

**Measuring Change in the Practice of Teachers Engaged in Literacy
Collaborative Professional Development:**

Preliminary Results from a Four Year Study

Heather J. Hough, Stanford University
Anthony Bryk, Stanford University
Gay Su Pinnell, The Ohio State University
David Kerbow, University of Chicago
Irene Fountas, Lesley University
Pat Scharer, The Ohio State University

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Abstract

Couched within a larger study investigating the effectiveness of the Literacy Collaborative (LC), this paper uses two years of data on coaches' activities and measures of teachers' practice to examine: 1) the amount that teachers changed their practices as a result of school-based professional development, 2) the degree of variation in teacher change within and across the schools, and 3) whether this variation was associated with differential exposure to coaching, background characteristics of individual teachers, and the school context. Three- and four-level hierarchical linear models are used to analyze longitudinal data from teachers nested within schools. We find that teachers' professional background and dispositions play an important role in their uptake of the LC intervention. Furthermore, after controlling for teacher characteristics, the amount of LC coaching and the degree of school-wide coverage appear related to increases in both how well and how often teachers implement the LC framework.

We examine in this paper evidence of changes in teacher practice in response to a specific professional development and coaching model, Literacy Collaborative (LC), and how these modifications in practice are related to teacher and school characteristics. This paper derives from a larger study that seeks to assess the effectiveness of the LC program, and to develop and field test the efficacy of adding Web-based collaborative learning tools to improve this work. This larger investigation involves a four-year field trial currently being carried out in 18 public elementary schools with significant proportions of African-American, Latino, and low-income students.

Background on Literacy Collaborative Coaching to Improve Classroom Instruction

The program at the center of this study, the Literacy Collaborative, has been used in over 700 elementary schools in 200 districts across 26 states. Its cornerstone is long-term professional development by an onsite coach. LC is committed to the idea that teachers need both training in particular approaches and procedures and the opportunity to reflect on their teaching and to talk about their observations of children with a “more expert” other who can support their development of the kinds of deep understandings they need to continue to improve their practice. In LC, literacy coordinators (or coaches) are trained over the course of a year while still teaching in their schools. Their professional development promotes a thorough understanding of literacy theory and content, expertise in implementing the LC instructional model, and experience in supporting adult learners’ development. After the training year, the literacy coaches continue to teach students half-time and assume full responsibility for providing a range of school-based professional development opportunities, including whole-school professional development, study groups, and one-on-one coaching.

These professional development activities are in turn grounded in a literacy instructional framework that builds on 30 years of research and development grounded in the reading theories of Marie Clay (1979; 2001; 2004) and elaborated by Fountas and Pinnell (1996; 2001; 2006). Central to the LC professional development model is engaging students at all ability levels in reading and writing processes, with explicit instruction and guidance from teachers. The LC program has been developed at two levels, K-2 and 3-6 with the K-2 program the primary focus of this study.

Six basic instructional components form the comprehensive literacy framework for kindergarten through grade 2:

1. *Interactive read-aloud (usually whole-class instruction)*. Teachers read aloud to students an array of texts that are carefully selected to help students think in various ways about texts. The teacher uses intentional conversation (conversational moves directed toward a goal of instruction) and also promotes routines such as “turn and talk” to help children learn how to talk with each other about texts. The opportunity to engage in “text talk” is rich (Beck & McKeown, 2001). The teacher is decoding the words of the text by reading it aloud, but in every other way, young students are processing it and expanding their understanding through talk that is grounded in texts (Fountas & Pinnell, 2006).

2. *Shared reading (whole-class or small-group instruction)*. In shared reading, the teacher and children read from a common text. Usually, the text is read several times. Group support helps students to process more difficult texts than they could read independently, although it is still important to match the complexity of the text to the group. Using this familiar text, the teacher makes appropriate teaching points that extend children’s understanding of the reading process (McCarrier, Pinnell, & Fountas, 2000).

3. *Guided Reading (small group instruction)*. Students are grouped together based on similarities in their reading development at a point in time. The teacher selects a text appropriate for the group, introduces it in a way that assists students to read it effectively, supports individuals during reading as needed, and invites students to discuss it afterward. The teacher makes strategic teaching points directed toward key aspects of the reading process. The teacher may use the option to do some very specific work with phonics or word recognition or to extend thinking through writing about reading (Fountas and Pinnell, 1996).

4. *Interactive writing (whole-class or small-group instruction)*. Children fully participate in the writing process during this activity (McCarrier, Pinnell, & Fountas, 2000). The teacher and children collaboratively compose a text and then write it word by word on a large chart. At several carefully selected points, the teacher invites individual children to come up to the chart and make contributions by adding letters or words. These occasions have high instructional value in helping children learn the construction of words (phonics) as well as important aspects of the writing process.

5. *Writing workshop (whole-class and individual)*. The teacher provides a mini-lesson on some aspect of writing, then students write independently as individuals confer with the teacher. At the end of the session, there is a brief sharing period during which the teacher can reinforce the mini-lesson principle and invite writer-to-writer feedback. Students write daily, applying critical principles to their own production of writing in a range of genres.

6. *Word study (whole class)*. The teacher provides a mini-lesson on phonics and students apply the principle independently. While phonics and word study are embedded in all the previously described contexts, here the instruction is preplanned, direct, and explicit. The

emphasis is to teach directly important principles related to how words work and/or the rules of English spelling (Pinnell & Fountas, 1998).

The reading and writing activities described above constitute a repertoire of practices that teachers weave together based on their pedagogical knowledge and their observation of children. Each approach has particular purposes and must be examined as an instructional context. Effective instruction, according to the Literacy Collaborative, also requires skillful orchestration across these contexts in order to advance effectively students literacy learning.

An Activity Theory Framework to Guide Our Inquiry

In principle, the success of interventions such as the Literacy Collaborative depend on a host of factors including the technical quality and frequency of professional development initiated by a school-based coach, the prior professional experiences and dispositions of teachers, the normative character of the relationships among the professional staff, and especially the new, emerging relationships around the role of a literacy coach. We have found it useful to conceptualize these sources of variation in the LC intervention through an activity theory framework. We highlight below the basic elements in this framework. For a more detailed discussion see Bryk, Gomez, Joseph, Pinkard, Rosen & Walker, 2006.

In general, activity theory argues that all human activity is fundamentally social and is shaped by the tools and sign systems whose use and meaning are the product of social and cultural processes (Cole and Engestrom, 1993; Engestrom, 1999; Leont'ev, 1974, 1978; Nardi, 2002). In the context of professional development interventions in schooling, the framework directs our attention to how the instructional artifacts of the school and classroom shape individuals' intentions, through the actions that they enable and constrain and through the assumptions they embody. Key for us, the framework links the problem of changing individual

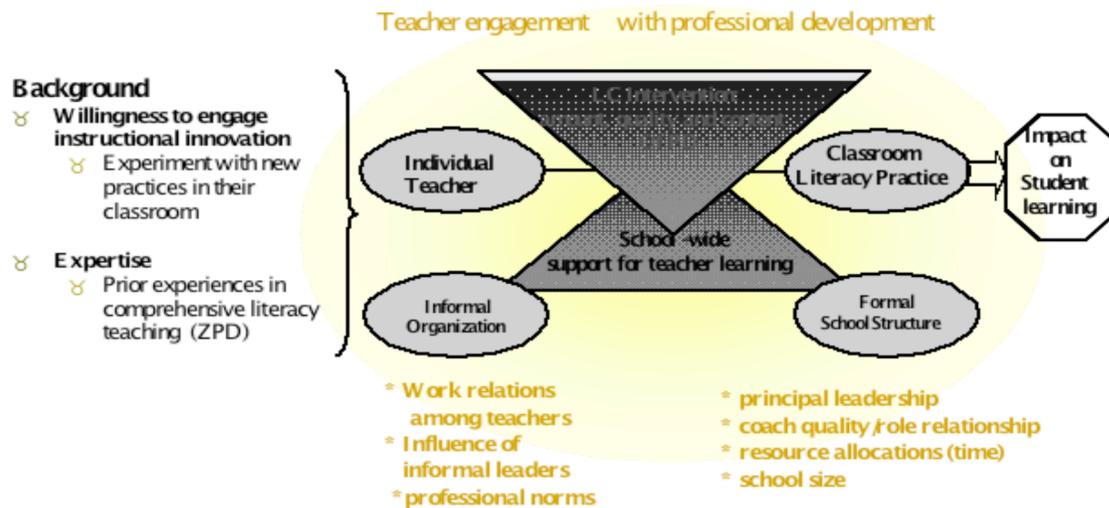
teacher practice with a focus on how core aspects of the social organization of schools influence innovation take-up and diffusion.

For many teachers, the Literacy Collaborative program represents a profound intervention into their work. It seeks to change the basic materials, procedures and social routines of instruction and even more fundamental, poses a challenge to basic normative conceptions about how teachers think about their work and relations to colleagues. Our application of activity theory focuses on how both individual and organizational factors may influence teachers as they consider use of a new instructional framework in their classrooms. Specifically, the framework draws attention to three core elements that we posit contribute to varying levels of individual teacher change:

- The intentional activity being undertaken by coaches to improve teaching and ultimately student learning;
- The different knowledge, skills and dispositions that individual teachers and coaches may bring to their work; and
- Key normative and structural aspects in the organization of schools.

Figure 1 illustrates this framework in the context of LC implementation

Figure 1. Examining teachers' take up and use of Literacy Collaborative professional development



Teacher Characteristics and Experiences

Each teacher brings her own ensemble of beliefs, professional background and dispositions to her work which will influence her take-up of any new instructional framework. It is well established in the general literature of innovation diffusion, for example, that individuals vary substantially in their willingness to take on new practices. (For a review of these findings see Rogers, 2003). Since the comprehensive literacy instructional may represent an entirely new pedagogical approach for the individuals involved, we hypothesize that a teacher's general *orientation toward innovation* (e.g. being an early versus a late adopter) will pre-dispose some teachers to participate more readily in Literacy Collaborative professional development.

Similarly, a teacher's *prior experience with comprehensive literacy* may come into play as well. The actual mechanics affecting individual participation, however, may be highly nuanced. Building on observations reported in Coburn's study of changes in teachers' literacy

practices (2004), we hypothesize that a zone of proximal development is at work here. The professional development objectives being introduced by the coach must be seem ambitious but also attainable by teachers and variability in individual teacher discernments are likely to occur here. For example, some new instructional practices may appear too foreign for some teachers, and as a result be simply be rejected out of hand. In contrast, other teachers may already have considerable prior experience in comprehensive literacy instruction, and a novice coach may have little capacity to add value. By tacit mutual agreement, the coach may choose to focus her attention elsewhere. As a result, we would again expect little program engagement and few change in instructional practice to be observed here. On the other hand, a relative novice teacher with aspirations for ambitious classroom practice may be maximally disposed to engage and use the services of school-based coach. Under these circumstances, substantial instructional change seems likely.

Coach Characteristics and Experiences

A teacher's exposure to LC comes primarily through the efforts of a school-based coach, whose own personal dispositions and previous experiences also influence how these relational dynamics unfold. We hypothesize that a similar set of individual background factors shape how their coaching role unfolds over time. In addition to their general orientation toward innovation and prior expertise in comprehensive literacy instruction, a coach's prior *experience in the role of an adult educator* is also likely to be a significant consideration. Individuals with prior experiences teaching other adults are more likely to engage readily in the coaching role envisioned by the Literacy Collaborative. This follows directly from the fact that the work of coaching makes demands on both one's expertise in teaching children and on facility in working with other adults on improving their practice.

Also entailed in the work of an LC coach is a new form of role relations with colleagues where coaches actively seek out to engage their fellow teachers in the improvement of practice. This work responsibility represents a fundamental challenge to traditional norms of egalitarianism and autonomy where teachers may offer help to colleagues but only when specifically requested by another (Lortie, 1975). We hypothesize that coaches will vary in their pre-disposition to take on such a “counter-cultural” role vis a vis school colleagues.

The Influence of School Organizational Context

The individual agency of both coaches and teachers, as discussed above, may operate quite differently depending on the particularities of school context. Four key elements interact here.

Formal leadership. Key in this regard is school leadership priorities and how these align with introducing the Literacy Collaborative initiative. For example, it seems reasonable to expect that the LC program will be more actively engaged in schools where the principal is strongly supportive. This support may manifest itself in variety of instrumental ways, such as principals allocate discretionary resources to support the program, creating extra time for the professional development activities to occur, and nurturing a “safe zone” for teachers’ experimentation with these new practices in their classrooms.¹ At a more symbolic level, supportive principals may also use the myriad of formal and informal interactions that they have with teachers to express support and encourage participation.²

¹ For an excellent conceptual and empirical account on these points in the context of technology use in schools see Yong Zhao & Kenneth A. Frank, “Factors Affecting Tech Use in Schools,” *American Educational Research Journal* 40, no. 4 (Winter 2003).

² For a detailed account of school context effects on efforts to improve reading instruction, see Cynthia E. Coburn, “Beyond Decoupling: Rethinking the Relationship Between the Institutional Environment and the Classroom,” *Sociology of Education* 77, no. 3 (July 2004) 211- 244.

Social control mechanisms over teachers' work. The instruction at the heart of the Literacy Collaborative requires teachers to be problem-solvers and to have access to knowledge that can support them in this activity. It relies on networks of human relationships that not only develop professional knowledge, but also make it possible for peers to agree on and hold each other accountable to common standards of practice. As such, the introduction of the LC initiative depends on the base social mechanisms controlling teachers' instructional work at the onset of the initiative and also seeks to influence subsequent development in these mechanisms over time.

In general, these mechanisms can vary from loose coupling (Bidwell, 1965) to the much tighter controls of bureaucracy or professional community (Rowan, 1990). Given the nature of LC, we posit that a base state of professional community, in which instruction is understood to be complex and dependent on collaborative problem solving and continuous learning by teachers (Elmore and Burney, 1997; Louis & Kruse, 1995; Newmann and Associates, 1996), is more likely to nurture the development and broad take up of the complex teaching practice envisioned in the Literacy Collaborative model. In contrast, more varied, idiosyncratic use is likely in schools where loose coupling predominates.

Relational trust across the informal social organization. Mutual vulnerability is a fundamental characteristic of adult work in schools. Classroom teachers, for example, remain dependent on diverse others—teacher colleagues, the school principal and parents—in order to achieve efficacy in their teaching endeavors (Bryk and Schneider, 2003). A higher base level of relational trust among faculty, with their principal, and emergent 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 the Literacy Collaborative professional development.

Organizational norms. Such norms shape how individuals think about and act on their roles and responsibilities within an organization. At the heart of the LC initiative is an idea of developing expertise in instruction (Bryk et al., 2008). In principle, such expertise legitimates the role of a coach, but this is only the case when expertise is publicly acknowledged and valued within that school community.

The prevailing norm of egalitarianism typically found in the loosely-coupled school can undermine an LC initiative. Under this norm, status tends to be accorded based on seniority and loyalty to superiors rather than expertise per se (Lortie, 1975). Not surprisingly, the formally developed expertise in the new role of the literacy coordinator may not fare well here.

Along a related line, in the loosely coupled school, teachers 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 school-wide collective action within a common instructional system and supported by mutual accountability. Consequently, schools where a norm of classroom autonomy predominates may delimit a coach's capacity to enact the professional development role envisioned by the Literacy Collaborative.

Contextual factors interacting. Implementation of the Literacy Collaborative represents an organized complexity (Simon, 1996) in that the various school organizational features and individual characteristics detailed above interact with one another to shape level and success of program implementation. These interactions influence how this new professional development activity enters the school and the pattern of local adaptation, if any. We hypothesize that each element at both the individual and organizational levels represents a potentially critical consideration in the role enactment of literacy coaches and how (if) teachers respond to the

professional development opportunities that they in turn create. Over the longer term, all of these individual and organizational features may be subject to impact by the LC program as well.

Investigating the Effect of the Literacy Collaborative Professional Development on Teacher Practice

The focus of this paper is to examine teacher practice in the context of the comprehensive literacy instruction framework supported by LC. We are interested in both how often teachers implement the LC framework, teachers' expertise development in these practices over the course of the study, and the final state of teachers' practices at the end. The key predictor of interest is exposure to professional development (PD) and how this may interact with the core individual and organizational features described above. This work will help inform subsequent analyses examining the actual work of coaching in schools and the effects of changes in teacher practice on student outcomes.

Background on the Larger Study

The analyses reported on in this paper are based on data from a four-year study in 18 schools across eight states in the eastern half of the US. Approximately 70 teachers at each grade level (K-2) are participating in the study. In the sample schools, about forty percent of the students are low income, 15.5% are African American, 6.9% are Latino/a, 4.3% are Asian, 0.5% are Native American and the remaining 72.8% are white. Four percent are designated as limited English proficient and these are clustered primarily in 3 schools. The schools were originally selected as carefully matched pairs, with one school from each pair randomly assigned to receive training on and access to supplemental Professional Development Support System (PDS2), which was designed to support coaches in fostering teacher reflection through analysis and discussion of video-cases, both online and in face-to-face sessions. This embedded randomized trial is not of focus in this report.

During the first year of the study (2004-2005), coaches were trained in the LC model but no school-based professional development activity was yet initiated by them. Thus, year one serves as a baseline or “no treatment,” period in an accelerated multi-cohort longitudinal quasi-experiment design. (For full details on this design see Biancarosa, Bryk and Dexter, 2008) In years two through four, literacy coordinators implemented LC professional development activities in their respective schools. The focus of this report is on data collected during the first and second year of program implementation. (We have just completed data collection on the third and final year of implementation which will be the focus of a subsequent report.) We sought to capture information about the individual teacher and coach characteristics, school organizational features, and coaching activities; each will be discussed below. (Additional data were collected to measure student achievement and the use of the online profession development tool; these data are not presented in this paper.)

Measuring Individual and School Characteristics and Exposure to Professional Development

As discussed in the activity framework above, the mechanism through which teachers implement the LC framework, and thus improve their practice, involves complex social processes depending upon both individual and school-level factors. To capture data on these different elements, prior to program start-up, teachers were surveyed regarding their: 1) prior professional background, 2) prior literacy training, 3) teaching experience, 4) professional dispositions, including orientation toward change in instructional practices and commitments to their school, and 6) base literacy practices at the beginning of the study. We also asked teachers to tell us about their school, and created aggregated measures on each school’s organizational context from these individual reports. These data, combined with information about student

demographics, tell us about individual, school, and student characteristics that might impact the effect of LC professional development and coaching on teacher practice.

In the analyses presented in this paper, the concept of teachers' *orientation toward innovation* is represented through two survey measures: 1) a scale composed of 7 items assessing a teacher's willingness to try new instructional strategies (EGINV), and 2) a scale composed of 4 items that examine a commitment to their current school (SCMT). Taken together, these two measures capture closely related considerations influencing a teachers orientation toward innovation within an LC school.

Teachers' *prior expertise* level was assessed through a single scale that inquired about their previous experiences in comprehensive literacy teaching (REFLIT). This measure consists of set of questions that asked about the base level of use of four specific instructional practices associated with comprehensive literacy.

To measure teachers' exposure to professional development, we asked coaches to complete monthly logs on our web site about their various professional development activities with individual teachers. From these web logs, we have created indicators of the number of hours of school-based professional development sessions each teacher attended and the number and content focus of individual coaching sessions. The teacher-level variable TAVEXP measures the amount of PD (workshops and one-on-one coaching) that each individual teacher receives. From these same data, we also created an aggregate school-wide variable (PPDAV) is the proportion of teachers in a school who participate in PD; this variable can also be seen as an omnibus indicator of a faculty's embrace of the LC initiative. Conceptually it represents both the average "treatment exposure" as well as this possible context effect, since an LC who is able to do a lot of coaching is doing at least in part because the school climate invites it.

We also collected extensive background data as each of the coaches took up their new role. In addition to completing the same baseline survey as teachers, coaches answered additional survey questions about their professional background, the training provided by the LC, the base support for the Literacy Collaborative program at their school, and how they viewed the new activities they were about to undertake. Supplementing this were individual interviews with each coach where we sought to gather more in-depth information about their training, their prior experiences as a literacy teacher and an adult educator, the potential challenges ahead as a novice in this new role of instructional coach, and the quality of extant work relationships with school leadership and teachers. We combined information from both the coach surveys and in-depth interviews to create a composite index of each coach's previous experience as a PD provider (LCPDEX). This indicator of the base expertise as an adult educator represents another central concept in the activity theory framework discussed above.

Tables 1 and 2 offer some additional details on the teacher- and school-level variables used in our analyses. For a more detailed discussion of the study measures and their construction, see http://www.iisrd.org/program_inquiry/instruments_measures.shtml.

Table 1. *Teacher-level Variables Used in Analysis*

Variable (Name)	Variable Description	Mean
Expertise		
Prior experiences in comprehensive literacy teaching (REFLIT)	This scale consists of items that ask how much teachers' classroom practice was influenced by comprehensive literacy practices (i.e., Running Records, Writer's Workshop, reading groups) prior to implementation of LC. A high score indicates that a teacher has adopted at least some key procedural and decision-making aspects of reform literacy practices. (4 survey items, person reliability: 0.54). Source: baseline survey.	Mean: -0.08 Standard Deviation: 0.87
Willingness to engage instructional innovation		
Orientation toward innovation (EGINV)	This scale consists of items that ask teachers if they tried "new practices" or use "new ideas" in their classroom prior to implementation of LC. A high score indicates that this teacher is strongly inclined to independently engage with innovations and to spread news of them to others (7 survey items, person reliability 0.79). Source: baseline survey.	Mean: -0.10 Standard Deviation: 0.82
School commitment (SCMT)	This scale consists of items that ask teachers about their loyalty and commitment to their current school. A high score indicates that a teacher is deeply committed to their school (4 survey items, person reliability 0.80). Source: baseline survey.	Mean: 0.09 Standard Deviation: 0.77
LC Intervention		
Exposure to PD (TAVEXP)	Number of whole-school professional development and coaching sessions attended by a teacher (averaged across all semesters). This is based on the set of teachers within each school for whom we have data on either the frequency or expertise measure. Source: coaching logs.	Mean: 7.30 Standard Deviation: 3.94

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- *The scales for teacher-level predictors were created using data from all teachers who completed surveys including 3rd grade. All teacher-level measures are based on a Rasch analysis).*

Table 2. *School-level Variables Used in Analysis*

Variable (Name)	Variable Description	Mean
LC Intervention		
Coach experience as a professional development provider (LCPDEX)	A high score on this measure indicates that the LC has a high level of previous experience as a professional development provider. Source: combined data from coach’s baseline survey and qualitative coding of interview responses, standardized.	Mean: .02 Standard Deviation: 0.90
School-wide PD coverage (PPDAV)	Proportion of K-2 teachers who either received one-on-one coaching or attended LC professional development sponsored by the coach in their school (averaged across semesters). Source: coaching logs.	Mean: 0.80 Standard Deviation: 0.19

Measuring Teacher Expertise Development: The primary study outcome

Most rubrics for measuring teacher practice have focused on examining particular teacher behaviors at a fixed point in time rather than conceptualizing changes in skill level and how this might evolve over time. Some literacy-focused observational systems are based primarily on frequency measures for the types of activities that are undertaken (Juel & Minden-Cupp, 2000; Edmunds & Briggs, 2003; Estrada, 2004; Foorman & Schnatschneider, 2003; and Greenwood, Abbott & Tapia, 2003). A different approach has been to use Likert scales to rate instructional quality rather than frequency, but such instruments do not typically include detailed descriptions of the kinds of behaviors that would warrant a specific score (Graves, Gersten, & Haager, 2004; Gersten, Baker, Haager, & Graves, 2005; Haager, Gersten, Baker, & Graves, 2003). A few observation rubrics have developed sequenced descriptions of teacher behaviors along a continuum, with qualitative accounts of exemplary teacher behaviors as well as of less exemplary, presumably predecessor, behaviors. While some of these rubrics have included literacy items (Doherty, Hilberg, Epaloose, & Tharp, 2002; Crossen et al., 2006; Resnick,

Matsumura, & Junker, 2006; Wolf, Crosson, & Resnick, 2006), none has been developed specifically to focus on K-2 literacy instruction.

The Developing Language and Literacy Teaching (DLLT) rubrics, used in this study, are grounded in the interactive literacy theories of Clay (2001) and Fountas and Pinnell (2006), and a conceptualization of teaching improvement as a problem of expertise development (Bransford, Brown, & Cocking, 1999; Ericsson, Krampe, & Tesch-Romer, 1993; Ericsson, 1996, 2006; Glaser & Baxter, 2002). The DLLT specifies behaviors arranged along a continuum of expertise, focusing on teaching behaviors within specific instructional activities, such as interactive writing lessons and guided reading lessons that are core components in most comprehensive literacy instructional systems. Thus, the DLLT is designed to measure teacher development that proceeds from procedural aspects of instruction to more expert practice. (For a more detailed discussion of the development and testing of the DLLT, see Bryk, et. al., 2008.)

Following on the idea that expertise is context- and task-specific, the DLLT is organized around the six specific instructional activities, described previously, that form the basis for comprehensive literacy instruction. The instrument consists of six separate rubrics to assess the quality with which each activity is enacted in the classroom. Each rubric includes descriptors of the range of teaching activity likely to be seen in classrooms where teachers are operating at varying levels of expertise with each particular activity. The frequency of use of each activity is also reported separately.

In addition, the DLLT includes two holistic assessments—one focusing on teachers' efforts to organize their classrooms; and a second, on teachers' efforts to orchestrate the enactment of literacy practices across the multiple instructional components of comprehensive

literacy in ways that maximize student learning. These two holistic rubrics are described briefly below. (See Table 3 for the list of eight rubrics.)

Table 3. *Eight Curriculum Areas for Rubric Development*

<i>Specific Instructional Activity</i>	<i>Classroom Organization</i>
1. Interactive Read Aloud	Usually whole class instruction.
2. Shared Reading	Whole class or small group instruction.
3. Guided Reading	Small homogeneous groups.
4. Interactive Writing	Whole class or small group instruction.
5. Writing Workshop	Whole class lessons and individual conferences.
6. Word Study	Usually whole class instruction, followed by individual application.
<i>Rubrics Used Across Instructional Contexts</i>	
7. General Aspects of Teaching	
8. Teaching for Strategies across Contexts	

i. *General aspects of teaching.* This rubric focuses on the basic social organization of the classroom to support quality instruction. These attributes are important in any classroom but are especially so in a comprehensive literacy framework because a great deal of activity is occurring simultaneously at any given time. The observer uses this rubric to evaluate available classroom materials, student engagement, the quality of teacher-student interactions, and sense of community among students.

ii. *Teaching for strategies.* This was designed to further differentiate truly expert practice from more mid-level efforts. The goal of reading instruction is to have students learn ways of thinking—literal, inferential, and analytic while reading fiction and nonfiction texts; word solving (including phonics and word analysis); and fluency (including phrasing and intonation). Likewise, instruction seeks to help students become fluid, expressive writers who understand how texts are organized, who can logically advance an argument, and who have developed their

own voice. Accomplishing these goals entails coordinating students' learning experiences across all literacy activities so that they "add up" to produce strong, self-extending readers and writers.

The DLLT rubrics have been found to have both high levels of inter-rater and over-time reliability in prior field testing (Bryk et al. 2008). Furthermore, significant differences were found among the teachers on the DLLT depending on the amount of prior exposure to comprehensive literacy professional development. The instrument was also found to reliably differentiate among teachers with as few as three observations per year.

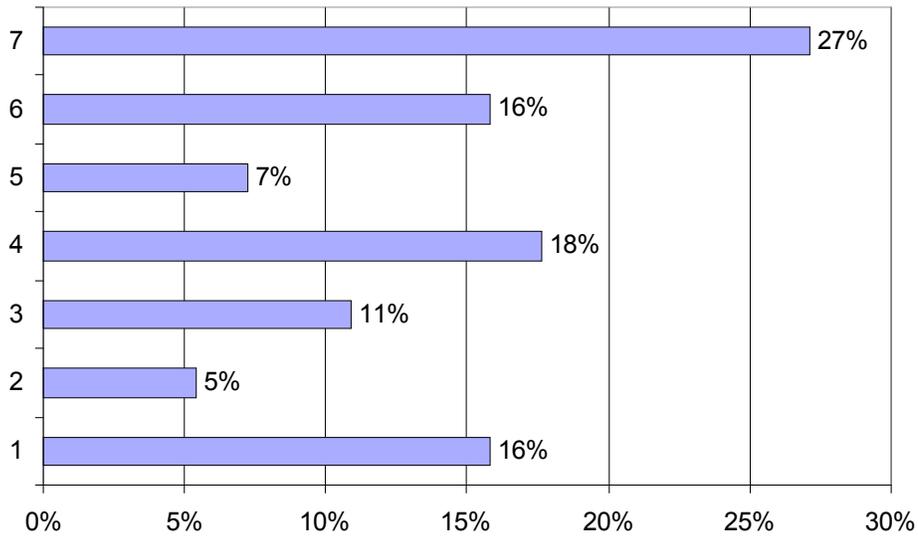
Data and Analysis

The analyses presented in this paper draw on data collected through the fall of 2007-08. Of the 285 teachers who were ever eligible for Literacy Collaborative professional development during this time period, 76.9% completed a baseline survey, and 78.5% were engaged in some professional development activities with their school's literacy coordinator (Source: school coaching logs) . (Note that teachers completed the survey when they entered the school, even if it was after the 2005-06 school year.)

To obtain measures of teacher practice and how this might change over time, we asked coaches to complete three observations using the DLLT each academic year on each teacher in kindergarten to second grade once that teacher began LC professional development with the coach. Since individual teacher participation in LC professional development was phased-in over the first year or even two years of local program implementation, the amount of data per teacher varies depending upon their tenure in the school and when they initiated LC professional development. Over the time period from fall of 2005-06 to fall of 2007-08, we have 1,045 observations for 236 teachers.

To assess changes in teachers’ practices as a result of exposure to LC, ideally we would have observations on each teacher over multiple years (a maximum of 7 time periods as of fall 2007 and 9 time periods as of Spring 08). However, because of the sequencing in initiating PD for some teachers especially in larger schools as noted above, and because of teacher turnover in the sample schools, and some missing observations, the overall distribution of observations across teachers and schools is quite complex. Figure 2 displays the actual patterns of longitudinal data collected and their frequency. We have complete data strings for all three years (to date) for 27% of our sample; 43% of the teachers have at least 6 observations, which corresponds to 2 years or more of complete data, and another 36% have at least 3 observations, corresponding to one year or more of complete data. The 16% with only a single observation are composed primarily of teachers new to their schools in the 2007-2008 year.

Figure 2. Percentage of teachers with each number of DLLT observations



Frequency of Implementation

Beginning in the fall of 2006-07 and as a supplement to the DLLT quality rubrics, coaches were also asked to report how frequently each teacher implemented each element of the framework in an average week. The response options were never, once a week, 2-3 times per week, or everyday/almost everyday. For analytical purposes, we recoded these ratings into an estimate of the number of times per week the element was used. The codes are as follows: never (0), once a week (1), 2-3 times per week (2.5), everyday/almost everyday (4.5).

In addition, to create an overall index of degree of program implementation, we created a composite measure of these ratings (a simple mean) for each teacher. (The form used to capture frequency of implementation can be found in Appendix A.)

Figure 3 shows how frequency of implementation varies by grade and framework element in the fall 2007 (i.e. the last occasion for which data was available to us as we conducted these analyses.) At this time point, which is the beginning of year 3 of program implementation, coaches reported relatively high use of all elements of the framework across all grade levels. Also, as expected, a pattern of use emerged where certain practices are more prevalent in kindergarten, such as shared reading and interactive writing, and others more prevalent at grades 1 and 2, such as guided reading and writers' workshop (note that writing workshop is not expected to be used in kindergarten classrooms in the fall). When averaged across the framework elements, the overall levels of implementation are similar across grades.

Figure 3. Weekly implementation of each element in Fall 2007-08, by grade

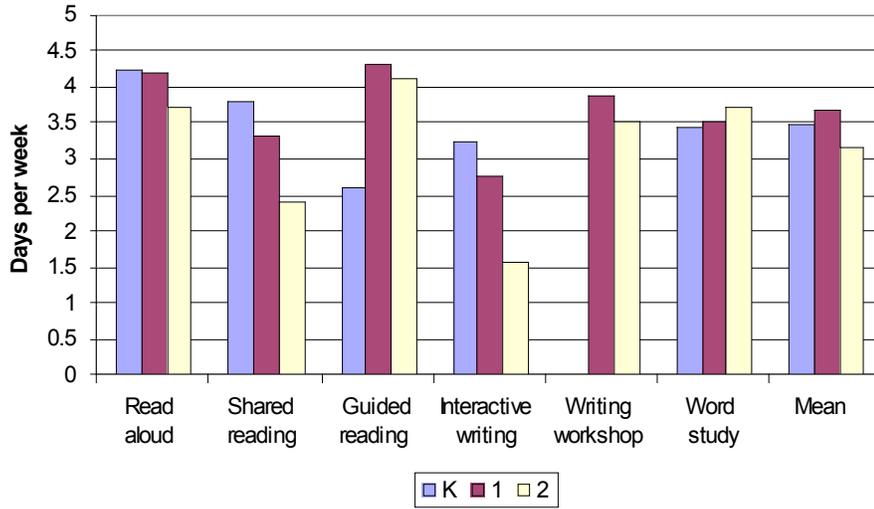
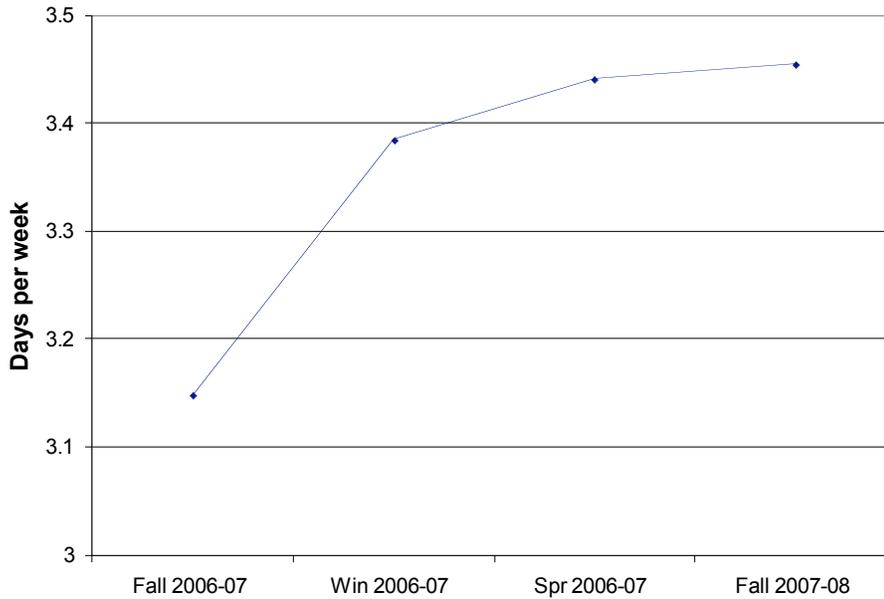


Figure 4 displays the average change in level of implementation across teachers and schools. In fall 2006 (which is one year after which the program started for most teachers), teachers implemented elements of the LC framework in their classroom on average 3.15 times per week; in the most recent wave of data collection (fall 2007), coaches reported that teachers' average implementation had risen on average to 3.45 times per week. We note that frequency of implementation data initiated at the beginning of the second full year of program implementation (2006-2007). During the first year, only DLLT data on quality of classroom practice was assessed.

Figure 4. Growth in overall frequency of LC implementation over time



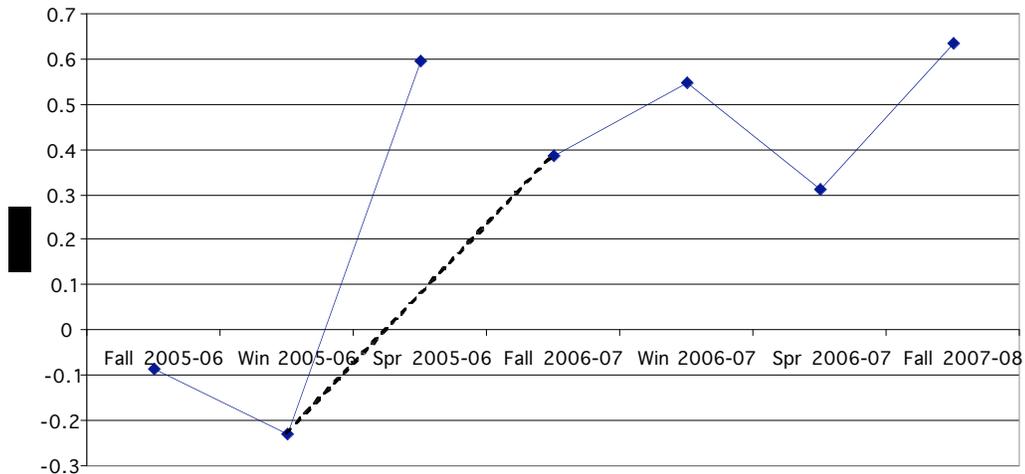
Expertise in Enactment

Some 51 rating scale items form the DLLT composing the 8 separate rubrics discussed above. Each rubric was subject to a Rasch Rating Scale analysis to create a separate measure for expertise in enacting that particular practice. In addition, a composite Rasch measure was created, combining data from all eight rubrics, to form an overall summary measure of teachers' classroom literacy practices.

In general, a Rasch analysis assesses the degree to which the rubric elements and subcategories hierarchically arrange in developmental order. The results of this scaling process specify empirically what it means to move from more novice to more expert practice in each area. Teachers are subsequently “measured” on this scale based on the practice ratings recorded for them on each item. The scale units are measured in logits (i.e., the log odds of being in a particular development category on a given element relative to base state practice). For more details about measure construction see Bryk, et.al. (2008).

Ideally, we would like to explore how teacher practice changes in each of the 8 elements of the rubric. However, because of patterns of missing data (in part due to how teachers phased-in separate practices in their classrooms), we are only able to use at this point the omnibus measure of teacher practice, which we call *expertise-in-enactment*. (Analysis of the separate components should be possible based on the final year data.) Figure 5 displays the precision weighted mean growth trajectories in expertise development.³

Figure 5. Growth in Expertise (omnibus measure of comprehensive literacy enactment)



The average teacher jumped from -0.08 on the logit scale in fall 2005 to 0.63 by fall 2007; an increase of 0.5 standard deviations. It should be noted that the spike in spring of 2005-06 appears artificial. Observation by study staff suggested some overall “scale drift” by coaches toward the end of the first year of coaching activity. Consequently, we retrained coaches during the summer of 2006 and the inflated scores reported in the spring dropped down to more realistic levels in the fall of 2006. While we include the spring 2006 data in our analyses, we add a fixed effect control variable for this one-time measurement artifact.

³ Precision weighting takes into account differences in the standard error of measurement associated with each observation. These standard errors are computed as part of the Rasch analysis. In computing the statistics reported here, each observation is weighted inversely proportional to its standard error.

Hierarchical Linear Model (HLM) Analyses

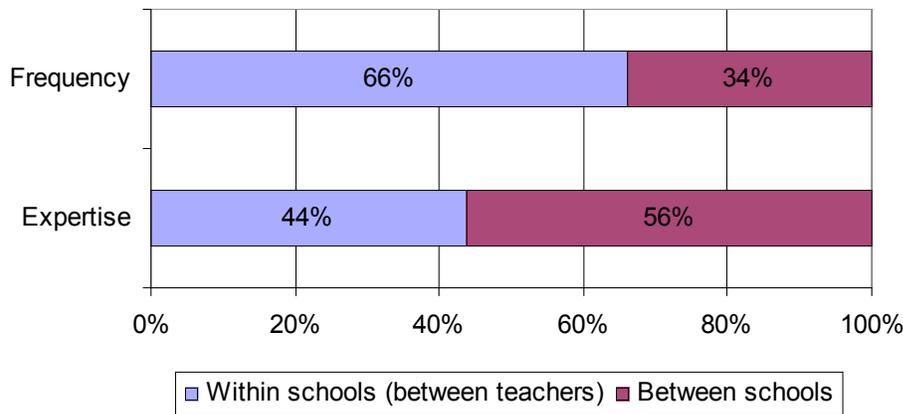
HLM is the logical analytical method for these data due to their hierarchical nature: multiple observations over time are nested within teachers, and teachers are nested within schools-coaches. The use of a hierarchical linear model allows us to observe the variability that exists at each level, as well as to examine possible effect of school- and teacher- level variables on teacher practice over time.

We analyzed both the frequency of implementation and expertise in enactment teacher outcome variables. In both analyses, we modeled the outcome as time-varying with TIME=0 specified at the last data collection time point (fall of 2007) and earlier time points counted down/or backwards from there. We settled on this representation for the time metric because teachers initiated professional development at different time points through out the course of the study. For example, some teachers such as those new to a school in 2006-2007 would first appear in the DLLT data set at observation time point 4 or later. Regardless, this time metric provides an interpretable intercept term for all teachers. Specifically, the intercept represents the latent expertise status for all study teachers at our last data collection point (currently fall of 2007). For simplicity, we call this *final status*. In addition, in modeling the expertise outcome, we also added a dummy variable (SPR06) at the repeated-measures level, to control for the measurement artifact associated with the first-year spring DLLT scores noted earlier, and a dummy variable (SCH25) at the school-level to control for a school that experienced a change in coach during the course of the study and whose DLLT scores seemed inconsistent with the other data.

Partitioning variance between levels. Fitting a basic, unconditional model allows us to partition the overall variability in our two outcome measures into within school (i.e. variability

among teachers within schools) and between school-coach components. As shown in Figure 6, significant variation in the frequency of implementation and expertise-in-enactment measures exists both within and between schools. Of the total variability among teachers, 34% and 56% respectively for the frequency and expertise measures is between schools, and 66% and 44% respectively is within schools (among teachers). This suggests that both individual and school level characteristics may account for significant variation in these two teacher outcomes.

Figure 6: Partitioning variance in final status between levels



Predicting final status and development. We sought to examine for both outcomes, the factors contributing to differences in the final status, as well as to higher levels of growth over time. We built separate models for each outcome in order to determine the important predictors for each outcome. All predictors in these analyses were centered around their respective grand means. In the teacher-level model, only the intercept was allowed to vary randomly, and in the school-level model, the intercept and time slope were allowed to vary randomly. (Given the limited number of observations available on many teachers, we were only able to estimate the variability among teachers in final status at this point. When the final data are available for analysis, we will have longer time series on a larger number of teachers and estimation of this within-school variance component may become possible.) Because our expertise outcome is

based on Rasch measurement model, we have a standard error of measurement associated with each individual outcome measure (OWGT). We have included this information in the analyses for this outcome. This transforms our analyses of the expertise outcome into a 4-level model where unreliability due to scale measurement error has now been taken into account. We present the final model equations in Table 4.

Table 4. *Fitted HLM Models*

Frequency of Implementation	Expertise in Enactment Measurement Model
	$Y_{ijk} = \pi_{1jk}(OWGT) + e_{ijk}$
Repeated Measures	Repeated Measures
$Y_{ijk} = \pi_{0jk} + \pi_{1jk}(TIME) + e_{ijk}$	$\pi_{0ijk} = \beta_{10jk} + \beta_{11jk}(TIME) + \beta_{12jk}(SPR06) + r_{1ijk}$
Teacher Level	Teacher Level
$\pi_{0jk} = \beta_{00k} + \beta_{01k}(TAVEXP) + \beta_{02k}(REFLIT) + \beta_{03k}(SCMT) + r_{0jk}$	$\beta_{10jk} = \gamma_{100k} + \gamma_{101k}(EGINV) + \gamma_{102k}(SCMT) + u_{10jk}$
$\pi_{1jk} = \beta_{10k}$	$\beta_{11jk} = \gamma_{110k} + \gamma_{110k}(TAVEXP)$
	$\beta_{12jk} = \gamma_{120k} + u_{12jk}$
School/Coach Level	School/Coach Level
$\beta_{00k} = \gamma_{000} + \gamma_{000}(LCPDEX) + u_{00k}$	$\gamma_{100} = \delta_{1000} + \delta_{1001}(SCH25) + v_{100k}$
$\beta_{01k} = \gamma_{010}$	$\gamma_{101} = \delta_{1001}$
$\beta_{02k} = \gamma_{020}$	$\gamma_{102} = \delta_{1020}$
$\beta_{03k} = \gamma_{030}$	$\gamma_{110} = \delta_{1100} + \delta_{1101}(SCH25) + v_{110k}$
$\beta_{10k} = \gamma_{100} + \gamma_{101}(PPDAV) + u_{10k}$	$\gamma_{111} = \delta_{1110}$
	$\gamma_{120} = \delta_{1200} + \delta_{1201}(SCH25) + v_{120k}$

i. Results for final status. Table 5 presents the results from modeling differences in final status as a function of both teacher- and school- level characteristics. For comparative purposes, Table 5 presents results based on the separate models built for each outcome as well as for “parallel” models, where the same set of explanatory predictors were considered at the teacher-

and school-level. In order to compare more directly the magnitude of these effects, we transformed these HLM results into a standard deviation metric.⁴ These are reported in Table 6.

Table 5. *Teacher- and School-level Predictors of Final Status*

	Frequency of Implementation		Expertise in Enactment	
	Separate Model	Parallel Model	Separate Model	Parallel Model
Teacher-level				
Amount of Exposure to Professional Development (TAVEXP)	0.04*** (0.01)	0.04**** (0.01)	--	0.01 (0.02)
Teacher's Prior use of comprehensive literacy practices (REFLIT)	0.07** (0.05)	0.06 (0.05)	--	0.06 (0.07)
Orientation toward innovation (EGINV)	--	0.03 (0.05)	0.19*** (0.07)	0.17*** (0.08)
School commitment (SCMT)	0.10**** (0.05)	0.09** (0.05)	0.15** (0.08)	0.14** (0.08)
School-level				
Coach's prior experience as a PD provider (LCPDEX)	0.29**** (0.12)	0.29*** (0.12)	--	0.08 (0.14)

****= p<.01 ***=p<.05 **=p<.1 *=p<.15

⁴ Because every variable in the HLM analysis was grand mean centered, an average teacher in an average school has an outcome score equal to the intercept at TIME=0 (final status). In order to evaluate the effect of the teacher-level variables, we assumed a teacher was average on all variables of interest and then observed the impact on the outcome of a change from one standard deviation below to one standard deviation above the mean in the independent variable of interest; we then divided this by the standard deviation of the outcome variable. In this way, we can understand the magnitude, in the outcome's standard deviation units, of a change of 2 standard deviations in each independent teacher-level variable. Similarly, with the school-level variable, we observed the difference in the outcome between a teacher in a school one standard deviation below to one standard deviation above the mean in the independent variable of interest; we then divided the resulting move in the outcome variable by its standard deviation.

Table 6. *Magnitude of the Effect of Teacher- and School-level Predictors on Final Status*

	Difference in final status between a teacher one standard deviation above and below the mean on the predictor (net of other variables in the model)	
	Frequency of Implementation	Expertise in Enactment
Teacher-level		
Amount of Exposure to Professional Development (TAVEXP)	0.68 standard deviation	--
Teacher’s prior use of comprehensive literacy practices (REFLIT)	0.25 standard deviation	--
Orientation toward innovation (EGINV)	--	0.38 standard deviation
School commitment (SCMT)	0.32 standard deviation	0.27 standard deviation
School-level		
Coach’s prior experience as a PD provider (LCPDEX)	1.11 standard deviation	--

These results indicate that teachers’ professional dispositions, assessed at the start of the LC intervention, are highly predictive of final status on both outcomes measured up to two years later. Strong school commitment (SCMT) is associated with substantially higher levels of both frequency of implementation and expertise-in-enactment, showing effects of 0.32 and 0.27 standard deviations respectively. This means that a teacher one standard deviation above the mean in school commitment at the start of the study on school commitment was 0.32 standard deviations higher on final frequency and 0.27 higher on the final expertise score than a teacher one standard deviation below the mean on the SCMT measure. Teachers with an initially positive orientation toward innovation (EGINV) had higher final expertise scores (an effect of 0.38 s.d.). In addition, those teachers who had prior experience using comprehensive literacy

practices (REFLIT) implement LC practices more frequently at the final time point (an effect of 0.25 s.d.).

In addition, Tables 5 and 6 offer some evidence of coaching effects on LC implementation. Specifically, the amount of individual teachers' exposure to LC professional development (TAVEXP) is the strongest teacher-level predictor of frequency of implementation (a 0.68 s.d. effect). We are also likely to see more frequent implementation overall in a school when a coach has had previous experience as a PD provider (PPDAV). Schools where the LC's prior experience as a professional developer was one standard deviation above the mean had a frequency of implementation 1.11 standard deviations higher than in schools with a coach's prior experience level was one standard deviation below the mean.

Taken together, these latter two effects appear quite substantial. For example, consider the estimated impact of frequent coaching (i.e. one standard deviation above the mean) by a coach with significant prior experience (i.e. also one standard deviation above the mean). An average teacher who receives such coaching has a predicted final implementation level 1.79 standard deviations higher than a teacher with less frequent PD by a less experienced coach (i.e. one standard deviation below the mean on both measures).

ii. Results for teacher development over time. Table 7 presents the HLM results predicting differences in growth rates as a function of both teacher- and school- level characteristics. Again, we present results based on the separate models built for each outcome as well as for “parallel” models, where the same set of explanatory predictors were considered at the teacher- and school-level., the HLM results In Table 8 are presented into a standard deviation metric.⁵

⁵ The conversion into standard deviation metric units is slightly different when observing the effect of independent variables on change over time. To calculate the effect of the independent variables, first we calculated the change

Table 7. *Teacher- and School-level Predictors of Growth*

	Frequency of Implementation		Expertise in Enactment	
	Separate Model	Parallel Model	Separate Model	Parallel Model
Teacher-level				
Individual teacher’s exposure to PD (TAVEXP)	--	-0.0003 (0.01)	0.01** (0.01)	0.01*** (0.01)
School-level				
Average proportion of K-2 teachers exposed to LC (PPDAV)	0.54*** (0.27)	0.54** (0.28)	--	0.04 (0.21)

****= p<.01 ***=p<.05 **=p<.1 *=p<.15

Table 8. *Magnitude of the Effect of Teacher- and School-level Predictors on Growth*

Variable	Difference in growth between a teacher one standard deviation above and below the mean	
	Frequency of Implementation	Expertise in Enactment
Teacher-level variable		
1 standard deviation increase in individual teacher’s average exposure to PD (TAVEXP)	--	1.04 standard deviations
School-level variable		
1 standard deviation increase in the average proportion of K-2 teachers exposed to LC (PPDAV)	2.64 standard deviations	--

Again, consistent with the LC claim that coaching can effect meaningful changes teacher practice, exposure to coaching is positively related to growth in both frequency of implementation and expertise-in-enactment. With frequency of implementation as our outcome, the proportion of teachers who receive coaching in the school is a strong predictor of growth. An

over time for an average teacher. We then compared the change in scores, assuming a teacher was observed at all 7-points in time, for those who were one standard deviation above and below the mean (or in a school one standard deviation below/above the mean for the school-level variable); we then divided the resulting change in the outcome variable by its standard deviation.

average teacher (on all other measures) in a school one standard deviation above the mean on school-wide PD exposure grows 2.64 standard deviations more than a teacher in a below average school. (It is important to recall that PPDAV can be interpreted as a school context effect; that is, a school with a high proportion teachers being of coached is more likely to have a staff that is open to and supportive of the LC implementation.) Regardless, our results do indicate that schools with high coaching coverage are more likely to witness increases in the frequency of implementation over time.

Our analyses also show that the level of individual exposure (TAVEXP) is strongly associated with individual teacher growth in expertise. An average teacher (on all other measures) that is one standard deviation above the mean on PD exposure has higher growth in their expertise-in-enactment score of 1.04 standard deviations than a below average teacher.

Conclusions and Next Steps

The analyses presented in this paper indicate that teachers' professional background and dispositions play an important role in their uptake of the LC intervention. Furthermore, after controlling for teacher characteristics, the amount of LC coaching and the degree of school wide coverage appear related to increases in both the final level of implementation and expertise and the growth in each of these two important teacher outcomes.

We caution, however that these results are preliminary. With additional data from the final study year, we should be able to more reliably measure individual teacher growth. We will also be able to examine results for the separate rubric components, and explore how coaching emphases may influence implementation on specific framework elements.

Future analysis will also work to uncover any potential bias that exists in the teacher ratings as a result of coaches being both the provider of the treatment and the rater of teacher

practice. In this regard, we plan to compare coach's standardized DLLT ratings that were collected as part of the training process to detect and possibly correct for systematic differences in LC ratings.

Lastly, all of this is precursor to our final analyses where we will seek to examine possible linkages between changes in teacher practice are related to changes in student outcomes. Our further investigations will help us understand the complex ways in which teachers, and coaches, interact with professional development, and ultimately, improve their practice and their schools.

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Appendix A. Form for Capturing Frequency of Implementation

Literacy Framework Elements

School: _____

Please indicate which literacy framework elements teachers are using in their classrooms during the current “Rubric Window” (October/November)

Use the following key:

- 0 – not using the element currently
- 1 – using the element approximately once a week
- 2 – using the element 2 to 3 times a week
- 3 – using the element almost everyday or everyday

Teacher	Read Aloud	Shared Reading	Guided Reading	Interactive Writing	Writing Workshop	Word Study