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Effects of a Professional Development Model on Preschool Teachers' Literacy Practices in Early Reading First Classrooms

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ABSTRACT

This study evaluated the effectiveness of a professional development model on Early Reading First preschool teachers' literacy practices in 14 classrooms across three agencies serving low-income, ethnically diverse children. The model used monthly seminars and bi-weekly on-site coaching and mentoring to prepare teachers to create literacy-rich environments and provide early literacy opportunites for their children. Teachers also received literacy materials for their classrooms. Hierarchical linear modeling analyses indicated that at baseline, these teachers scored significantly lower in all four dependent variables represented on the Early Language and Literacy Classroom Observation Toolkit (ELLCO) assessment scores than did the comparison group which had been matched by the demographics of the children served; however, Early Reading First teachers made statistically significant higher gains in all areas assessed compared with the comparison group.

Introduction

When children have limited opportunities to explore and experiment with the environment, they are more likely to experience difficulty learning in school. Research indicates that preschool education can positively impact children's learning and development which result in higher academic gains (Barnett, 1995; Barnett & Hustedt, 2003; Belfield, Nores, Barnett, & Schweinhart, 2006; Conyers, Reynolds, & Ou, 2003; Reynolds, Ou, & Topitzes, 2004). Preschool attendance itself has a positive effect on children's reading and math achievement in kindergarten (Nelson, 2005) and on academic attainment in school even taking into account family and environmental factors (Sammons, Elliot, Sylva, Melhuish, Siraj-Blatchford, & Taggart, 2004). However, the quality and intensity of the preschool program also matters. Children exposed to a full-time, high quality early childhood education program for low-income families demonstrated long-term cognitive and academic gains which impacted reading and math skills (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001). Likewise, a state universal pre-K program showed positive gains in early reading skills such as letter-recognition and spelling when entering kindergarten, including those from diverse ethnic and low income backgrounds (Gormley, Gayer, Philips, & Dawson, 2005). Preschool, then, can play an important role in offering children with multiple risk factors a stronger start to formal schooling (Sammons et al., 2004).

Teachers are an important part of the equation for quality preschool experiences. Professional development is often identified as one of the key elements to ensure struggling readers achieve long-term school success (Chard, 2004); however, although teachers in the K-12 system have at least a four-year degree, fewer than half of the teachers of children under the age of five have a BA degree and many have never attended college (Barnett, 2003). Teachers without adequate professional development have difficulty getting struggling readers to read successfully because they often do not have the knowledge or teaching skills to support these students. They also often have inadequate materials for instruction time to effectively promote literacy (Torgesen, 2003).

Professional development, then, is critical; yet, research is still limited on how best to prepare teachers to increase their children's early reading achievement (Chard, 2004). Sustained professional development over time appears to be a factor. In one study, teachers who participated in initial professional development sessions with yearlong support demonstrated increased knowledge and subsequent changes in teaching and classroom practice (McCutchen et al., 2002). Also, ongoing in-service meetings on literacy and in-classroom supports increased preschool teachers' shared book readings and writing activities for children (Yaden et al., 2000). The model for this study, then, provided monthly professional development sessions over a three-year period because on-going, sustained, systematic professional development is more likely to produce long-term effects than short-term, workshop style options with little or no follow-up (Hiebert & Pearson, 2000; Stahl & Yaden, 2004).

To provide classroom support, the Professional Development Team also served as mentors, visiting classrooms bi-weekly during the three-year period. A mentoring component was included because it can help build a foundation for growth and change, thereby promoting personal development and professional growth (Martin & Trueax, 1997). Preschool teachers who received professional development sessions and bi-monthly classroom visits by a mentor demonstrated ability to successfully prepare students for kindergarten (Kirshenbaum, 2000). Researchers also reported a positive effect on student achievement for middle school teachers who participated in mentoring programs (Frome, Lasater, & Cooney, 2005).

In this study, preschool teachers participated in monthly, ongoing professional development sessions, with bi-weekly onsite mentoring in their classrooms. Even though the focus of the professional development was on literacy, there were times that professional development sessions, and onsite mentoring would also address general classroom practice. For example, a teacher might be coached on classroom management in order to help her facilitate literacy strategies during a shared book reading during circle time. Therefore general classroom practice was included in the dependent variables studied. The purpose of this study was to compare the effects of the professional development model on the

classroom environment and teacher practices in four areas: (a) arranging the classroom environment to maximize early literacy opportunities for learning, (b) implementing positive general classroom teaching practices, (c) implementing appropriate literacy and language strategies in the classroom, and (d) providing early reading and writing opportunities for children. It was hypothesized that the teachers would exhibit growth in all four of these areas and that they would outperform the comparison group.

Method

Participants

Three preschool agencies in a low-income urban area in the Midwestern section of the United States participated in the project. Over the three-year period, the project served approximately 14 classrooms with an average of 210 children per year. Of those children, 26% were African-American, 1% Asian, 12% Hispanic, 41% Caucasian, and 21% of other or undetermined ethnic backgrounds. Seventy-four percent of the children qualified for free and reduced lunch, a commonly accepted indicator of poverty status. Two of the agencies, representing nine classrooms, were childcare programs providing full-day, year-round services. The third agency, with five classrooms, provided half-day, morning and afternoon preschool sessions, with the same teacher teaching both sessions in each classroom. School district personnel selected these agencies because they met the criteria for eligibility for their Early Reading First grant and were willing to commit fully to participating in the project. Since district personnel selected the sites to participate and the number of classrooms was small, random assignment was not possible. Therefore, to further measure the impact of the intervention on the selected preschool sites, the researchers selected 14 comparison sites from another agency that served a demographically similar population in the same community but had little contact with the participant sites.

Measures

Reliability and description of ELLCO assessment. The researchers administered the Early Language and Literacy Classroom Observation (ELLCO) Toolkit, Research

Edition (Smith & Dickinson, 2002) a standardized instrument containing three components: (a) Literacy Environment Checklist, (b) Classroom Observation and Teacher Interview, and (c) Literacy Activities Rating Scale. The ELLCO, which has been pilot-tested in early childhood classrooms, has inter-rater reliability coefficients of .88, .90, and .81 for each of the three components. Total score internal consistency coefficients (Cronbach's alpha) are .84, .90 and .86, respectively. The evaluation team assessed the Early Reading First teachers in fall and spring of each year of the project. The comparison sites were assessed annually in winter each of the years, since it was the only way for the researchers to logistically conduct the assessments around the time frame for the Early Reading First teachers' assessments.

There are three main parts to the ELLCO assessment. The first, Part 1, is a Literacy Environment Checklist, in which observers tally the number and types of different reading and writing materials and their uses in designated areas and around the room. Part Two is a Classroom Observation assessment based on a rating scale of different characteristics of best practices classrooms should exhibit. The rating scale ranges from 1 (deficient), to 5 (exemplary) with 3 being rated as basic. Questions in Part Two are grouped into two sub-categories: general classroom environment and those that impact language, literacy, and curriculum. In Part Three, for the Literacy Activities Rating Scale, observers tally the number and types of book reading and writing activities they are able to observe and score them in similar fashion as part one. For the data analysis in this study, the researchers chose to analyze data from parts one, two, and three separately, and to split out the general classroom observation ratings from the language, literacy and curriculum ratings. This allowed a more detailed analysis of the impact of the professional development on each of these areas.

Administration of ELLCO, training, reliability, and treatment fidelity. A total of six trained observers administered the ELLO throughout the project. If inter-rater reliability was below 90%, the observer was required to retrain until the reliability criterion was achieved. Inter-observer reliability was calculated for an average of 36% of the sessions each year. Reliability ratings ranged from 82-100% with a mean of 93%.

Procedures

The intervention had two primary components: (a) monthly professional development sessions, and (b) on-site coaching and mentoring. Additionally, the classrooms received literacy curriculum materials and resources to help them implement the language and literacy strategies they were learning. The professional development model is outlined in Figure 1. The Professional Development Team was made up of four full-time coaches; one to work with each of the three agencies, while the fourth provided support across agencies to obtain literacy materials for classrooms and assist teachers in maximizing their use of the materials to promote literacy. All of the coaches had at least a Master's degree in Reading, Early Childhood Education, or a related field and several years' teaching experience in early childhood settings.

Procedures for professional development sessions. Teachers are more likely to demonstrate effective classroom instruction skills and increased student learning in literacy skills when, in addition, to collaborating with other teachers, they have strong supports by their administrative personnel (Wixson & Yochum, 2004). They also retain use of instructional reading practices learned from an on-going professional development program if other teachers in their support network use the practices and if their principals are supportive (Klingner, Vaughn, Hughes, & Arguelles, 1999). Therefore, although only teachers were assessed for the projects' outcome data, teachers, paraprofessionals, and agency site directors were included in these sessions. Prior to each school year, the Professional Development team presented two-day seminars, which addressed the goals of the Early Reading First project, an overview of the research on early language and literacy development, and in-depth modeling and practice with the Early Language and Literacy curriculum. Additional sessions were provided for teachers and paraprofessionals new to the program and for continuing teachers whose skills demonstrated a need for more practice.

During each school year, the team presented two-hour monthly afternoon sessions, using a combination of Power Point lectures with handouts, modeled demonstrations of strategies, and guided practice in small and large groups. Teacher attendance across these seminars ranged from 87-100% across all three years with an average attendance of 96%. Teachers filled out a 6-question survey at the end of each session, which allowed them to rate on a 5-point scale their satisfaction with the session. Questions included: the knowledge and preparedness of the presenters, the quality of the presentation, the relevance of the content, usefulness of the information for classroom use, and overall satisfaction. Teacher satisfaction ratings were high. Ratings ranged from 3-5 with a mean of 4.7.

Procedures for mentoring. To help teachers internalize what they were learning at the sessions and improve classroom practice, one or more of the Professional Development Team mentors visited each teacher on a bi-weekly basis. Teachers used self-carbon lesson plan forms and provided copies to the Professional Development mentor prior to each visit. Observations lasted approximately two hours and were scheduled at both unstructured and structured times so mentors would be able to assess whether teachers were not only using the curriculum, but were implementing literacy strategies throughout the day.

During observations, mentors took anecdotal notes on a standard observation form the team created for this project, modeled lessons as needed, and gave feedback on teacher's use of the lesson forms, instructional strategies, and classroom arrangement. Individual consultation time was scheduled when this fit the teacher's schedule, which was often later in the day, such as nap time. Teachers were also required to self-reflect on their teaching performance and create objectives to work on for the next observation.

Procedures for providing classroom literacy curriculum materials and resources. In addition to the professional development sessions and on-site mentoring, the teachers received materials to allow them to create literacy-rich classrooms. To determine appropriate materials to purchase, researchers administered the ELLCO assessment. Baseline results

from the ELLCO, along with the Professional Development Team's observations and teacher input, provided the basis for initial purchases. This procedure was repeated each fall. Many of the classrooms initially did not have basic materials in good condition. Materials included items such as listening centers, story props to writing materials and books. Some classes needed basic furniture to create reading corners or writing centers. The Professional Development team also ordered books and related story-telling props that supported the themes in the Language and Literacy curriculum. The team supplied these materials as teachers were ready to introduce new units to their classrooms. The teachers used the Building Early Language and Literacy curriculum (Neuhaus Education Center, 2002), which systematically presented skills in phonemic awareness, print concepts, oral language, and alphabetic knowledge, and included story reading and retelling, and additional activities that could be integrated throughout the day.

Results

The mean scores and standard deviations resulting from the ELLCO assessments for the treatment and comparison groups are presented in Tables 1 and 2, with Table 1 presenting the Literacy Environment Checklist (ELLCO, Part 1) and Literacy Activities Rating Scale (ELLCO, Part 2), and Table 2 presenting the two subscores for the Classroom Observation (Part 2a: General Classroom and Part 2b: Language, Literacy, and Curriculum). As is evident from the data, the Early Reading First teachers' baseline scores were noticeably below the comparison group's baseline scores on all four of the dependent measures. However, the comparison group was tested at a later time, which could be an influencing factor in the test score difference. The mean scores of the treatment group continued to rise each successive test time for all of the dependent measures, with the exception of a small dip in Fall 2004 for The Literacy Environment and the Literacy Activities scales, which recovered and increased by Spring 2005. These scores increased even though there was considerable teacher turnover throughout the study. Of the 14 teachers tested at baseline, only 3 taught all 3 years, another 2 taught for 2.5 years, and the remaining teachers taught for 2 years or less. The average teaching length of time in the preschool programs during the study was 1.29 years, and a total of 34 teachers participated in the professional development for at least one semester.

The comparison group experienced much less turnover than the treatment group did; of the 15 teachers, 12 taught all 3 years, 2 taught for 2 years, and only 1 taught for 1 year. The average teaching length of time during the study was 2.73 years. Comparison group scores, however, did not show the same increases on each of the dependent measures that the treatment group demonstrated. Comparison group were more stable across test times for each of the dependent measures, with only a slight increase in pre -and post-test scores on the Literacy Activities and the Language, Literacy, and Curriculum Classroom Observation scales.

Given the variations in the timing of the ELLCO assessment administration for the treatment and comparison groups, the teacher turnover during the three-year period in the treatment sites which affected the number of professional development and onsite mentoring sessions different teachers received, the variations in the teacher turnover rates between the treatment and comparison groups, and the higher baseline scores for the comparisons, a more complex multi-linear analysis was needed to adjust for these differences to determine the extent to which the professional development model had an effect. The hierarchical linear model was selected because it is able to adjust for disparate points of time and allows for varied numbers of data points for individuals as long as there are two data points (Raudenbush & Bryk, 2002). Each outcome measure was analyzed separately, which allowed the intercept and slope describing the teachers' change in the dependent measures over time to be modeled as a function of group membership, that is, whether they belonged to the treatment or the comparison group. The analysis resulted in specific intercept and slope parameters for the treatment and comparison groups, and produced tests of statistical significance as to whether the treatment group parameters different than those of the comparison group.

The data were analyzed using the HLM 5 Hierarchical Linear and Nonlinear Modeling Statistical Software (Raudenbush, Bryk, & Congdon, 2000). Level 1 data took into account individual scores in relation to test time and Level 2 addressed the group membership variable. The method of estimation used was the restricted maximum likelihood of fixed effects with robust standards errors, since this produced the most conservative results of statistical significance. The results are posted in Table 3 for the Literacy

Environment Checklist and The Literacy Activities Rating scale, and in Table 4 for the General Classroom and Language, Literacy, and Curriculum subscales of the Classroom Observation section. Table 3 data results show that, in looking at the initial measurement occasion (predicted one data point prior to baseline) for both dependent measures, group membership (i.e. experimental vs. comparison) was a significant predictor [$t(47) = 5.347$, $p<.001$, and $t(47) = 6.302$, $p<.001$, respectively]. In other words, the treatment group scored significantly lower at baseline than did the comparison group on their ability to arrange materials to create a rich literacy environment and to present a variety of developmentally appropriate reading and writing activities to their children before the professional development program started. In looking at performance over time for both dependent variables, group membership (i.e. experimental vs. comparison) was also a significant predictor [$t(47) = -8.234$, $p<.001$, and $t(47) = -5.188$, $p<.001$, respectively]. Figures 2 and 3 show that the treatment group had a significantly higher slope (improvement) on these two variables than did the comparison group.

The same pattern is seen in Table 4 for the two Classroom Observation subscales: General Classroom and Literacy, Language and Curriculum. At the initial measurement occasion for both of these dependent measures, group membership was again a significant predictor [$t(47) = 5.302$, $p<.001$, and $t(47) = 9,277$, $p<.001$, respectively]. This indicates that treatment group scored significantly lower, before the professional development program begin, than did the comparison group on their ability to implement teaching behaviors important for general classroom learning as well as those that specifically support language and literacy skill development. In looking at performance over time for both dependent variables, group membership (i.e. experimental vs. comparison) was again a significant predictor [$t(47) = -6.014$, $p<.001$, and $t(47) = -8.363$, $p<.001$, respectively]. Figures 4 and 5 show that the treatment group had a significantly higher slope (improvement) on these two variables than did the comparison group.

As shown each of these four figures, the treatment group demonstrated a prominent rising slope from pre- to post-testing. In contrast, the comparison group demonstrated a slow declining slope for the General Classroom Environment Classroom Observation subscale and the Literacy Activities Rating Scale, and a slow rising slope on the Language,

Literacy, and Curriculum Classroom Observation subscale and the Literacy Environment Checklist. As evident from the figures, the treatment group scored noticeably lower at baseline levels than the comparison group did, but maintained a steeper trajectory (intercept + slope) than the comparison group, and easily outperformed them by the conclusion of the study.

Finally, although statistical significance is important from a research standpoint to determine the likelihood that the treatment effects occurred due to change occurrence, statistically significant changes do not always mean that the results have practical significance. Therefore, effect sizes were calculated for each of the pre- to post-test score changes for the treatment and comparison groups on each of the four dependent variables (Spring 2004 to Spring 2006 for the treatment group; and Winter 2004 to Winter 2006 for the comparison group). These are displayed in Table 5. The comparison group data show small effect sizes for three of the four variables, and a moderate effect size for the Literacy Environment Checklist. In contrast, the treatment group data demonstrate very large effect sizes for all four dependent variables. Increasing 14.06 points from baseline on the Literacy Environment Checklist would be a practical change that would greatly increase the number of literacy opportunities children would be able to experience. Moving from deficient or near deficient levels in both of the Classroom Observation Scales to scores between basic and exemplary performance would be a practical change in teacher's abilities to demonstrate positive general classroom and literacy-related teaching behaviors. Likewise, increasing the Literacy Activities Rating Scale score by about a third shows a practical change in the increased number and quality of reading and writing activities in the room. Consequently, it is reasonable to conclude that the professional development provided in this study likely resulted in both statistically practically significant changes in the treatment group and greatly improved teacher skills related to all four of the dependent variables.

Discussion of Results and Limitations of the Study

This project provided a professional development model of monthly sessions and bi-weekly onsite coaching and mentoring in preschool teachers' classrooms. Teachers

also received additional classroom materials, which allowed them to increase language and literacy learning opportunities for their children. As evidenced by the data results, these teachers scored significantly lower at baseline on all four dependent measure represented on the ELLCO assessment scores than did the comparison group; however, at post-testing, Early Reading First teachers made statistically significant gains in all areas assessed and outperformed the comparison group. Large effect sizes for each of these pre-to-post test score differences suggest that the professional development likely resulted in practical changes in teachers' abilities to arrange the classroom environment to maximize early literacy opportunities for learning, implement positive general classroom teaching practices, implement appropriate literacy and language strategies in the classroom, and provide early reading and writing opportunities for children.

The project had a number of limitations. By using a professional development model with multiple components, it was not possible to separate out the various factors of the model itself. Therefore, it was not possible to analyze the unique effects of the monthly professional development sessions from the bi-weekly mentoring and coaching and determine whether one or both of these elements had a greater impact, or even if both components were needed. It was also not possible to determine whether the professional development model would have been more or less successful without the purchase of additional literacy classroom materials and curriculum, or if the additional materials would have been effective without professional development on how to use these. Another limitation was the considerable differences in the treatment and comparison groups. The groups differed in job stability as reflected by teacher turnover rates, baseline scores on all four dependent measures, and in the test times the ELLCO assessment was given. Although the Hierarchical Linear Model of multi-linear analysis does help to address the problem of the treatment group assessed in the fall and spring, but the comparison group assessed in the winter, it does not help determine the true effect of the treatment. Furthermore, since classrooms were not randomly assigned and the number of classrooms was small, the generalizability of the findings should be taken cautiously.

Another factor to consider is the replicability of the project itself. Most childcare and preschool programs do not have the funds available to support the human resources

needed for monthly professional development sessions and bi-weekly classroom visits. Furthermore, paying substitute teachers to enable teachers and paraprofessionals to regularly attend professional development sessions or provide the amount of literacy and language materials available to the teachers in this project would be difficult to replicate due to cost factors. Finally, there is the aspect of teacher turnover, which was noticeably higher in the treatment group than in the comparison group. Teacher turnover data prior to and after the study were not available from each of the agencies; therefore it was not possible to determine whether the professional development itself may have contributed to the teacher turnover. Directors were very positive about participating in the project, were supportive during the project, and required all teachers and assistants to participate; however, anecdotal information from the directors indicated that some of the teachers may have left because of the pressures of having to perform at higher levels than before. Although some of the turnover may have enabled directors to remove poorly performing teachers from the preschool programs, it may also have caused others to simply "burn out" and leave for other jobs. Future research should look at the factors which effect teacher turnover as well as at the cost-benefit ratio for this type of professional development model and to address alternate ways to make this model more feasible for preschool and child care programs with limited resources, particularly since these are the programs most likely to serve children with multiple risk factors.

In summary, the strength of the study's results lend support that sustained professional development, with mentoring and coaching, can be effective in helping teachers become proficient in literacy practices that can provide their children a strong foundation for later reading skills. This model appeared effective in helping teachers serving ethnically diverse low-income children become proficient in demonstrating these skills in their classrooms. The professional development model also helped to compensate for teacher turnover and sustain growth in classroom teaching proficiency. However, although future research on the various components of a professional development model are warranted, it is also important for the early childhood field to address other aspects of the working environment, including factors that affect teacher sustainability in preschool and child care settings.

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References

Barnett, W. S. (1995). Long-term effects of early childhood programs on cognitive and school outcomes. *Future of Children, 5*(3), 25-50.

Barnett, W.S. (2003). Better teachers, better preschools: Student achievement linked to teacher qualifications. *NIIER Preschool Policy Matters, Issue 2*. Philadelphia, PA: Rutgers National Institute for Early Education Research.

Barnett, W.S., & Hustedt, J.T. (2003). Preschool: The most important grade. *Educational Leadership, 60*(7), 54-57.

Belfield, C.R., Nores, M., Barnett, S., & Schweinhart, L. (2006). The High/Scope Perry preschool program: Cost-benefit analysis using data from the age-40 follow-up. *Journal of Human Resources, 14*(1), 162-190.

Campbell, F.A., Pungello, E.P., Miller-Johnson, S., Burchinal, M., & Ramey, C.T. (2001). The development of cognitive and academic abilities: Growth curves from an early childhood educational experiment. *Developmental Psychology, 37*(2), 231-242.

Conyers, L.M., Reynolds, A.J., & Ou, S.R. (2003). The effect of early childhood intervention on subsequent special education services: Findings from the Chicago child-parent centers. *Education Evaluation and Policy Analysis, 25*(1), 75-95.

Chard, D.J. (2004). Toward a science of professional development in early reading instruction. *Exceptional Children, 12*(3), 175-191.

Frome, P., Lasater, B., & Cooney, S. (2005). *Well-qualified teachers and high quality teaching: Are they the same?* (Research brief). Atlanta, GA: Southern Regional Education Board.

Gormley, W.T., Gayer, T, Philips, D., & Dawson, B. (2005). The effects of universal pre-k on cognitive development. *Developmental Psychology, 41*(6), 872-884.

Hiebert, E. H., & Pearson, P.D. (2000). Building on the past, bridging to the future: A research agenda for the Center for the Improvement of Early Reading Achievement. *Journal of Educational Research, 93*(3), 133-144.

Kirshenbaum, K. (2000). *Helping preschool teachers implement developmentally appropriate child care practices utilizing a 4-point strategy to prepare preschoolers for kindergarten readiness.* Unpublished doctoral dissertation, Fort Lauderdale-Davie, FL: Nova Southeastern University. (ERIC Document Reproduction Service No. ED 448 923)

Klingner, J.K., Vaughn, S., Hughes, M.T., & Arguelles, M.E. (1999). Sustaining research based practices in reading: A 3-year follow-up. *Remedial and Special Education, 20,* 263-274.

Martin, A., & Trueax, J. (1997, July). *Transforming dimensions of mentoring: Implications for practice in the training of early childhood teachers.* Paper presented at the China-U.S. Conference on Education, Beijing, People's Republic of China. (ERIC Document Reproduction Service No. ED 425 405)

McCutchen, D., Abbott, R.D., Green, L.B., Beretvas, S.N., Cox, S., Potter, N.S., et al. (2002). Beginning literacy: Links among teacher knowledge, teacher practice, and student learning. *Journal of Learning Disabilities, 35*(1), 69-86.

Nelson, R.F. (2005). The impact of ready environments on achievement in kindergarten. *Journal of Research in Childhood Education, 19*(3), 215-222.

Neuhaus Education Center. (2002). *Building Language and Literacy.* Bellaire, TX: Author.

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

Raudenbush, S., Bryk, T., & Congdon, R. (2000). *HLM 5 Hierarchical linear and nonlinear modeling.* Scientific Software International, Inc.

Reynolds, A.J., Ou, S.R., & Topitzes, J.W. (2004). Paths of effects of early childhood intervention on educational attainment and delinquency: A confirmatory analysis of the Chicago child-parent centers. *Child Development, 75*(5), 1299-1328.

Sammons, P., Elliot, K., Sylva, K., Melhuish, E. Siraj-Blatchford, I., & Taggart, B. (2004). The impact of pres-school on young children's cognitive attainments at entry to reception. *British Educational Research Journal, 30*(5), 691-712.

Smith, M., & Dickinson, D. (2002). *Early language and literacy classroom observation (ELLCO) toolkit, (research edition) with user guide.* Baltimore, MD: Brookes Publishing Company.

Stahl, S., & Yaden, D. (2004). The development of literacy in preschool and primary grades: Work by the Center for the Improvement of Early Reading Achievement. *The Elementary School Journal, 105*(2), 141-165.

Torgesen (2003). *Scientific research and reading instruction for students with significant reading difficulties.* Paper presented at the Elissa Herst Teacher Training Forum. Princeton, NJ.

Wixson, K., & Yochum, N. (2004). Research on literacy policy and professional development: National, state, district, and teacher contexts. *Elementary School Journal, 105*(2), 219-34.

Yaden, D.B. Jr, Tam, A., Madrigal, P., Brassell, D., Massa, J., Altamirano, L.S., et al. (2000) Early literacy for inner-city children: The effects of reading and writing interventions in English and Spanish during the preschool year. *The Reading Teacher, 54*(2), 186-189.

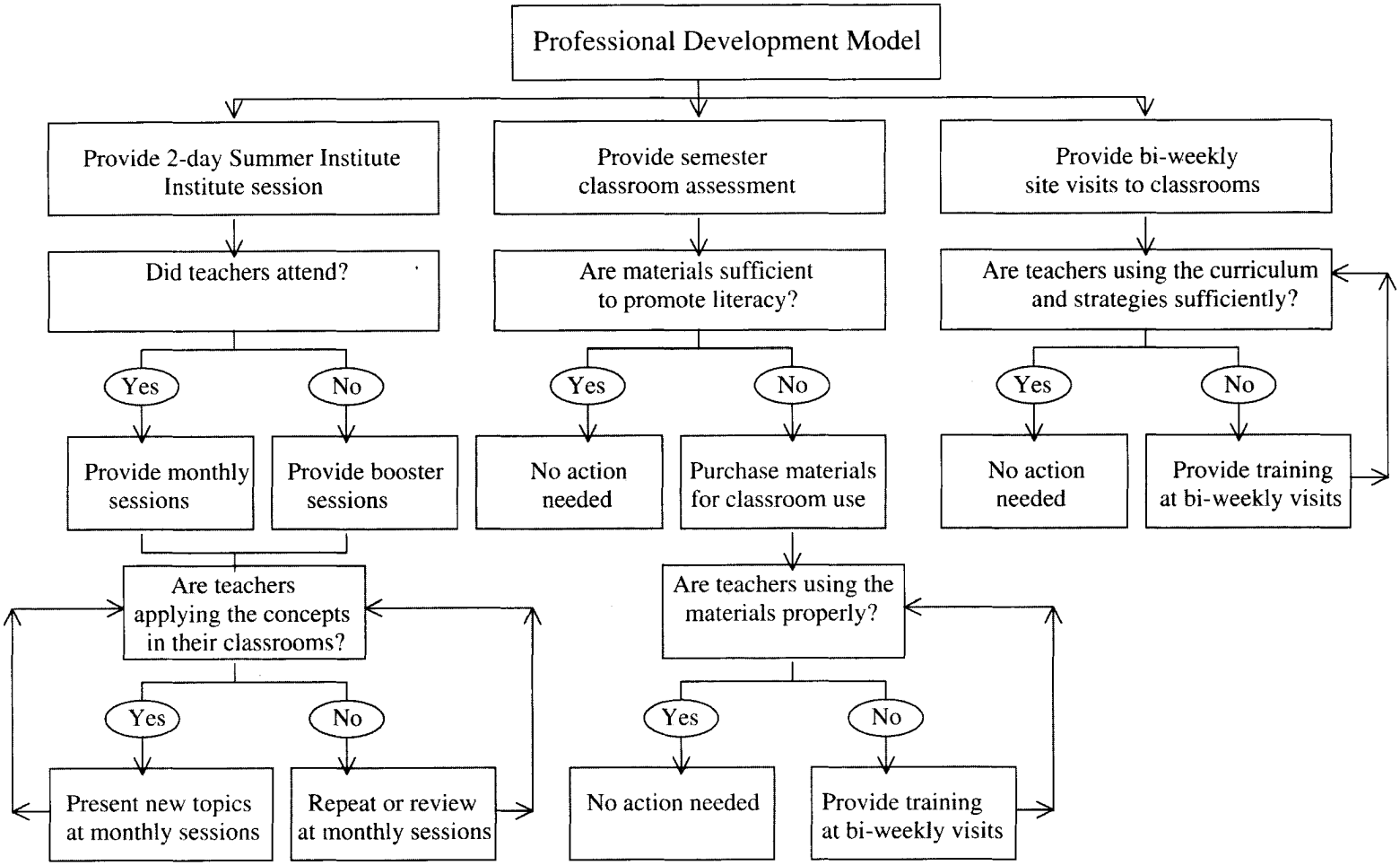

Figure 1 Flow chart of the professional development model and its implementation during the project.

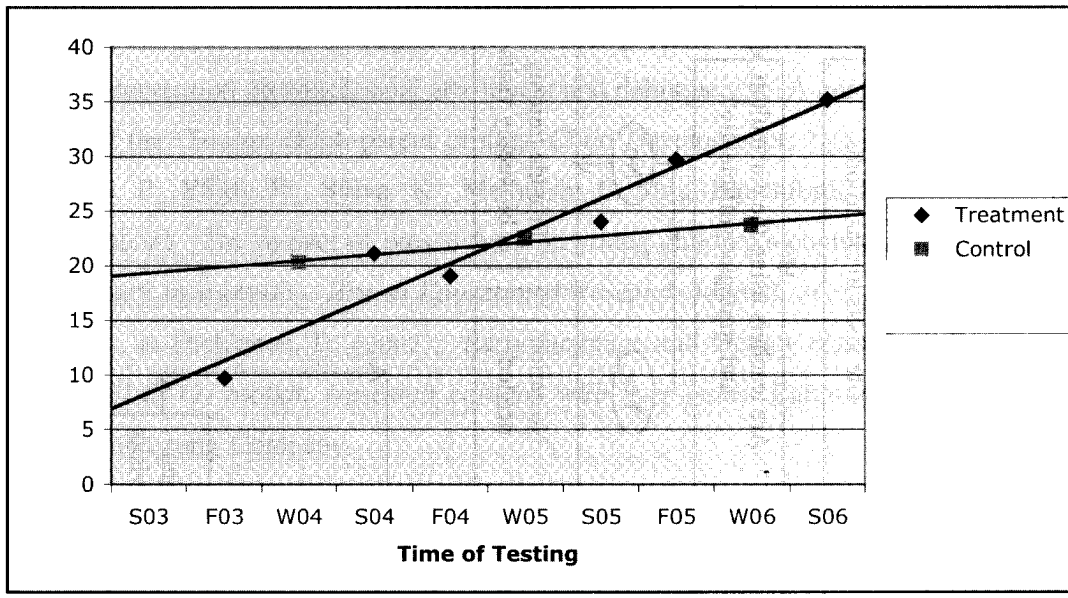

Figure 2 Comparison of treatment and comparison groups on ELLCO, Part 1: Literacy Environment Checklist

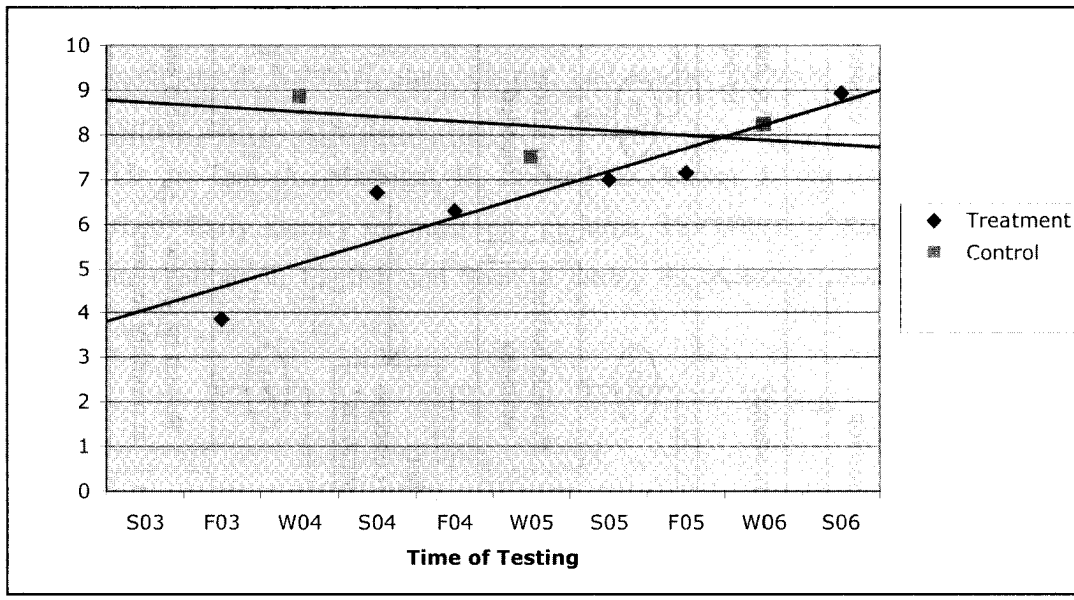

Figure 3 Comparison of treatment and comparison groups on the ELLCO, Part III: Literacy Activities Rating Scale

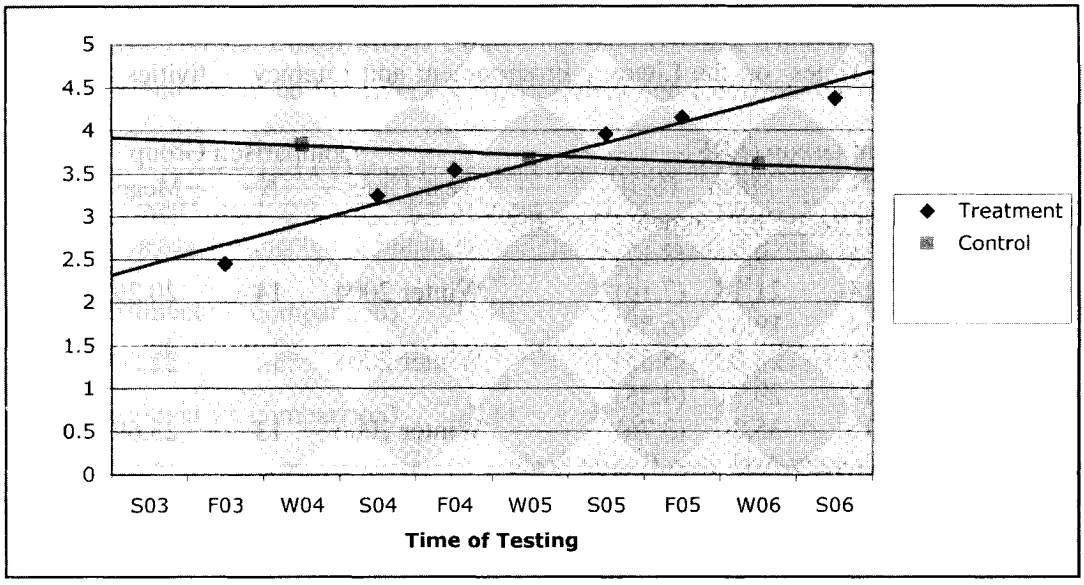

Figure 4 Comparison of treatment and comparison groups on the ELLCO, Part II Classroom Observation General Environment Subscale

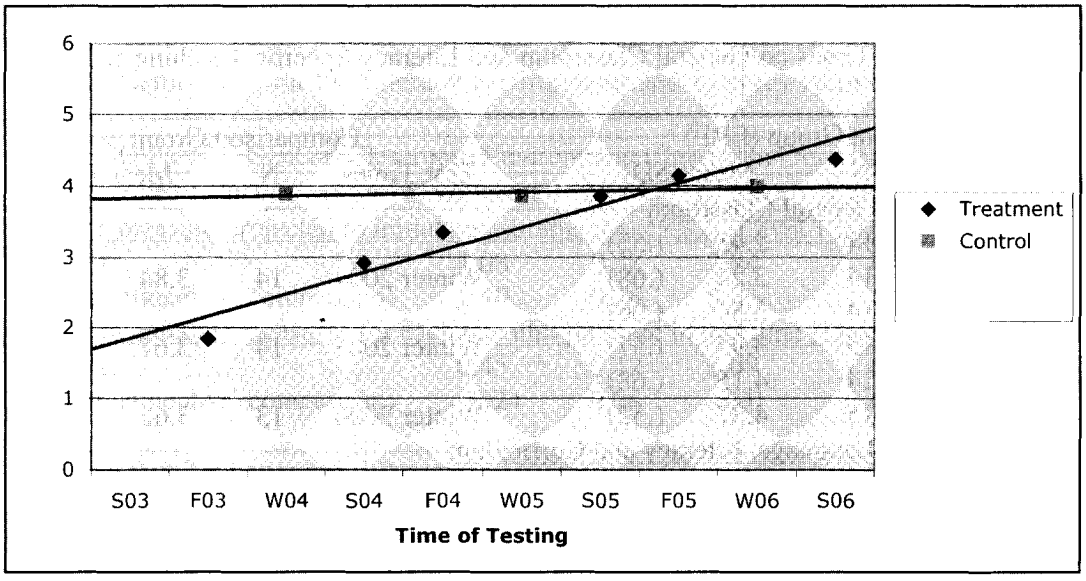

Figure 5 Comparison of treatment and comparison groups on the ELLCO, Part II Classroom Observation Language, Literacy, and Curriculum Classroom Observation Subscale

Table 1 Means and Standard Deviations of Treatment and Comparison Groups at each of the Test Times on the Literacy Environment and Literacy Activities

Treatment Group (ERF)				Comparison Group			
Test Times	N	Mean	(SD)	Test Times	N	Mean	(SD)
ELLCO Part 1: Literacy Environment Checklist							
Fall 2003	14	9.71	(3.17)				
Spring 2004	14	21.14	(7.16)	Winter 2004	14	20.29	(5.18)
Fall 2004	14	19.07	(6.59)				
Spring 2005	15	24.00	(5.55)	Winter 2005	14	22.50	(6.31)
Fall 2005	14	29.71	(4.58)				
Spring 2006	15	35.20	(3.76)	Winter 2006	13	23.69	(4.37)
ELLCO Part 3: Literacy Activities Rating Scale							
Fall 2003	14	3.86	(2.07)				
Spring 2004	14	6.71	(1.90)	Winter 2004	14	8.86	(1.83)
Fall 2004	14	6.29	(1.94)				
Spring 2005	15	7.00	(2.33)	Winter 2005	14	7.50	(2.25)
Fall 2005	14	7.14	(2.38)				
Spring 2006	15	8.93	(2.05)	Winter 2006	13	8.23	(1.79)

Table 2 Means and Standard Deviations of Treatment and Comparison Groups at each of the Test Times on General Classroom and Literacy Specific Teaching Behaviors

Treatment Group (ERF)				Comparison Group			
Test Times	N	Mean	(SD)	Test Times	N	Mean	(SD)
ELLCO Part 2a: General Classroom							
Fall 2003	14	2.45	(.55)				
Spring 2004	14	3.24	(.68)	Winter 2004	14	3.84	(.77)
Fall 2004	14	3.54	(.66)				
Spring 2005	15	3.95	(.57)	Winter 2005	14	3.67	(.72)
Fall 2005	14	4.15	(.68)				
Spring 2006	15	4.37	(.52)	Winter 2006	13	3.62	(.97)
ELLCO Part 2b: Language, Literacy and Curriculum							
Fall 2003	14	1.84	(.49)				
Spring 2004	14	2.92	(.82)	Winter 2004	14	3.89	(.51)
Fall 2004	14	3.34	(.66)				
Spring 2005	15	3.85	(.64)	Winter 2005	14	3.85	(.37)
Fall 2005	14	4.14	(.69)				
Spring 2006	15	4.37	(.47)	Winter 2006	13	3.99	(.53)

Rating Scale 1-5: 1 = deficient; 2 = between deficient and basic; 3 = basic; 4 between basic and exemplary; 5 = exemplary

Table 3 Hierarchical Linear Model Comparing the Effects of Time of Testing and Group Membership on the Literacy Environment and Literacy Activities

ELLCO Part 1: Literacy Environment Checklist					
Fixed Effect	Coefficient	SEM	t-ratio	Approx. df	p-value
Outcome measure projected to initial measurement occasion (Level 1 intercept)					
Intercept	-2.90	3.01	-0.97	47	0.340
Slope (treatment vs. comparison)	11.01	2.06	5.35	47	0.000
Change in outcome measures for each one unit increase in test time (Level 1 slope)					
Intercept	5.24	0.42	12.36	47	0.000
Slope (treatment vs. comparison)	-2.34	0.28	-8.24	47	0.000
ELLCO Part 3: Literacy Activities Rating Scale					
Outcome measure projected to initial measurement occasion (Level 1 intercept)					
Intercept	-0.67	1.06	-0.63	47	0.531
Slope (treatment vs. comparison)	4.70	0.75	6.30	47	0.000
Change in outcome measures for each one unit increase in test time (Level 1 slope)					
Intercept	1.15	0.19	6.18	47	0.000
Slope (treatment vs. comparison)	-0.63	0.12	-5.19	47	0.000

Table 4 Hierarchical Linear Model Comparing the Effects of Time of Testing and Group Membership on the Literacy Environment and Literacy Activities

ELLCO Part 2a: General Classroom Environment Classroom Observation Subscale					
Fixed Effect	Coefficient	SEM	t-ratio	Approx. df	p-value
Outcome measure projected to initial measurement occasion (Level 1 intercept)					
Intercept	1.08	0.38	2.84	47	0.007
Slope (treatment vs. comparison)	1.40	0.26	5.30	47	0.000
Change in outcome measures for each one unit increase in test time (Level 1 slope)					
Intercept	0.45	0.42	8.09	47	0.000
Slope (treatment vs. comparison)	-0.24	0.28	-6.01	47	0.000
ELLCO Part 2b: Language, Literacy and Curriculum Classroom Observation Subscale					
Outcome measure projected to initial measurement occasion (Level 1 intercept)					
Intercept (ERF)	-0.16	0.32	-0.48	47	0.631
Slope (treatment vs. comparison)	1.96	0.21	9.28	47	0.000
Change in outcome measures for each one unit increase in test time (Level 1 slope)					
Intercept	0.56	0.04	12.53	47	0.000
Slope (treatment vs. comparison)	-0.27	0.03	-8.36	47	0.000

Table 5 Effect Sizes of Pre- to Post-Test Changes in Treatment and Comparison Groups

	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Effect Size
Part 1: Literacy Environment Checklist					
Treatment	21.14	7.16	35.20	3.76	2.58
Comparison	20.29	5.18	23.69	4.37	.71
Part 2a: General Environment Classroom Observation Subscale					
Treatment	3.24	.68	4.37	.52	1.88
Comparison	3.84	.77	3.62	.97	.25
Part 2b: Literacy, Language, and Curriculum Classroom Observation Subscale					
Treatment	2.92	.82	4.37	.47	2.25
Comparison	3.89	.51	3.99	.53	.19
Part 3: Literacy Activities Rating Scale					
Treatment	6.71	1.90	8.93	2.05	1.12
Comparison	8.86	1.83	8.23	1.79	.35

Note: Pre- and post test assessment test times for the treatment group are Spring 2004 and Spring 2006, respectively; and Winter 2004 and Winter 2006, respectively for the comparison group.