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National Evaluation of Early Reading First

Final Report to Congress

National Evaluation of Early Reading First

Final Report

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Russell Jackson, Project Director
Ann McCoy
Carol Pistorino
Anna Wilkinson
Decision Information Resources, Inc.

John Burghardt, Principal Investigator
Melissa Clark
Christine Ross
Peter Schochet
Mathematica Policy Research

Paul Swank
Center for Improving the Readiness of Children for Learning and Education

Stefanie R. Schmidt, Project Officer
Institute of Education Sciences

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U.S. Department of Education
Margaret Spellings
Secretary

Institute of Education Sciences
Grover J. Whitehurst
Director

National Center for Education Evaluation and Regional Assistance
Phoebe Cottingham
Commissioner

May 2007

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Disclosure of Potential Conflicts of Interest[1]

The research team for this evaluation consists of a prime contractor, Decision Information Resources (DIR), Inc., and two subcontractors, Mathematica Policy Research (MPR), Inc. and the Center for Improving the Readiness of Children for Learning and Education (CIRCLE) at the University of Texas-Houston Health Sciences Center. DIR and MPR have no interests that could be affected by findings from the evaluation of the Early Reading First (ERF) program.

CIRCLE developed one of the study's classroom observation measures and advised on the selection of the child assessments. CIRCLE also trained DIR staff to collect classroom observation and child assessment data, but CIRCLE staff did not collect any data. They scored the classroom observations and child assessments by entering item-level data into computer programs, but they did not know the treatment or control status of the classrooms for which they entered data. CIRCLE carried out descriptive analyses of the classroom observation data that was incorporated into the report, but had no role in the impact analyses in the report. Under a separate contract with an ERF grantee that was part of the 2003 cohort in the study, CIRCLE provided services to and conducted the grantee's local evaluation as required under its grant. Under another separate contract with an ERF grantee that was part of the 2005 cohort and not in the study, CIRCLE provided technical assistance on the use of its classroom observation measure. In addition, CIRCLE has adopted a public position supporting early childhood classroom activities and instructional materials and seeks funding to provide services that are consistent with the goals of the Early Reading First program.

A consultant to DIR, Professor Christopher Lonigan of Florida State University, provided an assessment that was used in a battery of assessments for the evaluation. Dr. Lonigan's role in the DIR project was to review and provide feedback on the preliminary results of the study and to provide information on the psychometric properties of the assessment he developed. Dr. Lonigan had previously developed the assessment and he had no role in the selection of assessments. The assessment was not commercially available at the time it was selected by DIR and during the data collection phase. A revised version of the assessment became commercially available as the Test of Preschool Early Literacy (TOPEL) in January 2007, after the ERF data collection. Dr. Lonigan has a financial interest in the commercial version. Under a separate contract, Dr. Lonigan was commissioned by the Early Reading First Program Office to provide lectures on components of effective instruction in phonemic awareness at meetings of Early Reading First grantees in April 2006 and April 2007 after the preliminary descriptive findings of the report were shared with the grantees. Dr. Lonigan was also commissioned by the Early Reading First Program Office to provide a lecture on the preliminary findings of the National Early Literacy Panel in October 2004.

[1] Contractors carrying out research and evaluation projects for IES frequently need to obtain expert advice and technical assistance from individuals and entities whose other professional work may not be entirely independent of or separable from the particular tasks they are carrying out for the IES contractor. Contractors endeavor not to put such individuals or entities in positions in which they could bias the analysis and reporting of results, and their potential conflicts of interest are disclosed.

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Executive Summary

The No Child Left Behind (NCLB) Act of 2001 created the Early Reading First (ERF) program to enhance teacher practices, instructional content, and classroom environments in preschools and to help ensure that young children start school with the skills needed for academic success. This discretionary grant program provides funding to preschools that particularly serve children from low-income families so that the preschools can support age-appropriate development of children's language and literacy skills. The program, which was authorized under Title I, Part B, Subpart 2 of the Elementary and Secondary Education Act (ESEA) as reauthorized by NCLB, reflects the research of the last several years about the kinds of skills that young children must have to become successful readers. These skills include oral language (expressive and receptive language and vocabulary development), phonological awareness (rhyming, blending, segmenting), awareness of the print conventions, and alphabet knowledge (letter recognition) (Whitehurst and Lonigan 2001; Pullen and Justice 2003).

The NCLB Act also mandated an independent national evaluation of the ERF program and required a final report to Congress. This final report presents the impacts of the program on the language and literacy skills of children and on the instructional content and practices in preschool classrooms.

The main findings of the national evaluation of ERF are that the program had positive, statistically significant impacts on several classroom and teacher outcomes and on one of four child outcomes measured. Specifically, ERF had positive impacts on

- the number of hours of professional development that teachers received and on the use of mentoring as a mode of training
- aspects of classroom environments and teacher practices that were major focuses of the ERF program, including
    - language environment of the classroom
    - book-reading practices
    - the variety of phonological-awareness activities and children's engagement in them
    - materials and teaching practices to support print and letter knowledge and writing
    - the extensiveness and recency of child-assessment practices
- other, more general aspects of classroom quality, including the quality of teacher-child interactions, the organization of the classroom, and the planning of activities for children.

With regard to child outcomes, ERF had a positive impact on children's print and letter knowledge but not on phonological awareness or oral language.

ERF neither enhanced nor diminished children's social-emotional development during the preschool year. Patterns of results that were observed for the overall sample were also observed for most subgroups examined.

Study Background

Preventing Reading Difficulties in Young Children (National Research Council 1998) shows that a high percentage of children from low-income families attend preschools that may successfully address other developmental domains but often fail to provide the language, cognitive, and early-reading instruction and activities necessary to develop skills to become successful readers. Improving the instructional program to support the age-appropriate development of these skills is the central focus of ERF.

ERF provides grants to school districts, other public, nonprofit, and private organizations, and collaborations of the same entities that serve 3- to 5-year-olds, especially those from low-income families. The grants must be used to provide services that will better prepare children to enter kindergarten with the necessary language, cognitive, and literacy skills that can avert reading difficulties. ERF grants are intended to support the following items:

- A high-quality oral language and print-rich classroom environment
- Activities and instructional materials developed according to scientifically based reading research that will help develop children's oral language, phonological awareness, print awareness, and alphabet knowledge
- Screening and assessments to monitor children's acquisition of skills and to guide instruction
- Professional development formulated according to scientifically based reading research that will help teachers to enhance children's language, cognitive, and early literacy skills
- Integration of the instructional materials, activities, tools, and measures into the grantee's existing programs

Two key elements of ERF are the use of scientifically based methods and the goal of enhanced professional development. Scientifically based reading research is defined as that which applies rigorous, systematic, and objective procedures to obtain valid and reliable knowledge relevant to reading development, reading instruction, and reading difficulties. Consistent with the statutory definition of "professional development," ERF professional development was expected to be continuous, intensive, and classroom focused.

Five rounds of ERF grants have been awarded since the program began in 2002. These awards ranged from $750,000 to $4.5 million per site for a 3-year period. The national evaluation of ERF focused on the second cohort of grantees from FY 2003, in which the grants totaled approximately $75 million; the average award was $2.5 million, and individual awards ranged from $1,074,846 to $4,358,750 to be spent over three years.

The national evaluation of ERF was intended to investigate the effects on children's language development and emergent literacy when:

- preschools receive funding to adopt scientifically based methods and materials

- teachers are provided with focused professional development that supports the use of these materials and methods

The following research questions were addressed by the evaluation:

- What is the impact of ERF on the language and literacy skills of children enrolled in preschools that receive ERF support?

- What is the impact of ERF on the quality of language and literacy instruction, practice, and materials that preschools provide?

- To what extent are variations in ERF program quality and implementation associated with differences in the language and literacy skills of the children served?

Study Design

The study uses a regression-discontinuity (RD) design to assess the impact of ERF funding and program support for preschools on the language and literacy preparedness of preschool children. This study design takes advantage of the fact that the U.S. Department of Education (ED) is required to follow a formal, structured process for selecting grantees to receive ERF funding. In its published announcement of the availability of ERF grants for FY 2003 (*Federal Register* of March 11, 2003), ED established criteria for scoring each application received. Independent reviewers used these criteria to review and score applications. ED then awarded ERF grants to the grant applicants with the highest application scores, progressing down the score distribution until all funding available for the fiscal year had been allocated. In this way, 30 grants were awarded to the grant applicants with scores of at least 74; applicants with scores below 74 were not awarded grants. Impact estimates were obtained by comparing child outcomes and teacher practices in funded sites to those in unfunded sites, controlling for a smooth function of the application score.

The final evaluation sample was composed of a treatment group, which consisted of 4-year-olds attending preschool in 28 of 30 ERF grantee sites, whereas the comparison group consisted of children attending preschool in 37 of the 67 unfunded applicant sites that had the highest application scores and that agreed to participate in the study. Approximately three classrooms were selected from each participating site with probabilities proportional to the number of eligible students in each class (see Table 1). The study team randomly selected approximately 11 4-year-old students per classroom whose parents had provided written consent for participation in the study.

Table 1. Sample sizes for National Evaluation of ERF

Unit of Analysis	Funded sample size	Unfunded sample size	Total
ERF grantees/unfunded applicants	28	37	65
Preschools	86	75	161
Classrooms observed	78	91	169
Teachers surveyed	92	102	205
Children assessed	803	855	1,658

The study team collected data for the evaluation from several sources. Trained staff directly assessed the language and literacy skills of children participating in the study. Trained observers measured classroom practice in a subsample of study classrooms. The teachers of all children in the sample and the director or principal of each preschool participating in the study completed a self-administered questionnaire. Teachers of the sampled children were also asked to rate each child's social-emotional behavior. The study team also obtained data from the preschools about children's school attendance for the 2004–2005 year. Finally, parents of the sampled children were interviewed by telephone.

Data were collected at two times: fall 2004 and spring 2005. The same data-collection instruments and procedures were used in the funded and unfunded sites.

Child Assessments. Table 2 shows the instruments that were used to measure children's language and literacy skills in three domains (print and letter knowledge, phonological awareness, and oral language) and their social-emotional behavior.

Table 2. Data-collection instruments: child assessments

Instrument name	Domain measured	Psychometric information from published sources
(Pre-LAS)[1]	English proficiency screening	Internal consistency reliability = .86–.90
Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP)[2]	Print and letter knowledge	Test of Preschool Early Literacy (TOPEL): • Internal consistency reliability = .95 • Test-retest reliability = .89
	Elision[3]	Internal consistency reliability = .71–.88
Expressive One-Word Picture Vocabulary Test (EOWPVT) [4]	Expressive vocabulary	• Internal consistency reliability coefficients = .96–.98 • Test-retest reliability = .95
Preschool Language Scale (PLS-4)[5]	Auditory comprehension	• Test-retest reliability = .83–.91 • Internal consistency reliability coefficients = .83–.90
Social Competence & Behavior Evaluation (30-item)—Teacher Rating[6]	• Social competence • Anger-aggression • Anxiety-withdrawal	Internal consistency reliability coefficients = .85–.92

[1] Duncan, S. E., and DeAvila, E. A. (1998). *Pre-LAS 2000*. Monterey, CA: CTB/McGraw-Hill.
[2] Lonigan, C., Wagner, R., Torgesen, J., and Rashotte, C. (2007). *The Test of Preschool Early Literacy (TOPEL).* Austin, TX: PRO-ED.
[3] Internal-consistency reliability coefficients of Elision subtest from unpublished tabulations using data from the Head Start Impact Study (U.S. Department of Health and Human Services 2005), and the forthcoming Even Start Classroom Observations and Interventions and Preschool Curriculum Evaluation Research studies, both being conducted by IES.
[4] Brownell, R. (2000). *Expressive One-Word Picture Vocabulary Test Manual*. Novato, CA: Academic Therapy Publications.
[5] Zimmerman, I. L., Steiner, V.G., and Pond, R.E. (2002). *Preschool Language Scale-4th Edition, Examiner's Manual*. San Antonio, TX: The Psychological Corporation.
[6] La Freniere, P. J., and Dumas, J. E. (1996). "Social competence and behavior evaluation in children ages 3 to 6 years: The short form (SCBE-30)," *Psychological Assessment, 8,* 369–377.

Classroom observations and surveys. Classroom practice and overall quality of the preschool classrooms were measured by two observation instruments—the Teacher Behavior Rating Scale (TBRS)[2] and 11 items from the Early Childhood Environment Rating Scale-Revised (ECERS-R) that form the Teaching and Interactions Subscale.[3] Trained members of the study team conducted the classroom observations.

[2] Landry et al. (2004). "Teacher Behavior Rating Scale (TBRS)," unpublished research instrument.
[3] Harms, T., Clifford, R.M., and Cryer, D. (1998). *Early Childhood Environment Rating Scale: Revised Edition*. NY: Teachers College Press, and Clifford, R.M., Barbarin, O., Chang, F., Early, D., Bryant, D., Howes, C., Burchinal, M., and Pianta, R. (2005). "What Is Pre-Kindergarten? Characteristics of Public Pre-Kindergarten Programs." *Applied Developmental Science*, vol. 9, no. 3, pp. 126–143.

The evaluation team also developed self-administered surveys that the teachers and preschool principals or directors completed in the fall of 2004 and spring 2005. Parents of children in the study were interviewed through computer-assisted telephone interviewing. The team conducted in-depth telephone interviews with grantee directors for each of the 28 funded grantees to learn about their use of ERF funds, including challenges encountered and notable successes.

Impact estimation and hypothesis testing. Impact estimates were obtained by comparing child outcomes and teacher practices in funded sites to those in unfunded sites, controlling for a smooth function of the application score. If the application score fully reflects the selection rule used to award ERF grants and we control for the correct function of the score, this approach produces unbiased estimates of the effect of ERF.

We adopted a 2-tailed hypothesis test because it was unclear before the evaluation whether ERF funding would improve all outcomes. For each outcome, the findings indicate the statistical significance of the impact estimates at the 5-percent level. The analysis methods accounted for the fact that some outcome domains contained multiple measures. The tables presented include checkmarks for domains in which impacts are jointly statistically significant once the adjustment for multiple comparisons is made. The tables also include p-values for tests of statistical significance of individual outcomes that do not reflect adjustments for multiple comparisons. The conclusions are unaffected when adjustments for multiple comparisons are applied.

The following sections contain findings about

- characteristics of ERF children and preschools
- ERF impacts on teachers and classroom practices
- ERF impacts on children's language and literacy skills and social-emotional outcomes

The evaluation also estimated ERF impacts for several subgroups defined by key characteristics of children, preschools, and teachers.

Characteristics of ERF Children and Preschools

Characteristics of children. ERF participants appeared to be more disadvantaged than the national average. A relatively large proportion of children served by ERF grantees had some characteristics associated with disadvantage. More than one-third of the ERF sample reported monthly income of less than $1,500, compared to 17 percent of households with 3- to 5-year-olds nationally. Children in this cohort were also more likely than children nationally to come from single-parent households (40 percent compared to 28 percent), be Hispanic (46 percent compared to 21 percent), and have foreign-born parents (39 percent compared to 23 percent). About 4 out of 10 ERF parents (41 percent) reported that the primary language spoken in the home was something other than English. Initial scores on three standardized assessments suggest that children were functioning below national norms (which were standardized to be 100 on all three tests) when they entered the ERF program. ERF participants scored an average of 94 on test of print and letter knowledge, 91 on a test of auditory comprehension (an oral language measure), and 83 on a test of expressive vocabulary (another oral language measure).

Characteristics of preschools. The vast majority of ERF preschools (95 percent) combined ERF funding with other government funding sources, which was consistent with the goal of the program to enhance the quality of existing programs that particularly serve children from low-income families. The most common funding sources were state and local education agencies, state child-care funds, and Head Start, which were received by 56 percent, 38 percent, and 36 percent of ERF preschools, respectively. Just over half of ERF preschools received funding from only one of these sources, while over 40 percent received funding from two or more sources. The schedule on which ERF preschools operate and the characteristics of their teachers provide useful context for examining study findings. Three-quarters are full-day programs (operating for an average of 8 hours per day), 62 percent have a class size of 20 children or fewer, and almost 70 percent have a staff-to-child ratio of 1:10 or better. Seventy-five percent of the ERF teachers have bachelor's degrees, 67 percent have teaching certificates or licenses. Among teachers in ERF classrooms, 87 percent had completed college-level courses in early-childhood education or development, 67 percent had completed courses in teaching reading to elementary-school children, and 79 percent had completed courses in teaching language and literacy skills to children in a preschool setting.

ERF funding in the preschools. Based on the reported number of preschool children expected to be served by the FY 2003 grantees, the median ERF allocation across the 28 grantees evaluated in the FY 2003 cohort was $3,549 per preschool child per year.[4] These funds are in addition to the other government funding sources received by the preschools. To provide perspective, annual average Head Start funding per child in Fiscal Year 2003 was $7,092.[5]

Professional development through ERF. ERF teachers reported receiving an average of 72 hours of professional development during the previous year—the equivalent of 9 days. One hundred percent of teachers in ERF-funded classrooms reported receiving professional development in phonemic and phonological awareness (see Table 3). The vast majority of ERF teachers received training in six other language-development and early literacy topics, including literacy-rich print environments (97.8 percent), concepts of print writing and prewriting (96.7 percent), oral language (96.7 percent), facilitating emergent literacy (95.7 percent), alphabetic knowledge (92.4 percent), and oral comprehension and cognition (88.0 percent). Nine out of 10 ERF teachers reported receiving training in child assessment. Three-fourths of ERF teachers reported receiving training in traditional early-childhood topics, including children's development and ways to manage children's behavior in the classroom.

[4] The methodology used to compute the ERF allocation per child is described in Appendix B, "Data Collection Methods."

[5] U.S. Department of Health and Human Services (April 2004), *Head Start Program Fact Sheet Fiscal Year 2003,* Administration for Children and Families. http://www.acf.hhs.gov/programs/hsb/research/2004.htm.

Table 3. Topics in which ERF teachers received professional development in the past 12 months

Topic Areas	% ERF teachers who received training in topic
Language Development and Early Literacy	
Phonemic & phonological awareness	100.0
Literacy-rich environments	97.8
Concepts of print writing & prewriting	96.7
Oral language	96.7
Facilitating emergent literacy	95.7
Alphabetic knowledge	92.4
Oral comprehension & cognition	88.0
Child Assessment	
Child Development and Behavior	90.2
Early childhood growth & development	76.1
Classroom management	76.1
Other Topics	56.5
Number of Topics	**% ERF teachers who received training in number of topics**
0	0.0
1 to 4	1.1
5 to 8	21.7
9 or 10	77.2
Mean # of topics (SD)	9.6 (1.7)
Sample Size	92

SOURCE: Spring teacher surveys.

Curriculum and assessment. The statute requires ERF grantees to identify and provide activities and instructional materials that are designed according to scientifically based reading research for developing children's oral language, phonological awareness, print awareness, and alphabet knowledge.[6] ERF programs are also expected to integrate assessments of child progress with teaching so that instruction can build on what children already know and bring them to the next level (U.S. Department of Education 2003).

In ERF preschool classrooms, 39 percent of the teachers reported following one curriculum, and 61 percent reported using a combination of curricula. The most commonly reported curricula in ERF classrooms are Creative Curriculum (reported by 46 percent of teachers) and High/Scope (Educating Young Children) curriculum (reported by 24 percent of teachers).

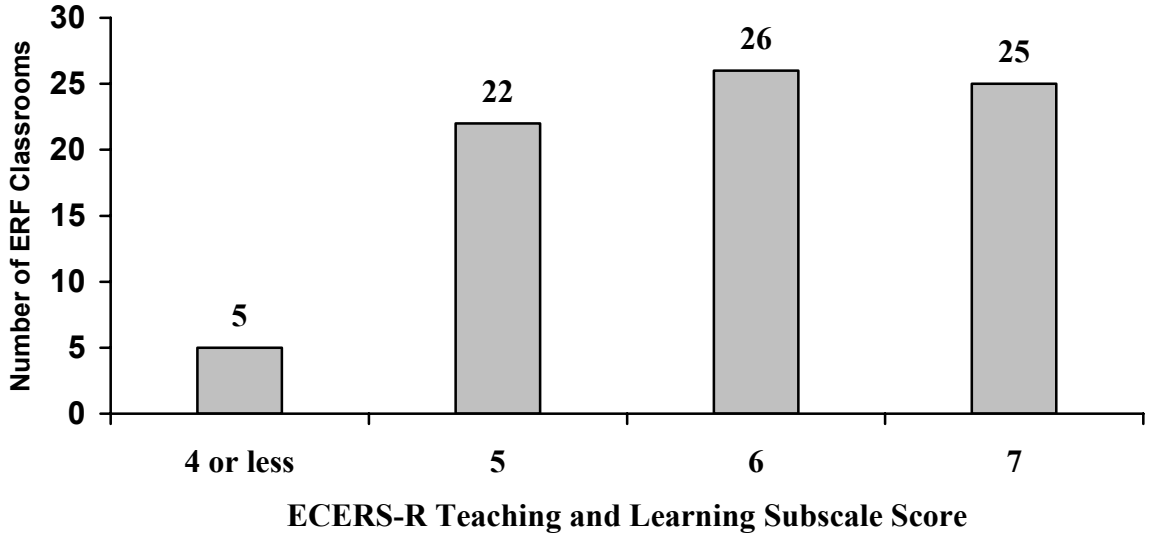
Nearly all ERF teachers (98 percent) reported using at least one assessment tool for children in their classes. A majority of ERF teachers (64 percent) reported using more than one assessment instrument with children in their classes.

Classroom environments and teacher practices. The Early Childhood Environment Rating Scale-Revised (ECERS-R) provided a measure of the general quality of the preschool

[6] U.S. Department of Education. *Guidance for the Early Reading First Program*. Washington, DC, March 2003, p. 5.

environment. The quality of teacher-child interactions refers to the teacher's responsiveness to children; sensitivity to children's needs; consistent, positive guidance; and encouragement. As one measure of teacher-child interactions, we used the Teaching and Interactions subscale of the ECERS-R (Clifford et al. 2005). The average score on the ECERS-R Teaching and Interactions subscale in the spring was 5.8 for ERF classrooms (slightly higher than 5.7 average score in the fall), with all but 5 classrooms scoring at least a "good" or 5 on the subscale (see Figure 1).[7]

Figure 1. Number of ERF classrooms by ECERS-R Teaching and Interactions Subscale, spring 2005



The TBRS measures the general quality of preschool classrooms (including teacher sensitivity) as well the language and early literacy aspects of teacher instructional practices and the available classroom materials. The TBRS items are scaled so that higher values represent greater frequency or quality or both, using Likert ratings that range from 1 (low or none) to 4 (high frequency/high quality) for virtually all of the items. Because of a high correlation between quantity and quality item scores, we have averaged them to create a single-item score and created subscales from these composite items.[8]

[7] Scores on the Teaching and Interactions subscale tend to be higher than scores on the full ECERS-R scale. In a sample of Head Start classrooms, the ECERS-R score was 4.9, and the Teaching and Interactions subscale score was 5.5.

[8] Appendix C contains additional information about the TBRS subscales used in the ERF evaluation.

The total TBRS score summarizes all of the TBRS general quality and language, literacy, and assessment subscales. The subscales measured

- oral-language use
- book-reading practices
- phonological-awareness activity
- print and letter knowledge
- written expression
- portfolios
- dynamic assessment

The average TBRS total score was 2.7 for ERF classrooms in the fall and 2.6 in the spring.

ERF Impacts on Teachers and Classroom Practices

In assessing the impact of ERF on teachers and classroom practices, we examined the following outcomes:

- teacher knowledge and skills
- the general quality of the preschool environment
- the quality of language, early literacy, and child-assessment practices and environments

Within each of these outcome areas, we examined measures for several domains. We also examined impacts on selected subgroups of teachers and classrooms.

Teacher knowledge and skills. We expected that ERF preschools would enhance teachers' knowledge and skills through professional development. Overall, we find that ERF had positive impacts on the hours of teachers' professional development during the 12 months preceding the spring 2005 survey and that it increased the proportion of teachers receiving professional development through mentoring.

- ERF increased the number of hours of professional development that focused on language and early literacy topics by 48 hours (6 days) over the 12 months preceding the survey.

- A higher proportion of ERF teachers than teachers in unfunded programs reported receiving professional development on language or literacy topics and on curriculum topics through mentoring or tutoring. The program's impact on the proportion of teachers receiving mentoring or tutoring on language and literacy topics was 41 percentage points.

- A larger proportion of ERF teachers than teachers in unfunded programs reported receiving workshop training on language and literacy topics. The program's impact on the proportion of teachers receiving workshop training on language and literacy topics was 41 percentage points.

ERF did not induce centers to raise the wages of their teachers who had received additional professional development through the program.

General quality of the preschool environment. This study examines teacher behaviors and environmental factors that relate to the general quality of the preschool classroom environment. We selected general quality measures, including teacher behaviors and classroom environment, that previous research has found to be positively correlated with young children's cognitive skills and emotional development (Vandell and Wolfe 2000; NICHD Early Childhood Research Network 2002, 2003, and 2006). However, given its correlational nature, this research is not conclusive. Further, the study examines the measures of teacher instructional practices and classroom environment that are closely related to ERF's emphasis on language and emerging literacy skills.

In the spring, ERF had *pervasive* impacts on the general quality of the preschool classroom—the classroom language environment, materials, and teaching practices that support early literacy, and child-assessment practices. In particular, ERF

- Increased the lead teachers' sensitivity and the quality of interactions toward children by approximately one standard deviation relative to what we would have expected in the absence of the program.
- Improved the quality of the assistant teachers' interactions with children by 0.79 standard deviations.
- Had positive impacts on measures of the organization of the classroom environment; effect sizes exceed one standard deviation.
- Significantly improved lesson planning.
- Increased the overall quality of the classroom-learning environment, measured by the total TBRS score (the average across subscales measuring general classroom quality and the language and early literacy environment).
- Increased the general quality of teacher-child interactions as measured by the ECERS-R teaching and learning subscale.

Quality of language, early literacy, and child-assessment practices and environments. In the spring, ERF had impacts on all domains of classroom language, early literacy, and assessment practices. Specifically

- Oral language use by both the lead and assistant teachers
- Book-reading practices that include introducing new vocabulary, using expressive voice, and asking open-ended questions during the book-reading session
- Phonological awareness activities that promote knowledge of letter and word sounds
- Print and letter knowledge materials and activities to promote letter recognition and the association between sounds and letters

- Written expression and early writing activities
- Child screening and progress assessments on a regular basis to plan instruction

ERF Impacts on Children's Language and Literacy Skills and Social-Emotional Outcomes

Ultimately, through its effects on classroom practices, the ERF Program is intended to provide young children with the necessary language, cognitive and early-reading skills to prevent reading difficulties and ensure school success as they enter kindergarten. We obtained the outcome measures for the child analyses from assessments that were given to children in spring of the school year on their literacy and language skills and behavior. The assessments measured *print and letter knowledge, phonological awareness, and oral language.* We also estimated ERF's impacts on children's social-emotional development.

Impact findings. Overall, we find that ERF had a statistically significant positive effect on children's print and letter knowledge but no statistically discernable impact on phonological awareness or oral language. We find no evidence of negative impacts on children's social-emotional skills. Specifically:

- ERF increased children's standard scores on Pre-CTOPPP print awareness by 5.78 points relative to what we would have expected in the absence of the program. This increase indicates that ERF improved children's ability to recognize letters of the alphabet and associate letters with their sounds. The impact estimate translates into an effect size of 0.34 standard deviations. Comparison of the regression-adjusted standard scores for children in the unfunded sites to the national norms for this subtest indicates that in the absence of ERF, children in the ERF sites would have scored about 3 percentage points below the national average of 100; with exposure to ERF, their average score of 102.69 was slightly above the national average for this subtest.
- We find no evidence that ERF improved children's phonological awareness.
- We find no evidence that ERF improved children's oral language skills.
- ERF did not affect children's social-emotional skills, as measured by the SCBE-30 anger-aggression, social-competence, and anxiety-withdrawal scales. The lack of program effects in this domain is noteworthy in light of concerns that ERF might *adversely* impact these skills by compelling teachers to focus on improving language and literacy at the expense of developing other skills.

Analysis of Mediators of ERF's Impacts on Classroom Instructional Practice and Children's Language and Literacy Skills

As a final part of the analysis of ERF, we explored potential channels, or mediators, through which ERF generated its positive impacts on classroom and child outcomes. Unlike the impact analyses, this analysis is correlational, rather than quasi-experimental, because we could not use the regression-discontinuity design to identify the causal effects of particular mediators.

Consequently, any observed effect of mediators on child or classroom outcomes might be due to the effects of unobserved factors that happen to be correlated with these mediators, rather than to the mediators themselves.

For our analysis of the channels through which ERF generated positive impacts on classroom and child outcomes, we hypothesized that the additional hours of professional development attributable to ERF and the increased proportion of teachers receiving professional development through intensive, individualized mentoring account for at least some of ERF's impact on the classroom language and early literacy environment. The impacts on classroom environments, in turn, might account for at least some of the program's impacts on children's language and literacy skills.

To investigate this hypothesis, we first examined the extent to which hours of professional development and the use of mentoring as a mode of training were associated with the classroom outcomes affected by ERF. We then examined the associations between classroom outcomes and the child outcome on which ERF had a positive impact—print and letter knowledge. Thus, our model of print awareness includes as mediators the number of phonological awareness activities, print- and letter-knowledge learning opportunities, written-expression learning opportunities, the classroom print environment, opportunities and materials for writing, book-reading practices, child portfolios, and teacher sensitivity.

The estimated marginal effect of hours of professional development is generally small and not statistically significant on each of the 10 measures with the exceptions of classroom print environment and teacher sensitivity; we estimated positive and statistically significant effects of professional development on those two measures. Similarly, the estimated marginal effect of mentoring on each of the 10 outcomes is generally small and not statistically significant, with the exceptions of child portfolios and teacher sensitivity; the estimated marginal effects of mentoring are negative and statistically significant on those two outcomes. The mediators are jointly statistically significant only for child portfolios and teacher sensitivity.

The estimated marginal effects on print and letter knowledge are not statistically significant for any of the potential mediators except print and letter-knowledge learning opportunities, which account for 27 percent of the total implied impact on print-awareness scores. Together, all eight mediators account for 60 percent of the total implied impact on print and letter knowledge and are jointly statistically significant at the 5-percent level.