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At-Risk Preschool Children: Establishing Developmental Ranges that Suggest At-Promise

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Abstract

The Early Reading First (ERF) program provided grants to transform preschools into centers of education excellence with the ultimate goal of preventing later reading difficulties (No Child Left Behind Act of 2001). The intent of ERF grants was to provide preschoolers with the necessary cognitive, early language, and literacy skills for success in kindergarten (United States Department of Education, 2007). Programs that received ERF funds were required to monitor children's progress in specific literacy and language skills (i.e., automatic recognition of alphabet letters, knowledge of the conventions of print, understanding of phonemes and letters, and use of increasingly complex vocabulary) and to identify children who may be "at risk". However, ERF failed to provide guidelines for monitoring progress or definitions of at risk. In this article, we explore an alternative approach to identifying children as at risk in preschool using data from the third year of Project EXEL, a 2002 ERF project. Our study developed a set of benchmarks for end-of-year preschool accomplishments in the areas of alphabet recognition, concepts about print, phonemic awareness and alphabetic principle, and vocabulary development. We also explored how these benchmarks might be used with monitoring assessments to identify preschoolers who may not be making satisfactory progress toward expected end-of-the-year performance.

Introduction

This article is structured in the following manner. We first discuss definitions of reading difficulties and procedures used to identify children with reading difficulties. Second, we relate these definitions and procedures to identifying preschool children who are at risk. Third, we describe the set of benchmarks that we developed for end-of-the-year preschool literacy accomplishments. We conceived of these benchmarks as a range of performance and believed that children who achieve within these ranges have a high likelihood of obtaining expected levels of accomplishment in kindergarten. Fourth, we apply these benchmarks to data from 2005-2006, the third year of Project EXEL. These data demonstrate that Project EXEL produced superior literacy and language outcomes and increased the percentage of children who reached developmental benchmarks compared to a control group of children in similar preschool classrooms. Next, we share children's progress monitoring scores to demonstrate the difficulties of identifying children who are at risk early in preschool programs. It is important to consider that Project EXEL did not include a response to intervention approach in its overall plan. Instead, the project director and other key stakeholders believed that many children who might be identified as at risk merely have not had an opportunity to receive high quality, scaffolded instruction, and would excel given the chance.

Definitions of Reading Difficulties and Methods of Identification

McEneaney, Lose, and Schwartz (2006) describe three ways of defining and identifying reading difficulties: categorical, discrepancy, and transactional approaches. The categorical view of reading difficulties, which emerged from early clinical studies by medical professionals (Hinshelwood, 1917), posits that reading disabilities are related to brain dysfunctions. This position leads to the conclusion that readers with disabilities are deficit in some core brain function involved in reading. Later models, which have posited deficits in cognitive processing, have defined the causes of reading disabilities as breakdowns in critical processes involved in reading such as being able to recode or transform graphemes into phonological units (Castles & Coltheart, 1993). However, research provided challenges for this definition of reading disability as some have found no evidence of a qualitative or categorical difference between children identified with dyslexia and other poor readers (Snow, Burns, & Griffin, 1998). Therefore, a more compelling model of reading disabilities emerged called the discrepancy view of reading difficulties.

The discrepancy, also called the dimensional approach (Snow et al., 1998), acknowledges that reading abilities, like other human abilities, range on a continuum (e.g., low, average, high) and are based on a norm-referenced assessment, where children's performance is compared to other children in an appropriate comparison population called the norm population. Readers whose abilities are at the low end of the continuum, compared to a norm group, are considered to be different or discrepant from normal readers. Because discrepancy is based on a cutoff point along a statistical distribution of skill in reading, the identification of disabled readers is arbitrary.

A third view of reading difficulties is called the transactional view and is based on theory and research in sociocultural theories of literacy (Jimenez, 2000) and situated cognition (Anderson, 2003). Reading disabilities are considered to be not solely rooted in the individual child, but rather result from the interaction of the child, the teacher, and the context. According to this perspective, any child may experience difficulties when his/her abilities cannot be appropriated into instruction which results in failure to learn. Based on this view, criterion-referenced assessments are employed. In contrast to norm-referenced assessments, children's performance is measured against a standard which identifies the level of achievement children should have acquired at specific points in their education.

Defining Preschoolers as At Risk for Failure in Reading

Because it is clear that some children who struggle to learn to read in first grade continue to be poor readers through the elementary grades (Juel, 1988), researchers have investigated why some children seem prepared to begin reading successfully while others struggle. Thus, researchers have sought to identify early predictors (in preschool and kindergarten) of reading achievement—"some measurable characteristic of a child or the child's home, school, or community that has been associated with poor progress in learning to read" (Scarborough as cited in Snow et al., 1998, p. 100). Researchers identified group factors (e.g., SES, minority status, home language other than English) and community factors (e.g., schools serving high numbers of families living in poverty) related to later reading failure. More recently, individual factors such as knowledge of foundational reading concepts, the nature of preschool and kindergarten experiences (National Early Literacy Panel, 2008), and home teaching practices (Britto, Brooks-Gunn, & Griffin, 2006) have also been identified.

Most children served by ERF grants are minorities, from low SES backgrounds, and may have English as their second language. Thus, the population of

children served is by definition at risk by virtue of group risk factors. However, the regulations of ERF require that grantees use individual factors (achievement in foundational literacy concepts) to further identify children as at risk.

The typical approach to identifying children as at risk in preschool is similar to the dimensional or discrepancy view of reading difficulties in which children on the low end of a continuum of performance on a variety of literacy assessments are identified as at risk. For example, children who score in the bottom quartile or quintile (lowest 20%) on an alphabet recognition test are considered at risk. This approach is problematic for at least two reasons. First, research has shown that low SES preschoolers, the children primarily served by ERF grants, score lower than middle class preschoolers on nearly every measure of language and literacy (Lonigan, Burgess, Anthony, & Barker, 1998). For example, at the beginning of preschool all low SES children in ERF projects are expected to know few, if any, alphabet letters so all children may cluster at the low end of the continuum making it difficult to know which children will move out of the lower end of the continuum after receiving instruction and which children will struggle to do so. The second problem with the dimensional approach to identifying children at risk is that a certain percentage of children are always considered at risk. If the lowest scoring 20% of the children can recognize 40 letters at the end of preschool, these children would be considered at risk. Yet knowing 40 alphabet letters at kindergarten entry may not be a risk factor.

An alternative method of identifying children at risk is to use the criterion referenced approach in which standards of expected achievement are specified. This approach also approximates the transactional view, in which all children are expected to vary at entry, but with personalized instruction most acquire foundational skills; those that do not are considered at risk. In this approach to identifying children as at risk, expected levels of performance that are likely to predict successful entry and progress through kindergarten are identified, and children receive research-based instruction aimed at helping them reach these expected levels of performance. Our benchmarks are based on this approach as we have examined research to determine preschool literacy developmental ranges in alphabet recognition, phonemic awareness, and concepts about print. We assume that scoring within one standard deviation of the mean on a standardized vocabulary assessment is an indication of reaching an expected level of achievement in vocabulary development.

Identification of Benchmark Levels of Literacy Achievement in Preschool

To identify standards of performance and set developmental ranges in literacy foundations at the preschool level, we turned to descriptive studies of what preschoolers know and can do and instructional research or training studies of what preschoolers can learn to do. We summarized many of these studies previously (McGee, 2005) to determine the level of knowledge typical of middle class preschool children or children who received effective research-based instruction. We reasoned that such levels of knowledge might enable children entering kindergarten to perform at least at the average of their class and to benefit from classroom literacy instruction. For example, Byrne and Fielding-Barnsley (1991) found that a small sample of middle SES preschoolers know a mean of 12.6 letters out of 26. Treiman, Tincoff, Rodriguez, Mouzaki, and Francis (1998) examined the knowledge of individual letter names and letter-sound correspondences among 600 preschoolers in two samples. One sample of children recognized 54% of the letters and six letter-sounds, and a second sample recognized 74% of the letters and nine letter sounds. Justice and Ezell (2002) found that low SES preschoolers know a mean of 6.0-6.8 letters out of a set of 20 letters, but with instruction learned a mean of 7.8 to 10.9. Justice, Chow, Capellini, Flanigan, and Colton (2003) demonstrated that children knew 16 of 26 letters. Roberts (2003) found that young ELL children only knew a range of 2.3 to 2.8 letters out of a set of 16, but after instruction learn a range of 6.7 to 11.1 letters. Roberts and Neal (2004) found that at the end of a 16-week instructional program for ELL preschoolers, 58% of the children knew 13 or more letters and the mean number of letters learned was 11 out of 16 letters taught. Taken together, these studies suggested that the mean number of letters that middle class children know range from 50-75% of the alphabet, and low income children can learn a similar range of letters with appropriate instruction. Thus, a developmental range of expected knowledge for alphabet recognition would be 50-75% of the total 52 letters at the end of preschool.

Research on children's concepts about print shows a similar pattern with middle income children knowing more concepts, but low SES children capable of learning within that range. For example, Byrne and Field-Barnsley (1991) demonstrated that middle class children know a mean of 5.4 concepts about print from a set of 24. Justice and Ezell (2002) and Justice et al. (2003) demonstrated that low SES children knew a mean of 5.0 to 9.1 concepts out of 20, but can learn a range of 7.6 to 11.2 concepts. In a later study, Justice, Bowles, and Skibbe. (2006) showed that middle class children knew a mean of 10 out of 17 concepts while low SES

children knew 4 out of 17 concepts. Roberts and Neal (2004) demonstrated that ELL children could learn a range of 8.6 to 12.0 concepts about print out of 23 with targeted instruction. The range of concepts about print that middle class children knew and lower SES and ELL children learned seemed wide with a low of approximately 25% to a high of approximately 60%. However, most studies used a wide range of concepts about print based on Clay (1993), and some of these concepts are intended for children as old as first grade. Thus, we decided that a developmental range from 60-70% of a smaller number of concepts about print (16) more appropriate for the preschool population would work well.

In deciding the range of phonological awareness appropriate for preschoolers, we considered not only the level of awareness, but also the type of assessment used. Justice (2006) argued that, "There is little evidence indicating what level of phonological awareness a child must achieve to be a good reader or on what type of tasks he or she should be able to perform adequately if not masterfully" (p. 291). However, she also indicated that children must demonstrate some threshold level of performance and suggested that level would be with a unit smaller than a syllable. Therefore, being able to segment an onset (a single phoneme in single consonant word) from a rime is likely the threshold that matters in phonemic awareness. For older children in kindergarten, being able to detect a phoneme is the level of phonemic awareness that matters for reading and spelling (Gillon, 2004). Although few studies examine preschoolers' initial ability to segment a phoneme from a spoken word, several demonstrate that a significant percentage of preschoolers can learn to segment phonemes with instruction. Byrne ,and Fielding-Barnsley and Ashley (2000)1999) revealed that children could learn to segment 67% of phonemes taught in both initial and final position (Byrne & Fielding-Barnsley, 1991). In fact, 95% of the children segmented most phonemes in both the initial and final position. Hindson, Byrne, Fielding-Barnsley, Newman, Hine, & Shankweiler (2005) also demonstrated that preschoolers identified as at risk could reach similar levels of phoneme segmentation (approximately 50%) with instruction. While other tasks (e.g., rhyme detection or production) have been used to demonstrate children's phonological awareness, our project decided to use isolation or segmentation of the beginning phoneme of a word as the expected level of achievement that would suggest success in kindergarten. Thus, the expected range for phonemic awareness was set at isolating or segmenting beginning phonemes in 50-70% of spoken words at preschool exit.

Finally, we examined research which measured children's knowledge of letter-sound relationships. Byrne and Fielding-Barnsley (1991) found that middle class

children knew a range of five to six letter sounds. Treiman et al. (1998) found that middle class children knew a range of 5.6 to 8.3 letter sounds. Bloodgood (1999) showed that middle income preschoolers knew a mean of 8.26 out of 12 letter sounds but learned 10.11 by the end of the year. Taken together, the research shows that most children in preschool know from five to eight letter sounds, but can learn more. Our project used a set of 10 letter sounds, and determined that the range of knowing 60% to 80% of first letter sounds was a reasonable expected outcome.

The research examining mean performance in alphabet recognition, concepts about print, phonemic awareness, and letter-sound knowledge suggested that a range of values rather than a single benchmark would likely capture most children who are making adequate progress. The developmental ranges were established within the mean level of performance of middle class children and included the range of mean performance of lower SES children who had received instruction. Basing estimates on the mean level of performance suggests that children who reach these levels of achievement should have average or better achievement levels at kindergarten entry.

Methods

Participants

The participants for this study were 268 four-year-old children enrolled in treatment and control classrooms during year three of Project EXEL, a three-year 2002 ERF grant. The treatment group consisted of 128 children who were available for testing in both fall and spring from eight classrooms: two Head Start classrooms, two state-funded preschool classrooms, and four Title I-funded preschools in two southern communities of the United States with a total of 92% of the children identified as low SES. The control group consisted of 140 children from three Head Start classrooms, two state-funded preschools, and four Title I funded preschools located in the same communities with 94% of the control children identified as low SES. The control classrooms were purposefully selected by administrators at the agencies involved in the treatment group. These classrooms were in the same agency or school district as the project classrooms. Since treatment and control classrooms were from the same funding category (Head Start, state-funded, Title I funded), these classrooms used the same early childhood curriculum. Because two of the control classrooms had a mixture of three- and four-year olds, nine control classrooms were selected.

Measures

Two sets of measures were used in this study. Vocabulary data were obtained by the results of the Expressive-One Word Picture Vocabulary Test (EOWPVT; Garner, 1990). The EOWPVT is a standardized expressive vocabulary assessment with a reliability of .96 where children were shown a picture and asked to name it. Foundational literacy data was obtained by the results of Early Literacy Knowledge Assessment (ELKA; McGee & Morrow, 2005). ELKA was developed for Project EXEL and was modified to provide a range of assessments appropriate for capturing literacy development in four- and five-year-olds (McGee & Morrow, 2005). We selected assessments with face validity—those that had been used in previous research of children’s literacy development (Bloodgood, 1999; Lonigan et al., 1998), were included as important predictors of reading and writing (Snow et al., 1998), and were clearly related to the list of required literacy skills presented in the Early Reading First call for proposals.

ELKA consists of a wider range of assessments than were selected for monitoring purposes. Eight subtests were administered to four-year-olds in the fall and spring, and three additional assessments were administered in spring only. The fall and spring assessments included upper and lower case alphabet recognition, writing the alphabet letters, matching pictures by alliteration, matching pictures by rhyming, segmenting phonemes from spoken words, blending segmented words, and concepts about print. In addition, the spring assessments included segmenting ending phonemes, matching a letter to sounds, and inventing spellings. The internal consistency of the entire ELKA battery based on assessments of 278 children was .925.

A comparison of the items in ELKA subtests with items included in other screening tools demonstrated ELKA’s face validity. For example, *Get Ready to Read!*, a screening tool developed by Lonigan and Whitehurst (Whitehurst, 2001) has been shown to have high validity (.69 correlation coefficient with Developmental Skills Checklist, .66 correlation coefficient with letter knowledge, .58 correlation coefficient with Peabody Picture Vocabulary Test) and reliability (split-half .80). This 20 item screening tool included items related to six of the subtests included in the ELKA: concepts about print, alphabet recognition, beginning letter-sound associations, beginning phoneme segmentation, rhyme, and blending.

The first three subtests of ELKA assessed children’s alphabet knowledge. Upper and lower case alphabet recognition are assessed using an adaptation of Clay’s alphabet recognition task (1993) in which three alphabet letters are presented on a test booklet page rather than presented all together on one sheet. All 52

alphabet letters in upper and lower case are presented. Clay reported a .95 reliability for first graders when assessing alphabet recognition. The third alphabet assessment required children write 15 letters presented orally by the examiner. Bloodgood (1999) reported a reliability of .97 for several alphabet letter knowledge assessments including upper and lower case recognition and alphabet writing when used with three- to five-year-olds.

The fourth subtest of the ELKA assessed concepts about print (16 items) using, among other items, a modification of Clay's Concepts about Print Test (CAP) items 1-9 and 11 (Clay 1993). The 16 items included in ELKA have children identify book orientation concepts (front, back, top, bottom, print versus pictures as read, turning pages in order), directionality concepts (left to right, return sweep), and letter and word concepts (point to an alphabet letter, point to a word, locate a word with a W, find a short word, find a long word, and find a word with four letters). Neuman (1999) used a similar concept about print assessment based on the same items from Clay with preschoolers. Clay (1993) reported a reliability of .95 for the entire assessment for first graders.

The ELKA included several assessments of phonemic awareness. Rhyme and Beginning Phoneme assessments were administered fall and spring. These assessments had 10 items each and were directly modeled from MacLean, Bryant, and Bradley (1987) and used by Lonigan and his colleagues (1998). Children were shown three pictures and asked to choose two pictures that rhymed or began with the same sound. Lonigan (1998) reported that the internal consistency of these measures was .63 for rhyme and .44 for beginning phoneme. Bloodgood (1999) reported reliability of .69 for two similar measures of rhyme and beginning phoneme together. A third phonemic awareness subtest was isolating (segmenting) the beginning sound of ten words. The child provided the initial phoneme of words pronounced by the examiner. A final phonemic assessment administered fall and spring was blending (saying a word after the tester says the word isolated into syllables or phonemes) adapted from Lonigan et al. (1998) and Stahl and Murray (1994). Lonigan (1998) reported .96 internal consistency for the blending assessment for four-year-olds. This measure included a total of 10 items of blending compound words, blending syllables into a word, blending onsets and rimes into words, and blending phonemes into words.

One of the spring-only phonemic awareness subtests was the Sound-Letter Association assessment, in which children matched an alphabet letter to beginning phoneme as shown in one of three picture alternatives (Stuart, 1995). This subtest included 10 items. A second spring-only measure of phonemic awareness was

children's ability to segment ending phonemes (10 items). The final spring-only measure assessed children's ability to invent spellings. The assessment used the procedure outlined in Stahl and Murray (1994) using a scoring rubric in which children gained points for attempting to write with letters or spelling increasingly complex patterns. Children were asked to spell five words for a total possible 30 points.

Procedures

General Procedures

During the fall and spring of their preschool year, children were individually administered the battery of assessments by trained assessors. All assessments were completed within a three-week period, beginning approximately two-three weeks after the start of the school year and three to four weeks prior to the end of school. Before working with the children, each assessor received a standard training to administer each measure which included demonstrations and practice scoring with the first author or an evaluation expert, and practice with one or more children. The first author or the evaluation expert observed the administration of 10% of all assessments, scoring the assessments independently from the assessor. The evaluator and assessors were 100% in agreement on the scoring.

Instruction in the Treatment and Control Classrooms

The treatment classrooms used the High Scope approach to early childhood (Hohman & Weikart, 2002) except for the two Head Start classrooms, which were using Creative Curriculum (Dodge, Colker, & Heroman, 2002). High/Scope and Creative Curriculum have similar approaches to preschool programming as both are based on Jean Piaget's ideas where children are expected to learn by actively exploring materials and carrying out projects (Piaget & Inhelder, 1972). Adults support children's initiatives and provide whole and small group instruction daily based on the children's needs and interests. High Scope's and Creative Curriculum's key experiences address children's emotional, intellectual, social, and physical skills and abilities. Classrooms are arranged in centers and children are expected to plan what activities they do in centers, carry out those plans, and later review what they accomplished. Therefore, project classrooms included centers stocked with appropriate preschool materials. Each classroom had a book and writing center, paper and pencil props integrated within several centers, and a computer center.

Project EXEL did not use a specific early literacy curriculum although Scholastic's "Building Language for Literacy" (Newman, Snow, & Canizares, 2000)

curriculum was purchased, and, while teachers used the themes and literature selections from this curriculum to guide their instruction, they did not follow the lesson plans. The project required that teachers use six key instructional activities either daily or at least three times a week. First, teachers were required to use interactive techniques to read aloud at least two books daily (McGee & Schickedanz, 2007). Second, they were required to engage children in shared writing activities several times a week in order to teach targeted concepts about print. The books selected for reading aloud had to be theme related, and teachers were required to emphasize theme vocabulary during reading and in follow-up small group activities. Teachers were required to teach alphabet letter recognition (using at least three letters per week) and later phonemic awareness and letter-sound associations (teaching two phonemes or letter-sound associations per week) in small group lessons using a scope and sequence developed for the project. During the later part of the year, teachers were required to use two more sophisticated instructional techniques: fingerpoint reading of songs and poems presented on the pocket chart and small group writing lessons in which children were encouraged to invent spellings. The project teachers reported they spent a range of 45 minutes to 1 hour 45 minutes on literacy instruction with a mean of 1.1 hours. Teachers were provided with professional development by outside consultants for five to six days per year of the project and they observed the outside consultants demonstrate instructional activities in their classrooms. A reading coach supported the teachers in implementing the new instructional strategies they were expected to use in the project. All teachers received one to two hours of coaching in his or her classroom twice monthly.

Each control classroom was observed fall and spring for approximately 1.5 hours during the time the teacher specified as their literacy instructional time. The first author conducted these observations over the three years of the project. Based on these observations, it was noted that the control classrooms were using the High Scope approach to early childhood and the Head Start control classrooms were also using Creative Curriculum. Because these classrooms were a part of the same agencies and school systems as the treatment classrooms, they too had center-based classrooms with more than adequate preschool materials. All control classrooms had additional literacy curricula they were expected to follow. The Title I classrooms were using the Open Court PreK literacy curriculum (Bereiter, Campione, Carruthers, Hirshberg, McKeough, Pressley, Riot, Cardamalia, Stein & Treadway, 2003), Head Start Classrooms were using the Alpha Time Letter People Curriculum (Let's Begin with Letter People, 1996), and the two state-funded preschools were not using an additional literacy curriculum. The Open Court PreK Literacy curriculum

is a comprehensive approach to literacy development in which teachers provide explicit and systematic instruction in oral language, book and print awareness, phonological awareness, and the alphabetic principle. Teachers read aloud books focusing on vocabulary and children respond to the books as a way to build comprehension. In whole groups children learn about letters and sounds, with follow-up activities in small groups. The curriculum includes 160 lessons arranged by theme and sequenced by skills. Alpha Time Letter People is an add-on curriculum that teaches names of the upper and lower case letters at the same time as the sounds associated with the letters. Teachers use large inflatable dolls called letter people and songs and stories to introduce children to the letter shapes, names, and sounds. Observations during the second and third year of the project revealed all control teachers were using their curriculum as evident in the instructional activities and materials. During the third-year observation in the spring control teachers reported they spent a range of one-two hours in literacy instruction and activities, with a mean of 1.4 hours. Professional development was provided to control teachers as directed by their centers. Teachers in the control group reported receiving two to three days of professional development on their literacy curriculum.

Results

Statistical Analyses

Table 1 presents the mean scores of pre- and posttests from EOWPVT and ELKA subtests for Project EXEL treatment children and the control children. Data analysis was conducted only on children with complete fall and spring data sets. A multivariate analysis of covariance (MANCOVA) was performed to determine the project effect on 10 dependent variables, eight ELKA subtests scores given at both pre- and posttests and ELKA total scores, and the standard score of the EOWPVT, using pretest scores as the covariates. The assumption of homogeneity of slopes was supported for all dependent variables. Significant differences were found between the treatment and control groups on the dependent measures, Wilkes' lambda = .80, $F(9,248) = 6.79$, $p < .000$. Analyses of covariances (ANCOVA) on each dependent variable were conducted as follow-up tests to the MANCOVA. Using the Bonferroni method, each ANCOVA was tested at the .005 level. ANCOVAs were significant for the following tests scores: standard score of the EOWPVT $F(1, 256) = 17.73$, $p < .000$; rhyming words, $F(1, 256) = 13.29$, $p < .000$; lower case letters, $F(1, 256) = 10.07$, $p = .002$; isolating beginning phonemes, $F(1, 256) = 31.35$, $p < .000$; concepts about print, $F(1, 256) = 12.14$, $p = .001$; and the total ELKA, $F(1, 256) =$

18.76, $p < .000$. The treatment group produced significantly superior performance on these tests.

Table 1. Mean Posttest Scores (and Standard Deviations) of Treatment and Control Children on EOWPVT and ELKA Assessments

Group		Mean	Std. Deviation	N
EOWPVT	Treatment	95.1858	15.37600	128
	Control		11.87022	140
		86.3929		
upper case recognition	treat		4.93361	128
	cont	22.8828	7.95665	140
		20.6500		
rhyme	treat		3.42049	128
	cont	4.6797	2.97347	140
		3.0857		
lower case recognition	treat		5.70803	128
	cont	20.6797	7.92582	140
		17.6929		
segment begin phoneme	treat		3.76366	128
	cont	7.2656	4.31362	140
		4.1357		
concept/print	treat		3.90323	128
	cont	10.1797	3.14481	140
		8.2286		
write abc	treat		3.96726	128
	cont	11.9063	4.87380	140
		10.9071		
blend word syllable sound	treat		3.00115	128
	cont	4.7188	2.91132	140
		3.7786		
letter sound	treat		3.73968	128
	cont	6.8047	3.82315	140
		5.1286		
segment end phoneme	treat		3.82323	130
	cont	3.1615	2.79790	143
		1.5315		
invented spelling	treat		7.00193	130
	cont	10.8923	6.90705	143
		9.2448		

A multivariate analysis of variance (MANOVA) was conducted to determine project effects on four additional dependent variables that were only administered in the spring, three additional ELKA subtests scores (i.e., isolated ending phoneme, matching letter-sounds, and invented spelling), and ELKA total spring scores (i.e.,

sum of all ELKA subtest scores). Significant differences were found among groups on the dependent measures, Wilkes' lambda = .92, $F(4, 268) = 5.67$, $p < .000$. Analyses of variances (ANOVAs) on each dependent variable were conducted as follow-up tests to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .01 level. ANOVAs were significant for: isolated ending phoneme, $F(1, 271) = 16.36$, $p < .000$. The treatment group produced significantly superior performance on this test in comparison with the control group.

Analysis of the Percentage of Children Reaching Age Appropriate Developmental Ranges

The EOWPVT and five subtests of the ELKA were used as monitoring assessments in order to determine children's progress in reaching age appropriate development ranges in vocabulary development, alphabet recognition (the upper and lower alphabet recognition assessments were combined), concepts about print, phonemic awareness, and letter-sound knowledge. Table 2 presents the percentage of children whose scores at posttest were within the ranges of age appropriate developmental levels in the project (treatment) classrooms and in the control classrooms. This table shows that a higher percentage of project children would be entering kindergarten having already reached challenging age-appropriate ranges of achievement for all areas of language and literacy development. For both treatment and control groups a high percentage of children (91% and 83%) reached expected age ranges in alphabet recognition and a low percentage of children (48% and 30%) reached expected levels on the concepts about print assessment. The difference between the percentage of children who reached expected levels of achievement was largest for segmenting beginning phonemes where 76% of project children reached age appropriate levels and only 43% of the control children did so.

Table 2. *Percentage of Children Who Scored within Age-Appropriate Developmental Ranges*

Measure	Treatment	Control
EOWPVT	74.0%	54.8%
Alphabet recognition	90.8%	82.9%
Concepts about print	48.1%	30.1%
Isolate beginning phoneme	76.3%	43.2%
Letter-sound association	65.6%	45.9%

These same assessments were used as progress monitoring in the treatment classrooms throughout the school year. They were administered by teachers in October, January, and March as well as by assessment personnel at pre- and post-test. At early pretesting most children in project classrooms scored at floor levels for both alphabet and phonemic awareness. For example, only 8% of the treatment children knew more than 20 upper case alphabet letters and 54% of the children knew fewer than three letters. Only 2% of the children could segment a single phoneme. As expected, most of the project children exhibited very little knowledge of the foundational concepts about literacy; thus, making it impossible to determine who might really be at risk. Because of the large number of children who had so little knowledge of the alphabet, we decided to monitor the number of children who were not making progress in learning upper case alphabet letters on a sliding scale. Our intent was to identify children who were not making progress in learning upper case alphabet letter names. In October 35% of the children had not yet learned 10 upper case alphabet letters, in January 23% of the children had not yet learned 15 upper case letters, and in March 14% of the children had not yet learned 20 of the upper case letters. However, by end of the year only 6 % of the children knew less than 20 upper case letters, and only 3% could identify fewer than 10 letters.

The results of monitoring were even more striking for phonemic awareness. At pretest 94% of the children could not segment the beginning phonemes of any words, in October that percentage was reduced to 68%, in January it reduced slightly to 52%, and in March was reduced to 34%. By the end of the project only 24% of the children had not reached the developmental range of expected progress; they segmented the beginning phonemes on fewer than five words.

Discussion

This study provides evidence of the effectiveness of this Early Reading First project in raising the level of performance for low SES children and closing the gap with middle class children. Project EXEL, using six key instructional activities as a guide for literacy instruction as well as providing targeted professional development, proved more powerful than control classrooms using commercial literacy curricula with fewer hours of professional development. Children in the project classrooms outperformed control children in alphabet recognition (lower case), phonemic awareness (rhyme, isolating beginning sounds, isolating ending sounds), concepts about print, and expressive vocabulary. The means of the project children on most ELKA assessments were similar to or higher than means found in middle class samples of research reviewed in this article as the mean number of upper case

alphabet letters that children recognized was 22 (even the control children recognized a mean of 20 upper case letters). Project children recognized a mean of 20 lower case letters and even control children recognized a mean of nearly 18 letters. Previous research with a large sample of children (Trieman et al., 1998) showed they knew 13 or more upper case letters and 10 or more lower case letters. Therefore, both project and control classrooms were very successful in helping children learn to recognize alphabet letters. However, project classrooms were more successful in teaching a wider range of literacy skills than the control classrooms. Project EXEL teachers were able to raise children's standard scores on the One Word Expressive Picture Vocabulary Test by 2/3 of a standard deviation. The mean number of concepts about print (10.2) was approximately 65% of the items, higher than found in previous research with other at risk children (Justice & Ezell, 2002). Project EXEL teachers provided children with opportunities to learn a range of phonemic awareness skills including isolating beginning and ending phonemes and identifying rhyme. In contrast to the study by Lonigan and his colleagues (1998) who found that 66% of a sample of middle class children could not identify which picture of three did not have the same beginning sound, our study found a stronger effect: only 24% could not segment beginning phonemes at expected levels.

The second purpose of the study was to set ranges of expected achievement in language and literacy and to determine if the project classrooms were more successful in helping children reach these levels. We examined previous research and used the range of mean performances in these studies to establish our developmental ranges. Unknown to us at the time, Invernizzi, Sullivan, Meier, and Swank (2004) were also establishing developmental ranges on scores for their assessment, the Phonological Awareness Literacy Screening test for PreK (PALS, PreK). They also piloted changes in a Beginning Sound assessment, which was like our Isolating Beginning Phoneme assessment. The method they used to establish developmental ranges was to examine the range of preschool scores for children who later were successful in kindergarten and first grade. While the PALS PreK tasks are not identical to our ELKA assessment, they are very similar. Table 3 compares the developmental ranges we used in this study compared to the developmental ranges established for PALS PreK. This table shows that for every assessment, the ranges in both assessments are similar and overlapping. These similarities provide strong evidence of growing consensus about what the important outcomes in language and literacy ought to be at the end of preschool.

Table 3. *ELKA Developmental Ranges Compared to PALS PreK Developmental Ranges*

Measure	ELKA	PALS PreK
Alphabet recognition		
Upper Case	26-39/52	12-21/26
Lower Case		9-17/26
Concepts about print*	10-11/16	7-9/10
Isolate beginning phoneme**	5-7/10	5-8/10
Letter-sounds	6-8/10	4-8/10

*PALS PreK calls this task Print and Word Awareness

**PALS PreK calls this task Beginning Sound

The results of this study also demonstrate that fewer children were considered to be at risk at the end of the year in ERF classrooms than in the control classrooms. Considering that 92% of the treatment classrooms' children were considered at risk at the beginning of their preschool year due to low SES, it is remarkable that many ended the year having made successful progress toward expected goals. More than 90% of the children knew an appropriate number of alphabet letters (50% or more); in fact 50% of the project children knew 40 or more alphabet letters. More than 75% of the project children could segment beginning phonemes on five or more words, and more than 65% could associate five or more letters with sounds. It is noted that all of the benchmarks established for this study were ambitious and required children to reach levels of achievement usually not expected in intervention projects for at-risk children.

One area proved to be particularly difficult for most children to reach: concepts about print. In the treatment classrooms only 48% reached benchmark ranges and in the control classrooms only 30% of the children reached those ranges. More investigation of the nature of concepts about print that could be considered age-appropriate is warranted. The project set ambitious benchmark ranges compared to those found in previous research, and lower ranges may be more appropriate.

Although this study intended to identify benchmarks that would help identify children at risk throughout the project, the monitoring assessments in August, October, and January provided little if any guidance in identifying which children were not making adequate progress toward developmental benchmarks. In August,

nearly all the children's results suggested they were at risk, and even by October, while fewer children seemed to be at risk, depending on the task, 30-60% of the children scored at risk. It was not until March, when much of the school year was complete, that teachers began to see clear patterns of the fewer number of children who truly seemed not to be making progress emerge. While early and frequent monitoring is often suggested, we argue that without clear evidence that this is needed, teachers' time early on might well be spent teaching. This is especially the case when our results demonstrate that large percentages of children entered kindergarten with the promise of success.

There are several limitations to this study. The control and treatment children were not randomly selected; although they shared many common characteristics, it could be that the treatment classroom teachers were more skillful in the craft of teaching as they were selected to join the project. The treatment teachers received more hours of professional development than the control teachers and were assisted by a reading coach. Thus, it is not possible to isolate the factors which made Project EXEL's results superior to the control classrooms. Finally, the children were not followed into kindergarten. It is not possible to determine whether the children who had reached age-appropriated ranges performed as expected in kindergarten, and whether children who had not reached those levels experienced difficulties.

Nonetheless, the results of this study suggest it is possible to close the gap between middle class and lower SES children at kindergarten entry. Many more children in Project EXEL headed to kindergarten with high levels of literacy knowledge reflective of the mean levels of performance of middle class children than control children who also attended preschools intended to serve at-risk populations. More research is needed to demonstrate whether this gap continues to shrink through effective kindergarten instruction that capitalizes on the promise of success that a high percentage of children bring at school entry.



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