to explain. For instance, panel A of Figure 1 depicts coaching at Lawndale Elementary. Each line represents the accumulating number of coaching sessions that a specific individual teacher received in that school over time. Notice that Lawndale Elementary has a relatively small K–2 staff with 4 to 5 teachers in any given year.

We can see that some Lawndale teachers left this school partway through the study, while others joined the staff at the beginning of years 3 and 4. All teachers received coaching soon after they were eligible, and teachers accumulated a significant number of sessions over time. By the end of the study, teachers at Lawndale had received about 29 coaching sessions on average, with one teacher receiving a high of 36 sessions. Because of the small size of Lawndale Elementary, the coach was able to consistently coach every teacher, despite the fact that this school did experience some teacher turnover throughout the course of the study.

In contrast, panel B of Figure 1 depicts a second study school—Newberry Academy—with a different coaching pattern. First, the K–2 staff size was clearly much larger at Newberry, where the coach was responsible for the professional development of about 15 K–2 teachers each year. By the end of year 4, teachers at Newberry had accumulated on average about 13 coaching sessions each—notably fewer than teachers at Lawndale Elementary. We can also see that a few teachers at Newberry were never coached (illustrated by the flat, connected lines where the y axis equals 0). These results are not surprising. In a large school like Newberry, each teacher receives fewer coaching sessions simply because the coach must divide her time across more teachers. In fact, the coaches in these two
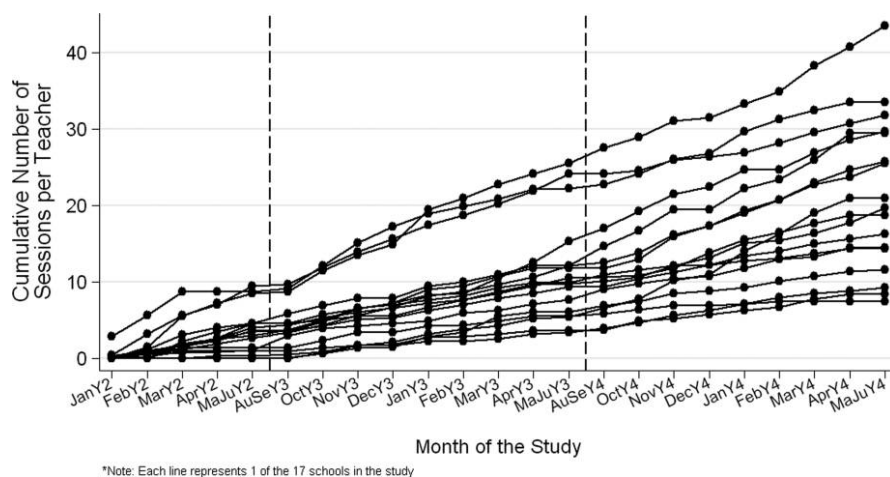
Figure 2. Average number of coaching sessions accumulated per teacher across all 17 schools over time.

schools recorded about the same total number of coaching sessions during our study—239 at Lawndale and 220 at Newberry.

Figure 2 highlights the variation between schools in teachers' exposure to coaching. Each line in the graph represents one of the 17 schools. We see marked differences among schools in the average amount of coaching experienced by teachers. In one school, the average teacher accumulated only about nine coaching sessions throughout the course of the study. However, in another school, the average teacher has accumulated over 40 coaching sessions by the end of the study. The next step in the analysis is to further probe this within- and between-school variability and determine what factors—including school size—account for the patterns visible in Figure 2.

Analyzing the Variability in Coaching Exposure both Within and Between Schools

The descriptive statistics presented above suggest noteworthy variation in the amount of coaching occurring both among teachers within each school, as well as across the 17 schools. We use hierarchical linear model analyses to decompose this variance and explore possible predictors at both the teacher and school levels, drawing on the activity theory framework introduced earlier (Raudenbush & Bryk, 2002). The outcome of interest in these HLM analyses is the number of coaching sessions received in month i by teacher j in school k.

We began by estimating an unconditional model in order to partition the variance across levels. Of the variability among teachers in participation, 25% exists at the teacher level—that is, among teachers within any given school. The remaining 75% of the variation is between schools. Although the major component of variation is between schools, it is also clear that individual teachers within the same school received significantly different amounts of one-to-one coaching.

To offer a descriptive account of the within-school results, we computed a 95% plausible value range for teachers' exposure to professional development. In the average school, some teachers might receive as few as 0.44 coaching sessions per eligible month (i.e., the 95% lower bound), as compared to other teachers

Table 1. Six Patterns of Coaching Exposure between Coaches and Teachers

Teachers' Work Tenure during Study	Coaches' Experience Implementing Their Role		
	First Year	Second Year	Third Year
First year	204	40	43
Dummy variable name	T_1C_1	T_1C_2	T_1C_3
Second year		169	26
Dummy variable name		T_2C_2	T_2C_3
Third year			141
Dummy variable name			T_3C_3

Note.—Cell contents present the number of teachers who were in the first, second, or third year during the study (row categories) and experienced coaching in the coach's first, second, or third year implementing her new role as coach (column categories). Each coaching session falls into one of these six cells, and dummy variables are used in the final model to indicate to which set each coaching session belongs. The total number of teachers ever eligible for coaching was 249.

who might receive 1.40 or more coaching sessions per month (i.e., the 95% upper bound). These differences prove substantial when aggregated over time. For example, suppose we consider two teachers present in the same school over the full five semesters of data collection (i.e., 23 eligible months for participation). If we assume coaching sessions of average duration as previously reported (73 minutes), some teachers may have received less than 13 hours of one-to-one coaching, while others in the same school have received as many as 39 hours of coaching over the same 3-year period.

When we shift to examining between-school variability, the HLM analyses confirm descriptive patterns previously illustrated in Figure 2. The lower bound of the 95% plausible range identifies a school where most teachers receive practically no coaching in any given month. In contrast, teachers in schools at the upper bound may receive about 1.76 coaching sessions per month. (The latter is close to the target of two coaching sessions per teacher per month referenced by LC in its program guidelines.) Given that the average length of a coaching session is about 73 minutes, the average teacher working in a high-exposure school during the course of our study would have received over 49 hours of one-to-one coaching.

The level 1 base model. We began by specifying a level 1 model for the number of coaching sessions per month i for teacher j in school k. The data set consisted of a total of 4,236 observations (i.e., the total number of months that the 249 teachers were present and eligible during the course of the study). Because teachers entered and left study schools at various points during the 3 years of program implementation, a teacher could experience 1, 2, or 3 years of professional development, depending on their work history at the school. In addition, coaches were also accumulating experience in their new role as the program progressed. Assuming some development in coaches' expertise over time, the experience for a new teacher who arrived at a school in year 3 (i.e., the coach's third year in the role) might be quite different from what a new teacher might have experienced during the coach's first year in her role. These two factors—a teacher's history in the school and the coach's timeline in her own development—led us to consider six specific patterns of exposure to coaching, tabulated and represented visually in Table 1.

Because teachers' professional development experiences might vary across these six coaching exposure patterns, we sought to explicitly model this. We

Table 2. Final Model Fixed Effects for Three-Level Analysis of Coaching Exposure

	Coefficient	SE	t Ratio	p Value
Model for L1 intercept, π_{ojk} (adjusted number of coaching sessions per semester for teacher j in school k):				
Model for "Average Coaching"—the intercept, β_{ook} (adjusted number of coaching sessions per teacher in school k):				
Intercept, γ_{000}	.916	.133	11.561	.000
Average K–2 staff size, γ_{001}	−.579	.110	−5.255	.000
Perceived support for LC, γ_{002}	.152	.060	2.535	.026
LC's prior training, γ_{003}	.148	.057	2.592	.024
Teacher influence in school				
Decision making, γ_{004}	.101	.064	2.169	.042
Model for β_{o1k} (fixed effect of teacher role conception on π_{ojk}):				
Intercept, γ_{020}	.048	.021	2.243	.026
Model for β_{o2k} (fixed effect of teacher school commitment on π_{ojk}):				
Intercept, γ_{010}	.092	.024	3.799	.000
Model for β_{o3k} (fixed effect of more than 10 years prior teaching experience on π_{ojk}):				
Intercept, γ_{030}	−.099	.046	−2.129	.034
Model for L1 slope, π_{1jk} (average increment in number of coaching sessions for "T1C2" months for teacher j in school k):				
Model for intercept, β_{10k}:				
Intercept, γ_{100}	.117	.083	1.413	.158
Model for L1 slope, π_{2jk} (average increment in number of coaching sessions for "T1C3" months for teacher j in school k):				
Model for intercept, β_{20k}:				
Intercept, γ_{200}	.370	.080	4.617	.000
Model for L1 slope, π_{3jk} (average increment in number of coaching sessions for "T2C2" months for teacher j in school k)				
Model for Intercept, β_{30k}:				
Intercept, γ_{300}	.239	.043	5.550	.000
Model for L1 slope, π_{4jk} (average increment in number of coaching sessions for "T2C3" months for teacher j in school k):				
Model for intercept, β_{40k}:				
Intercept, γ_{400}	.482	.096	5.018	.000
Model for L1 slope, π_{5jk} (average increment in number of coaching sessions for "T3C3" months for teacher j in school k):				
Model for intercept, β_{50k}:				
Intercept, γ_{500}	.437	.045	9.681	.000

introduced five dummy variables into the level 1 model to capture the six patterns represented in Table 1. In so doing, we separated out any variation in the outcome due to different patterns of teacher entry and exit from variation due to other teacher- and school-level characteristics.

As reported in Table 2, the overall intercept, γ_{000}, is estimated to be 0.916. That is, the average number of coaching sessions per teacher per month is 0.916 sessions, after adjusting for the distribution of teachers across the six possible exposures to coaching patterns.[11] Since the first category, T1C1, is the reference group in the analysis, the TxCy coefficients on each of the five fixed effects

estimate the differences in amount of coaching that occurred in each T-C combination as compared to the T1C1 base period. For instance, the coefficient on T2C2, γ_{300}, is estimated to be 0.239 coaching sessions. This number indicates that teachers who were present at the onset of the program received on average 0.239 more coaching sessions per month in their second year than they received during their first year of coaching. Each of the five coefficients on T1C2 through T3C3 can be interpreted in this same way—that is, as additional coaching over the reference category T1C1. The fact that all of these coefficients are positive indicates that more coaching occurred over time as the initiative matured.

Notably, teachers new to the program in years 2 or 3 of implementation received more coaching than those who started LC in year 1. The coefficient on T1C2, γ_{100}, is 0.117, and the coefficient on T1C3, γ_{200}, increases to 0.370. This indicates that the amount of coaching received by new teachers increased over time as coaches gained more experience entering teachers' classrooms and the initiative became more firmly rooted in the schools' operations.

Teacher-level predictors (level 2 model). Recall from the conceptual framework that we hypothesized that teachers' (1) prior experience, (2) willingness to engage innovation, and (3) conception of their role relations with colleagues might influence their participation in coaching. We conducted exploratory analyses that considered each of the teacher-level predictors that were developed to measure these three constructs. Table 2 reports results from the final model, based on the subset of statistically significant predictors identified.

The first and most important predictor of variation at level 2 was the measure of *role conception* that captures each teacher's view of her responsibilities toward her colleagues ($\beta = 0.048$, $p = .026$). The positive coefficient associated with this predictor indicates that teachers who reported a positive prosocial orientation toward colleagues prior to the LC intervention ($+ 1.0$ standard deviation on this predictor) were likely to participate in 0.048 additional coaching sessions per month. This coefficient, when considered in the context of the overall adjusted mean of 0.916 sessions per month, represents a 5% increase in coaching for teachers with a *role conception* measure 1 standard deviation above average.

A second teacher-level measure, *school commitment*, also significantly predicted exposure to coaching ($\beta = 0.092$, $p = .000$). Even when comparing teachers with the same personal conception of their role relations with colleagues, teachers who initially reported higher levels of individual commitment to their school were likely to receive more coaching.

We also found a statistically significant association for teacher experience ($\beta = -0.099$, $p = .034$). Specifically, teachers who had more than 10 years of experience in teaching typically received about .1 fewer coaching sessions per month. Viewed against the overall adjusted mean of 0.916 sessions per month, this implies that teachers with over 10 years of experience received on average about 11% less coaching.

Taken together, these level 2 relationships provide empirical support for all three components of teacher agency detailed in the activity theory framework. That is, coaches worked more frequently with newer teachers (prior experience), and with teachers who were committed to the school (willingness to engage innovation) and had an active orientation toward their colleagues (role concep-

tion). When entered simultaneously into the model, these three explanatory variables accounted for 15.8% of the variance at level 2.

To illustrate the magnitude of the relationship between the three predictors and the amount of coaching received, consider two hypothetical teachers within the same school. The first teacher exhibits the three characteristics that, according to the final level 2 model, predict less coaching. In her survey reports, she is 1 standard deviation below the mean in terms of individual school commitment and her conceptions of her role relations vis-à-vis colleagues (i.e., more professionally passive than the average teacher), and has more than 10 years of prior teaching experience. The model predicts that this teacher will receive, on average, about 0.67 coaching sessions per month. In contrast, a teacher who is 1 standard deviation above the mean on her measures of school commitment and role vis-à-vis colleagues and has less than 10 years of experience is predicted to receive about 1.16 coaching sessions per month. This represents about a 75% increase in exposure to coaching—a substantial difference when compared to the teacher standard deviation below the mean.

School-level predictors (level 3 model). The activity theory framework also hypothesizes that effective teacher engagement with coaching depends, at the school level, on both the professional background that the coach brings to the work and on formal and informal aspects of the organizational context in which her work occurs. Paralleling our investigation at the teacher level, we conducted exploratory analyses at the school level for each of the corresponding coach- and school-level measures that we developed to indicate these constructs. In addition, given the descriptive findings introduced earlier, it is reasonable to expect that faculty size would account for a substantial part of the observed variability among schools in the amount of coaching each teacher received. For this reason, we consider school size as another important formal aspect of the organizational context.

Turning to the final model results, school staff size was the single most important predictor of differences among schools in average exposure to coaching (see Table 2). The estimated coefficient indicates that a 10-person increase in staff size predicts coaches offering 0.579 fewer coaching sessions per teacher per month ($p < .001$). In fact, introducing K–2 staff size into the model explained 55% of the variation across schools in the average amount of coaching taking place (see Table 3).

After controlling for school size, we also found that a literacy coach who reported above average levels of support for the LC in her school during the baseline year (i.e., 1 standard deviation above average on the *support for LC* measure) engaged in 0.152 more coaching sessions per teacher per month over the next 3 years.[12] This finding is consistent with the conceptual framework's discussion of how school leadership can influence the success of efforts to introduce innovations into a school.

In addition, more coaching occurred in schools where the faculty reported higher levels of *teacher influence over decision making*. A 1 standard deviation increase on this measure predicts 0.101 more coaching sessions per month, holding constant K–2 staff size and school support for the LC model. The teacher-influence measure corresponds with the portion of the conceptual framework that posits that the social control mechanisms over teachers' work should influ-

Table 3. Final Model Random Effects for Three-Level Analysis of Coaching Exposure

Random Effects	Variance Component	df	χ2	p value
Level 1 variance:				
Variation across semesters, e_{ijk}	3.537			
Level 2 variance (teachers within schools):				
Outcome for teacher j in school k, r_{ojk}	.052	229	446.34	.000
Level 3 variance (between schools):				
Average outcome in school k, u_{ook}	.036	12	93.102	.000

	Variance Component		Percent of Variance Explained
Model for L1 intercept, π_{ojk} (adjusted number of coaching sessions per semester for teacher j in school k):			
Unconditional Level 2 model	.060		–
Conditional models:			
Added teacher school commitment	.054		10.10
Added teacher role conception	.053		12.50
Added over 10 years of prior teaching experience	.051		15.20
Intercept, β_{ook} (adjusted number of coaching sessions per teacher in school k):			
Unconditional Level 3 model	.172		–
Conditional models:			
Added average K–2 staff size	.082		55.34
Added support for LC	.070		61.62
Added teacher influence in decisions	.054		70.55
Added coach's prior training	.036		80.53

ence reform engagement. This finding suggests vigorous reform implementation in schools where teachers have a voice about important professional decisions such as choosing their professional development strategies.

Finally, we have evidence that a coach's base level of expertise also matters. The coach's experiences in comprehensive literacy and in working as an adult educator, as captured by the measure called *LC prior training*, significantly predicted differences among schools in the average amount of coaching, net of effects associated with the other school-level factors described above. A coach with stronger prior professional preparation (plus 1 standard deviation) conducted 0.148 more coaching sessions per teacher per month.

Taken together, these four explanatory variables account for about 80% of the variation between schools in the amount of coaching actually implemented (see Table 3). Once these variables were included, we found no additional statistically significant associations. Neither *relational trust* nor *professional community* at the school level, nor any of the other indicators for coach background, added further predictive power to the model.

Summary and Conclusions

This article provides new evidence on the implementation of coach-based professional development. We documented the length, frequency, and distribution of coaching activities as actually practiced in 17 schools. Our descriptive results bring to light the wide variability among teachers in coaching participation both

within and between schools. We found that an average teacher working in a high-implementation school for five semesters received about 45 hours of one-to-one coaching, or almost two coaching sessions per month. This represents a substantial opportunity for teachers to work one on one with a more expert other when reflecting upon and changing their practice. For a variety of reasons related to individual teachers, contextual conditions, and temporally idiosyncratic factors, many teachers received less coaching in other schools.

This marked variability is especially noteworthy given the comparative maturity of the LC program (i.e., it had been operational for over 10 years when this study began), the detail of its program standards, and the intensive nature of its coach training and support. It is reasonable to expect that in other coaching initiatives, which tend to be less well specified than LC, even wider variation in actual practice might result. Subsequently, we delved into possible explanatory factors that might account for this variability in exposure to coaching. We introduced an activity theory framework to explore this phenomenon, developed an initial inventory of measures for key constructs, and presented a first round of empirical evidence for examining the utility of the framework.

Usefulness of the Conceptual Framework

Our analyses offer some empirical support for an activity theory framework for understanding teachers' engagement with school-based coaching. At the teacher level, we found statistically significant relationships for measures from the three major components hypothesized to influence teacher agency—role conception, willingness to engage innovation, and prior professional experience. Our findings corroborate observations made in other coaching research. Neufeld and Roper (2003) concluded that it was crucial that teachers be willing to try a new approach to professional development and commit to the school's improvement strategy. This is consistent with the results of the current study, which identifies school commitment as a key variable. Our results are also consistent with Poglinco et al. (2003), who documented contextual hindrances to coaching, including teacher resistance to new practices.

We also found some empirical support for the framework as an explanatory device at the coach/school level. Admittedly our evidence here is more limited, as the study was conducted in a relatively small sample of 17 schools. Nonetheless, we were able to account for about 25% of the variability in coaching participation among these schools with measures based on the activity theory framework. For instance, more coaching occurred in schools where perceived leadership support for LC (i.e., formal leadership) was stronger at program onset. This finding mirrors Marsh, McCombs, and Lockwood (2008), who reported that limited principal support constrained coaching efforts in some Florida schools. More broadly, Carlisle and Berebitsky (2010) documented that communication among teachers, collaboration, and perceived support from school leaders supported coaching efforts. Their results, like ours, are consistent with the claim that a supportive school environment is key to teachers' active engagement in coaching. In addition, we also found that more coaching occurred in schools where teachers reported greater control over schoolwide decisions affecting their work (i.e., social control mechanisms). The latter result is consistent with Coburn

(2004), who linked a school's institutional environment to changes in teachers' practices. Once these characteristics of the coach and the school environment were taken into account in HLM analyses, we found no evidence that trust relations or professional community, measured during the baseline period, added any additional explanatory power.

Taking these results together, we conclude that the activity theory framework introduced in this article merits further consideration in subsequent studies of teacher engagement in school-based professional development. Other investigators may also find this framework of some value in analyzing teacher participation in school-based instructional interventions more generally.

The Important Role of Faculty Size

Over half of the variation in coaching among schools was accounted for by school size. This finding has important policy implications for the design of future coaching initiatives. By way of background, LC suggests one coach for up to 12 teachers to achieve a strong implementation. While many of the 17 schools cluster around this standard, both substantially smaller and larger K–2 faculties existed in the study sample. Not surprisingly, the demands on a literacy coach who works with only five teachers are substantially different than the demands on a coach who must attend to 25 teachers. While the latter coach may actually conduct more coaching sessions overall in order to reach more teachers, she may simultaneously conduct fewer sessions per teacher than coaches working in smaller schools. Indeed, we found in this study that coaches in schools with larger faculties conducted a greater total number of coaching sessions, but the amount of individual teacher exposure to professional development was less.

It is also important to keep in mind when interpreting our results that LC coaches are expected to carry out the staff-developer aspects of their role only half time; coaches also continue to teach children half time throughout the school year. Clearly, this fact, in conjunction with faculty size, places a hard constraint on how much coaching any one teacher is likely to receive. The combination of faculty size and the fixed amount of time in a coach's work schedule represents strong structural boundaries on how deeply any coaching initiative can reach into a school. Especially in schools with larger faculties, coaches must make strategic decisions about how to allocate their time and energy. Depending on the base normative environment operative in a school, coaches may choose to work with particular kinds of teachers and eschew others. For example a coach might opt to work with new, incoming teachers when existing, more senior faculty express hesitancy about opening up their classrooms to critical analysis.

Limitations

There are several limitations of the study worth noting. First, though the sample of students in this study resembles the national distribution in terms of race/ethnicity (KewalRamani, Gilbertson, Fox, & Provasnik, 2007), it is not as demographically diverse as schools typically found in disadvantaged urban settings. This may limit our ability to generalize findings to schools with especially

high percentages of minority students. Recall also that the sample of schools was not randomly selected; instead these schools expressed some interest in LC and in receiving financial support for implementing the program. In this case, our results most likely generalize to the kind of schools that willingly adopt a new school intervention approach.

In addition, a notable limitation of this study is the modest sample size at the school level ($N = 17$). Though we have rich quantitative data on each school, the limited degrees of freedom restricts our ability to simultaneously test the full range of socio-organizational dynamics that may be at work. For this reason, it was important to use the conceptual framework to delineate a discrete number of hypotheses to consider at the school level. As noted, not all elements of the conceptual framework proved significant in our final HLM model. However, given the relatively small sample of schools, and therefore relatively low power to detect school context effects, we caution against drawing inferences from these null findings.

Implications for Future Research on Coaching

Despite these limitations, it seems clear that instructional reform initiatives based on coaching are complex and varied treatments that involve a multistep causal cascade from implementation of coaching to improving student learning. Articulating this logic and testing each step against empirical data are key to understanding how an intervention of this sort is actually implemented in schools and how this might subsequently lead to changes in teaching and student learning. Other research associated with the larger project seeks to build on the findings in this article to examine the impact of coaching on subsequent instructional practice and student learning (see Biancarosa et al., 2010; Hough & Bryk, 2010). We encourage more research to analyze the full causal cascade: the intentional design of professional development, actual implementation, changes in classroom practice, and ultimately improvements in student learning.

Finally, we wish to draw the reader's attention back to our findings about the instability of teaching assignments in our 17 study schools. Of the 249 teachers who were ever eligible to receive coaching at these schools, only 141—or about 57%—continued teaching in a K–2 classroom for all 3 years of LC implementation. This notable staffing churn surprised us.[13] The fact that teachers churned through their teaching assignments at such a high rate has important implications for interpreting research on efficacy of professional development initiatives. For example, studies that do not attend to how long teachers were actually present to experience a coaching intervention might incorrectly estimate overall program effects. More generally, since the effects of coaching attach to teachers, and presumably these effects move with them, significant impact could subsequently accrue for students in classrooms outside the study sample. A program could well be changing teachers' instructional practices and improving student learning, but absent sophisticated data systems for tracking teachers' actual exposure to coaching and where those teachers subsequently teach, much of this might go undetected.

Appendix A

Table A1. Detail on Sample Descriptives

	Student Demographics in Study Schools (%)					Teacher Demographics in Study Schools										
School	Low Income	African American	Latino	Other	White	Total No. K–2 Teachers	Mean Years of Experience	% New Teachers	% Present for 1 Year	% Present for 2 Years	% Present for 3 Years	% African American	% Latino	% Asian	% White	% Other
1	47	3	31	5	61	39	7.9	15	41	36	23	0	4	0	96	0
2	33	31	8	10	51	7	12.6	0	14	14	71	0	0	14	86	0
3	20	30	12	11	47	5	10.7	20	20	0	80	0	0	0	75	25
4	35	1	2	2	95	21	10.7	24	29	14	57	0	0	0	94	6
5	36	7	20	1	72	21	7.0	10	38	24	38	0	6	6	88	0
6	19	20	4	15	54	16	6.1	31	44	25	31	20	0	0	67	13
7	49	1	0	0	99	8	15.0	0	50	25	25	0	0	0	100	0
8	38	1	3	1	95	16	12.5	13	13	6	81	0	0	0	100	0
9	60	41	2	28	21	6	9.3	17	33	17	50	0	0	0	100	0
10	50	3	1	2	94	17	13.6	6	24	6	71	0	0	0	100	0
11	60	1	0	0	99	6	7.8	0	33	0	67	0	0	0	100	0
12	73	50	6	29	15	9	12.7	0	11	11	78	17	0	0	50	33
13	43	0	0	12	88	15	14.9	0	27	0	73	0	0	0	100	0
14	45	35	4	0	61	22	7.9	32	36	27	36	6	0	0	94	0
15	50	0	0	3	97	10	9.0	20	30	10	60	0	0	0	100	0
16	86	36	4	0	60	19	11.6	0	32	16	53	0	7	0	93	0
17	38	4	2	3	91	12	9.5	25	17	83	0	0	0	0	88	13
Overall	46	16	6	7	71	249	10.1	14	30	18	52	3	2	1	91	4

Appendix B

Psychometric Details for Selected Measures in Final Models

All of the measures used in this study were developed through Rasch rating scale analyses (Wright and Masters, 1982). Several were drawn from measures previously developed and validated by the Consortium on Chicago School Research. For these, we used the anchored calibrations provided by the Consortium to generate measures for each case.

For more details on the Consortium measures see http://www.ccsr.uchicago.edu/publications/measures_in_organizing_schools.pdf. In addition, we undertook original Rasch rating scale analyses for the new measures developed as part of this study. For these measures, we also present infit statistics as well as item difficulty calibrations. The rating scale reliability statistics are akin to a Cronbach's alpha and formally reduce to that when scale items are dichotomous.

1. Teacher-Level Measures

Measure name: Orientation toward engaging innovation
Source: Original measure
Person reliability: .79

Please mark extent to which you disagree or agree with the following (strongly disagree, disagree, agree, strongly agree):	Item Difficulty	Infit
I prefer to rely on the "tried and true methods" that have worked for me.	1.4	1.2
I am usually one of the first people at my school to try new practices.	1.01	1.15
I prefer to wait and see how other teachers respond to a new program before I am willing to try something new.	.8	.85
I like to help spread the word in my school about new ideas and practices that I think are worthwhile.	.14	1.03
I prefer not to work with a new idea or practice unless my principal lets me know it's expected.	−.49	.72
I am not especially inclined toward using "new ideas."	−.57	.99
I am willing to take a risk with a new instructional practice, if I think it might help my students learn.	−2.3	.95

Measure name: Role conception (role vis-à-vis colleagues [influence])
Source: Original measure
Person reliability: .79

Please mark the extent to which you disagree or agree (strongly disagree, disagree, agree, strongly agree):	Item Difficulty	Infit
When one of my colleagues experiences instructional difficulties in the classroom · · ·: I generally feel that I shouldn't get involved.	1.5	.8
I feel a professional responsibility to initiate contact that might help my colleague improve.	.02	.92
I think it is the role of the principal or someone else in a leadership position to address the problem.	−.45	1.13
I feel I should offer suggestions only if my colleagues ask for help first.	−1.08	1.03

Teacher-Level Measures Used Available on CCSR Web Site:

School Commitment

2. School- or Coach-Level Measures
Measure name: Perceived support for Literacy Collaborative
Source: Original measure
School Reliability: .68

Please indicate the extent to which you disagree or agree with the following (strongly disagree, disagree, agree, strongly agree):	Item Difficulty	Infit
In thinking about my upcoming work as a Literacy Coordinator, I expect that:		
I will have sufficient time to do this work well.	4.95	1.24
A number of teachers will be resistant to the instructional practices advocated by the Literacy Collaborative.	1.89	1.18
Most teachers will be interested in learning about Literacy Collaborative practices and trying them out in their classrooms.	−.37	1.01
I will have sufficient support from the Literacy Collaborative to do this work well.	−2.54	.57
Our participation in the Literacy Collaborative will really improve student learning at my school.	−3.55	1.26
My principal will strongly support the Literacy Collaborative initiative.	−3.55	1.26

School and Coach Measures Used, Available on CCSR Web Site:
(1) Teacher influence in school decision making, (2) Teacher-teacher trust, (3) Extent of principal-teacher Trust, (4) Reflective dialogue among teachers, (5) Collective responsibility for student learning, (6) Collaboration among teachers around instruction.

Notes

   1. Several other papers have investigated the conditions, predispositions, and training support that foster the development of effective school-based coaches. For additional information on this topic, see Allen (2006), Casey (2006), and Stein, Smith, and Silver (1999).

   2. For an excellent conceptual and empirical account on these points in the context of technology use in schools, see Zhao and Frank (2003).

   3. For a detailed account of school context effects on efforts to improve reading instruction, see Coburn (2004).

   4. For an overview of the estimation procedures used to create the measures in the current study, see Wright and Masters (1982). More detailed information regarding the survey measures drawn from the Consortium on Chicago School research can be found at http://www.ccsr.uchicago.edu/publications/measures_in_organizing_schools.pdf.

   5. We considered other possible ways of grouping the years of experience or transforming the data into a more linear version of years; however, given the distribution of teachers across the options provided in the survey (1 year or less, 2–3 years, 4–5 years, 6–10 years, 11–15 years, more than 15 years), grouping them into a simpler indicator variable (less or more than 10 years) seemed most appropriate.

   6. While there is some variation in the length of individual coaching sessions, comparative analyses using the number of hours of one-to-one coaching a teacher received as the outcome variable yielded findings fully consistent with those reported here. Because coaching programs do not typically describe results in terms of minutes and hours, we chose to report our findings in terms of their descriptive metric of number of sessions.

7. We note that documenting coaching is considered a regular professional responsibility for an LC coach. During their training year, coaches are trained by LC to keep records of both their group activities and one-to-one coaching sessions. As a result, the online logs were a natural extension of the coach's LC responsibilities. In general, we found that most coaches maintained their online records without prompting. As a safeguard, the research team regularly monitored these reports month by month to ensure continuous and reliable recording. Any problems were referred to LC staff, who subsequently contacted the coach at the respective site. In addition, research staff conducted end-of-year interviews with each coach where the professional development activities reported in the logs were discussed.

8. The school-based start-up of the LC program were challenging first months for novice coaches. In addition, the coaches in our study also functioned as local site coordinators for data collection for the larger project. Conscious of the collected burden imposed by project data-collection procedures, we phased in these responsibilities over time. Specifically, we did not ask coaches to complete online work logs during their first semester start-up of the LC professional program.

9. While it may at first seem more intuitive to report the number of coaching sessions per semester rather than per month, we choose to use the time increment of months because examining coaching sessions per semester masks notable periodicity across months within the school year.

10. We especially took notice of the 29 teachers who received no coaching, even when present and eligible for this activity. Indeed, 15 of these 29 teachers worked at Clairborn Elementary, the largest school in the study, with 24 K–2 classrooms. The unusually high work load for the coach at Clairborn was further compounded by the relatively high teacher turnover at this school. Some 55 different teachers cycled through the 24 primary classrooms during the course of our study. In fact, 8 of the 15 Clairborn teachers who never received coaching entered and then left the school before the coach ever engaged them. The remaining 14 non-Clairborn teachers who received no coaching were spread relatively evenly across seven other schools in the sample.

11. Note that this estimated intercept comes from the final model, which includes predictors at levels 2 and 3. These predictors are discussed in subsequent sections of the article; however, the reader should be aware that 0.916 coaching sessions is estimated for a hypothetical school with average values of the other school predictors, since all of the measures are centered. This variable centering and the inclusion of teacher- and school-level predictors accounts for the discrepancy between the simple average number of coaching sessions per month (.79) reported previously in the descriptive section of the article and the final model intercept reported here (.916 sessions per month).

12. This estimate, γ_{003}, of the partial regression coefficient is in Table 3 of the fixed effects from the final level 3 model. γ_{003} can be interpreted in the following way: 1 standard deviation difference in the measure *support for LC* is associated, on average, with a 0.152 positive difference in the amount of coaching each teacher receives in school *k* per month, holding constant the schools' average K–2 staff size and the other significant predictor in the model for β_{00k}, the coach's school commitment, and teacher-perceived influence at the school.

13. We documented every classroom transition that occurred during the course of the study. We found no evidence that these changes in classroom assignment were caused in any way by the LC program. Rather, a mix of factors seem to be at work including medical leaves, staff reassignments to fill other pressing needs in the schools, and teacher turnover among schools and out of the profession. We have every reason to believe that these data reflect normally occurring events routinely seen in many schools.

References

Allen, J. (2006). *Becoming a literacy leader: Supporting learning and change.* Portland, ME: Stenhouse.

Barton, R., & Lavrakas, J. (2006). Finding gold at the end of the rainbow: Anchorage's investment in literacy coaching pays big dividends. *Northwest Regional Education Laboratory*, **12**(1), 6–11.

Bean, R. M., & Carroll, K. E. (2006). The literacy coach as a catalyst for change. In C. Cummins (Ed.), *Understanding and implementing Reading First initiatives: The changing role of administrators.* Newark, DE: International Reading Association.

Biancarosa, G., Bryk, A. S., & Dexter, E. (2010). Assessing the value-added effects of literacy collaborative professional development on student learning. *Elementary School Journal*, **111**, 7–34.

Bidwell, C. (1965). The school as formal organization. In J. G. March (Ed.), *Handbook of organizations.* Chicago: Rand McNally.

Bryk, A., Gomez, L., Joseph, D., Pinkard, N., Rosen, L., & Walker, L. (2006). *Activity theory framework for the information infrastructure system*. Working paper, Information Infrastructure System Project at the Center for Urban School Improvement, Chicago.

Bryk, A. S., & Schneider, B. L. (2002). *Trust in schools: A core resource for improvement.* New York: Russell Sage.

Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2009). *Organizing schools for improvement: Lessons from Chicago.* Chicago: University of Chicago Press.

Carlisle, J., & Berebitsky, D. (2010). Literacy coaching as a component of professional development. *Reading and Writing*, **24**, 1–28.

Casey, K. (2006). *Literacy coaching: The essentials.* Portsmouth, NH: Heinemann.

Clay, M. (1979). *Reading: The patterning of complex behavior* (2nd ed.). Portsmouth, NH: Heinemann.

Clay, M. (2004). *Change over time in literacy learning.* Auckland, New Zealand: Heinemann.

Coburn, C. (2004). Beyond decoupling: Rethinking the relationship between the institutional environment and the classroom. *Sociology of Education*, **77**, 211–244.

Cole, M., & Engeström, Y. (1993). A cultural-historical approach to distributed cognition. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 1–46). New York: Cambridge University Press.

Darling-Hammond, L., & McLaughlin, M. W. (1996). Policies that support professional development in an era of reform. *Phi Delta Kappan*, **76**(8), 597–604.

Eccles, J. S. (2002). Motivational beliefs, values and goals. *Annual Review of Psychology*, **53**, 109–132.

Elmore, R. F., & Burney, D. (1997). *Investing in teacher learning: Staff development and instructional improvement in community District #2.* New York: National Commission on Teaching and America's Future and Consortium for Policy Research in Education.

Engeström, Y. (1987). *Learning by expanding.* Helsinki: Orienta-konsultit.

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R. Punamaki (Eds.), *Perspectives on activity theory* (pp. 19–38). Cambridge: Cambridge University Press.

Fountas, I. C., & Pinnell, G. S. (1996). *Guided reading: Good first teaching for all children.* Portsmouth, NH: Heinemann.

Fountas, I., & Pinnell, G. (2001). *Guiding readers and writers grades 3–6: Teaching comprehension, genre, and content literacy.* Portsmouth, NH: Heinemann.

Fountas, I. C., & Pinnell, G. S. (2006). *Teaching for comprehending and fluency: Thinking, talking, and writing about reading, K–8.* Portsmouth, NH: Heinemann.

Frank, K. A., Zhao, Y., & Borman, K. (2004). Social capital and the diffusion of innovations within organizations: Application to the implementation of computer technology in schools. *Sociology of Education*, **77**, 148–171.

Fuhrman, S. H., & Elmore, R. F. (1990). Understanding local control in the wake of state education reform. *Educational Evaluation and Policy Analysis*, **12**(1), 82–96.

Gibson, S. (2006). Lesson observation and feedback: The practice of an expert reading coach. *Reading Research and Instruction*, **45**, 295–318.

Hough, H. J., & Bryk, A. S. (2010). *The effects of literacy coaching on teacher practices.* Paper presented at the American Educational Research Association, Denver.

International Reading Association. (2004). *The role and qualifications of the reading coach in the United States.* Newark, DE: Author.

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

KewalRamani, A., Gilbertson, L., Fox, M., & Provasnik, S. (2007). *Status and trends in the education of racial and ethnic minorities* (NCES 2007-039), National Center for Education Statistics, In-

stitute of Education Sciences, U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Kruse, S., Louis, K. S., & Bryk, A. (1995, Spring). Building professional community in schools. *Issues in Change*, **6**, 3–6.

Leontjev, A. N. (1974). The problem of activity in the history of Soviet psychology. *Soviet Psychology*, **27**(1), 22–39.

Leontjev, A. N. (1978). *Activity, consciousness and personality*. Englewood Cliffs, NJ: Prentice-Hall.

Leontjev, A. N. (1981). *Problems of the development of the mind*. Moscow: Progress.

Literacy Collaborative Trademark Committee. (2006). *Literacy Collaborative standards*. Retrieved from http://literacycollaborative.org/docs/LCstandards6_2k6.pdf

Lortie, D. C. (1975). *Schoolteacher*. Chicago: University of Chicago Press.

Marsh, J., McCombs, J., & Lockwood, J. (2008). *Supporting literacy across the sunshine state: A study of Florida middle school reading coaches*. Santa Monica, CA: Rand.

McLaughlin, M. W., & Talbert, J. E. (2001). *Professional communities and the work of high school teaching*. Chicago: University of Chicago Press.

Meyer, J. W., & Rowan, B. (1978). The structure of educational organizations. In J. W. Meyer (Ed.), *Environments and organizations: Theoretical and empirical perspectives* (pp. 78–109). San Francisco: Jossey-Bass.

Neufeld, B., & Roper, D. (2003). *Coaching: A strategy for developing instructional capacity*. Cambridge, MA: Education Matters.

Newmann, F. M., Marks, H. M., & Gamoran, A. (1996). Authentic pedagogy and student performance. *American Journal of Education*, **104**(4), 280–312.

Norlander-Case, K. A. (1999). *The professional teacher: The preparation and nurturance of the reflective practitioner.* San Francisco: Jossey-Bass.

Norton, J. (2007). Adding layers of support: Alabama's program helps site-based coaches succeed. *National Staff Development Council*, **28**, 20–25.

Poglinco, S., Bach, A., Hovde, K., Rosenblum, S., Saunders, M., & Supovitz, J. (2003). *The heart of the matter: The coaching model in America*. Retrieved from http://www.cpre.org/images/stories/cpre_pdfs/AC-06.pdf

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rowan, B. (1990). Commitment and control: Alternative strategies for the organizational design of schools. In C. B. Cazden (Ed.), *Review of research in education* (Vol. **16**). Washington, DC: American Educational Research Association.

Showers, B., & Joyce, B. (1996, March). The evolution of peer coaching. *Educational Leadership*, 12–16.

Stein, M. K., Smith, M. S., & Silver, E. A. (1999). The development of professional developers: Learning to assist teachers in new settings in new ways. *Harvard Educational Review*, **69**(3), 237–270.

Walpole, S., & McKenna, M. C. (2004). *The literacy coach's handbook: A guide to research-based practice.* New York: Guilford.

Weick, K. E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly*, **21**(1), 1–19.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

Wright, B. D., & Masters, G. N. (1982). *Rating scale analysis*. Chicago: Mesa.

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, **40**(4), 807–840.