Examining the Sustained Effects of an Early Literacy Curriculum and Instructional Support System Using a Randomized Field Trial

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ABSTRACT[1]

Children enter kindergarten with a range of experiences and skills. Without intervention, struggling readers continue to struggle. This longitudinal study investigated the sustained effects of a research- and standards-based preschool curriculum enhancement on the emergent literacy skills of at-risk kindergarten children. Data were collected on the children's early reading ability as measured by the *TERA-3* and letter recognition. HLM analyses indicated that children who had participated in preschool classrooms using the curriculum enhancement with instructional support scored higher than children in preschool classrooms using traditional approaches on measures of alphabet knowledge and reading quotient obtained at the end of kindergarten. This study provides evidence supporting the viability of using literacy-focused instructional materials and tools in combination with job-embedded coaching as a strategy to help early care and learning teachers with varying levels of formal preparation improve literacy-focused learning outcomes for children from low-income neighborhoods.

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The *Early Literacy and Learning Model (ELLM),* a research- and standards-based early literacy curriculum enhancement and instructional support system, was developed to support the literacy development of children enrolled in preschool and primary education classrooms. Early childcare and learning systems in the United States are in a state of transition, moving from a focus on custodial care to a focus on learning care. This transition involves overcoming a number of challenges, including the critical challenge of strengthening childcare teachers' knowledge and skills about emergent literacy development. This study was designed to determine if the effects of *ELLM* in improving the emergent literacy abilities of 4-year-old preschool children from low-income neighborhoods were sustained through the first year of kindergarten.

Four reports published at the turn of the 21st Century summarized the growing consensus around the importance of high-quality early childhood learning and care for all children. In 1998 the International Reading Association (IRA) and the National Association for the Education of Young Children (NAEYC) jointly published *Learning to Read: Developmentally Appropriate Practices for Young Children,* a milestone that established early literacy as a "recognized domain of development from birth to 5 years of age" (Roskos & Vukelich, 2006, p. 297). Three reports commissioned by the National Research Council appeared about the same time. In *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998), researchers described the connections among children's success in learning to read and their prior knowledge and skill in domains such as letter knowledge, phonological awareness, and language ability. Moreover, the authors described the inadequacy of the language environment in many preschool programs serving poor children and noted that programs designed to serve children in poverty could produce immediate effects of about .5 standard deviations.

From Neurons to Neighborhoods: The Science of Early Childhood Development (Shonkoff & Phillips, 2000) noted that converging forces supported the importance of attending to early childhood development: research that "has led to major advances in understanding the conditions that influence whether children get off to a promising or a worrisome start in life" (p. 1) and the contemporary circumstances of families with young children that include factors such as employment by both parents, economic hardship, and young children spending a considerable amount of time in child care. The committee that produced the report noted that the quality of child care available to families

> is highly fragmented and characterized by marked variation in quality, ranging from rich-growth-promoting experiences to unstimulating, highly unstable, and sometimes dangerous settings. The burden of poor quality and limited choice rests most heavily on low-income, working families whose financial resources are too high to qualify for subsidies yet too low to afford quality care. (p. 9)

However, the committee also noted the consistent findings from the literature that high-quality, intensive, center-based early learning experiences can positively affect children's language development and school achievement. Moreover, the report noted, "the strongest effects of high-quality care are found for children from families with the fewest resources and under the greatest stress" (p. 311).

Finally, the third report commissioned by the National Research Council, *Eager to Learn: Educating Our Preschoolers* (Bowman, Donovan, & Burns, 2001), was unequivocal in its conclusion that young children "living in circumstances that place them at great risk of school failure…are much more likely to succeed in school if they attend well-planned, high-quality early childhood programs" (p. 8).

Together, these four reports defined an ideal policy environment for changes in the attention paid to early childhood care and learning in the United States: a "compelling problem (the need to prepare children to read and succeed in school), coupled with a potential solution (early literacy instruction) in a favorable political environment (standard-based reading reform)" (Roskos & Vukelich, 2006, p. 298).

Further support for the importance of high-quality child care and learning, particularly for children most at risk of school failure, was provided through several longitudinal analyses of the economic benefits of high-quality early child care programs. Cost-benefit analyses for high-quality, intensive early learning programs such as Perry Preschool in Ypsilanti, Michigan, the Abecedarian Project in North Carolina, the Chicago Child-Parent Centers, and the Elmira (New York) Prenatal/Early Infancy Project ranged from $3 to nearly $9 for every dollar invested, with estimated internal rates of return ranging from about 7 percent to more than 16 percent annually (Grunewald & Rolnick, 2004). Barnett (1995), taking a different approach, estimated the cost of failing to provide at least two years of quality early childcare as about $100,000 for a child from a poor family.

Results of this magnitude depend on the provision of high-quality child care and learning programs. Characteristics of high-quality programs are not particularly controversial. Most definitions include well-prepared teachers and staff, a reasonable child-to-teacher ratio, attractive and safe settings, and materials designed to enhance children's development (see, for example, Gallagher & Clifford, 2000; Gallagher, Clifford, & Maxwell, 2004). Both the setting and the teacher-child interactions are important:

> Clearly, the actual presence of books, environmental print, writing materials, and the like serves to stimulate children's literacy behaviors. In addition, it appears that teacher attention to literacy through instruction also stimulates children's literacy behavior. (Farran, Aydogan, Kang, & Lipsey, 2006, pp. 260-261)

Professional development for teachers may be particularly important, as many early child care providers have not been trained to provide high-quality literacy environments.

The challenges of providing well-prepared child care teachers have been particularly daunting in states such as Florida, which has a history of under-prepared child care workers and relatively unregulated child care environments. A 2005 report on the state of state-funded prekindergarten programs (Gilliam & Marchesseault, 2005) indicated that the majority of teachers in the Florida classrooms to which the researchers had access (54.5%) had no formal educational degree higher than a high school diploma or GED and the average number of hours of in-service training attended by teachers in a 12-month period was 33 clock hours.

The effects of early intervention cannot be expected to be sustained over time if classrooms and out-of-school environments are not supportive of children's continued literacy development. As Ramey and Ramey (2006) noted, "no development theory is premised on the assumptions that positive early learning experiences are sufficient by themselves to ensure that children will perform well through their lives" (p. 456). Regardless, whether gains can be sustained over time has long been a concern to researchers in early childhood. Researchers have examined the long-term effects of small-scale, comprehensive, high-quality early interventions such as the Chicago Child-Parent Center (Conyers, Reynolds, & Ou, 2003; Temple, Reynolds, & Miedel, 2000); the Perry Preschool Project (Nores, Belfield, Barnett, & Schweinhart, 2005); and the Abecederian Project (Campbell & Ramey, 1995). Other researchers have examined the sustained effects of large-scale interventions such as Head Start (Westat et al., 2005) and Early Head Start (Love et al., 2002).

Specifically, here we are interested in the effects of preschool programs at age 4 on children in early primary education. Gilliam and Zigler (2001) conducted a meta-analysis of state-funded preschool programs from 1977 to 1998. Their results indicated non-trivial positive effects of preschool that were maintained through kindergarten, inconsistent effects at first grade, and nonexistent effects beyond that. Magnuson, Meyers, Ruhm, and Waldfogel (2004) examined data from the Early Childhood Longitudinal Study Kindergarten Class of 1998-1999 (ECLS-K) to look at the effects of preschool on kindergarten and first grade. Overall, they found positive effects for attendance in preschool on early reading and mathematics in kindergarten and first grade, and children who attended a center or preschool-based program were less likely to be retained in kindergarten. Effects were largest for disadvantaged groups, suggesting that preschool for children of disadvantaged families provides a policy option for narrowing the school readiness gap. Using data from the National Assessment of Education Progress, Grissmer, Flanagan, Kawata, and Williamson (2000) concluded that prekindergarten has stronger effects in states with lower income levels. In general, the effects of preschool have generally been found to be sustained at least through kindergarten. The current study provided the opportunity to test the effects using a random clinical trial design in multiple settings.

Research Design and Methodology

ELLM was designed as a curriculum enhancement consisting of learning materials and strategies that classroom teachers used for at least one hour each day to provide emergent literacy experiences and help children acquire literacy skills. The experiences included oral language, listening, and vocabulary development activities (Hart & Risley, 1995; Stahl & Stahl, 2004; Watson, 2003; Whitehurst & Lonigan, 2003; Xue & Meisels, 2004); reading aloud and emergent comprehension activities (Beck & McKeown, 2001; Fisher, Flood, Lap, & Frey, 2004; Marzano, 2004; National Reading Panel, 2000; Whitehurst & Lonigan, 1998); and independent reading activities (Cullinan, 2000; Cunningham & Allington, 1999; Samuels, 2002). Literacy skills included letter and sound knowledge (Adams, 1995; Honig, 2001; Riley, 1996), print concepts (Clay, 1991; Duffy, 2004; Reutzel & Cooter, 2007; Strickland & Schickedanz 2004), phonological awareness and the phonics connection (Gunning, 2000; Snow, Burns, & Griffin, 1998; Yopp & Yopp, 2004), and emergent writing (Dyson, 2003; Genishi, Stires, & Yung-Chan,

2001; Haney, Bissonnette, & Behnken, 2003). *ELLM* was intended to enhance the standard curriculum already in use in preschool classrooms.

The curriculum was supported by instructional materials and strategies based on research and performance standards. Print-rich environments are fundamental to early literacy experiences and skills (Neuman, 2004; Pressley, Rankin, & Yokoi, 1996; Roskos & Neuman, 2001; Taylor, Pearson, Clark, & Walpole, 1999; Wade & Moje, 2000). Both state and national literacy performance standards were used to identify the intended outcomes. Monthly literacy packets and accompanying books supported classroom instruction. Teachers received several resource guides that included materials such as phonological awareness learning activities, suggestions for developing and using word walls, and alphabet and thematic songs and poems. *ELLM* families had access to many resources, including a classroom book lending library that enabled children to take home books daily to share with their parents; monthly family tips and literacy calendars that suggested literacy activities families could do with children; and opportunities to engage in activities with other families throughout the year.

ELLM also included an extensive instructional support system for both teachers and literacy coaches. Literacy coaches provided weekly one-hour, job-embedded training for teachers designed to enhance the learning processes through more effective instructional practices (Allen, 2006; Paglinco et al., 2003; Walpole & McKenna, 2004). For example, coaches helped teachers use children's ability to identify the letters of the alphabet to focus instruction on the needs of the children. The instructional support system was developed and enhanced using several knowledge bases (see, for example, Berliner, 1987; Garet, Birman, Porter, Desimone, & Herman, 1999; Hargreaves, Earl, Moore, & Manning, 2001; International Reading Association, 2004; National Association for the Education of Young Children, 2001; National Staff Development Council, 2001; Sternberg & Horvath, 1995).

We hypothesized that 4-year-old children who experienced the *ELLM* enhancement to the standard classroom curriculum and received instruction from teachers who were supported in development of their literacy-related teaching skills would demonstrate more growth in their literacy-related learning than children in classrooms that lacked the *ELLM* enhancements. Moreover, we hypothesized that these effects would be sustained through the first year of formal education.

In July 2002 *ELLM* became part of a three-year longitudinal study through a *Preschool Curriculum Evaluation Research* (PCER) grant from the U.S. Department of Education Institute of Education Services (IES). Through participation in the grant program, the efficacy of *ELLM* was tested using randomized clinical trials in multiple settings. Both *ELLM* researchers and a national evaluator began a longitudinal study to follow children, their teachers, and their parents during the 2002-2003 school year. In summer 2003, IES terminated this longitudinal study. However, *ELLM* researchers continued the study and tested kindergarten children who had been assessed as preschoolers. This paper reports results of the first and second years of the longitudinal study, which was designed to determine whether the higher emergent literacy achievement scores for *ELLM* 4-year-old children from low-income neighborhoods at the end of preschool were sustained through the end of kindergarten.

Sample Description

Preschool children in three geographical locations representing differing degrees of urbanicity (one sparsely populated, one densely populated, and one with an intermediate population density) within a single southeastern state participated in the study. Twenty-eight preschool sites located within the attendance boundaries of six elementary schools serving low-income families were randomly assigned to either *ELLM* or wait-list control status. The sample included Head Start classrooms, early intervention school-based classrooms, faith-based classrooms, and subsidized childcare classes. The prevalent comprehensive curricula used in both *ELLM* and wait-list control classes were *Creative Curriculum*, *High/Scope*, and *High Reach*. Within the targeted classes, the *ELLM* literacy curriculum was used in combination with the existing comprehensive curricula. Children who were four years old on or before September 1 of the school year were assessed during the first year of the study. Table 1 describes the composition of the sample during the preschool implementation.

Table 1
Summary Descriptions of Preschool Participants

	ELLM	*Control*
Number of Classes	14	14
Number of Children	87	89
Percentage Boys	53%	56%
Number of 4-year Degreed Teachers	4	5
Percentage of Children in Classes Taught by 4-year Degreed Teachers	36%	34%

As indicated in the table four-year degreed teachers taught about one-third of the children. Teachers who held associate degrees or had completed some college course work with child-care certificates were evenly divided between the *ELLM* and control classrooms. Two teachers in *ELLM* classrooms had only a high school diploma, though one had a child-care certificate.

In the second year of the study, children from the *ELLM* and wait-list control classrooms were followed into kindergarten. The sampling plan was designed to facilitate locating the children as they matriculated to elementary schools. However, for the most part, children did not attend preschool within the attendance boundary of their neighborhood elementary school. The 87 children from 14 *ELLM* preschool classrooms and the 89 children from 14 control classrooms advanced to 76 kindergarten sites. The distribution of the children in Year 2 of the study is reported in Table 2.

Table 2
Preschool-to-Kindergarten Transitions

	Area 1 N=57	Area 2 N=60	Area 3 N=59
Number of Preschool Sites	10	10	8
Number of Kindergarten Sites	15	31	30
Number of Preschool/Kindergarten Combinations	31	38	38
Number of Single-Observation Combinations	20	28	30

As indicated in Table 2, the 176 children made 107 different preschool-to-kindergarten transitions. Over 70% of the kindergarten classrooms enrolled only one of the children from the study.

Study Measures

Data were collected on the children's ability to recognize the 52 upper- and lowercase letters of the alphabet, and their early literacy abilities were measured by the *Test of Early Reading Ability-Third Edition, Form A (TERA-3).* The *TERA-3* is composed of three scales measuring unique but related early literacy skills. According to the *TERA-3 Examiner's Manual* (Reid, Hresko, & Hammill, 2000), the Alphabet scale measures graphophomenic knowledge, the Conventions of Print scale measures knowledge of conventions of English print, and the Meaning scale measures ability to comprehend meaning of print. Published validity and reliability information presented in the *TERA-3 Examiner's Manual* indicates Cronbach's Alpha coefficients of internal consistency for 4-year-old children for the Reading Quotient and the

Alphabet, Conventions, and Meaning scales are .97, .94, .88, and .94, respectively. Alpha coefficients for the 5-year-old children were comparable. This analysis used *TERA-3* raw scores. Because there is no raw score equivalent to the *TERA-3* Reading Quotient standardized score, the Reading Quotient score used in the analysis is defined as the sum of the raw scale scores after adjusting for scale basals.[2]

The Alphabet Letter Recognition Inventory (ALRI) is a locally developed inventory of children's ability to recognize the upper- and lowercase letters of the alphabet. Trained assessors presented uppercase letter flashcards, arranged in a fixed non-alphabetic order, to each child. The child was asked to name the letter. Following presentation of the uppercase letters, lowercase letter flashcards were presented in a similar fashion. The children's responses to both measures were recorded on scanable forms and computer scored.

Results

Table 3 shows the *TERA-3* and ALRI mean standardized scores of the *ELLM* preschool children and the control children at pretest, year 1 posttest, and at the end of kindergarten.

Table 3
Standardized Scores on the TERA-3 and ALRI Scores

		ELLM (n=87)		*Control (n=89)*	
TERA-3 Scale	*Time*	*Mean*	*SD*	*Mean*	*SD*
Reading Quotient	Preschool fall	84.8	11.5	87.5	12.0
	Preschool spring	93.7	14.4	91.9	12.6
	Kindergarten spring	92.3	13.2	92.4	14.9
Alphabet	Preschool fall	7.8	2.8	8.5	3.0
	Preschool spring	10.2	3.7	10.0	3.4
	Kindergarten spring	11.4	2.0	11.2	2.8
Conventions of Print	Preschool fall	7.2	1.9	7.4	1.8
	Preschool spring	8.1	2.6	7.8	2.1
	Kindergarten spring	8.3	3.2	8.6	3.2
Meaning	Preschool fall	7.9	2.2	8.2	2.5
	Preschool spring	8.9	1.9	8.4	1.9
	Kindergarten spring	6.6	2.6	6.6	2.3
ALRI	Preschool fall	14.4	15.5	20.2	17.7
	Preschool spring	32.7	17.3	35.3	16.2
	Kindergarten spring	48.7	4.4	47.7	7.3

[2] A basal is determined when an examinee responds to three consecutive items correctly, which results in all items before the consecutive items being counted as correct regardless of the examinee's actual response.

The use of hierarchical linear modeling (HLM) is indicated for data analysis because children experienced the *ELLM* instructional model and kindergarten instruction together in classes rather than in one-on-one settings. The design of the longitudinal study is a cross-classified random effects model in which the children are cross-classified by preschool site and the kindergarten school. HLM allows this shared learning to be modeled in data analysis (Raudenbush & Bryk, 2002). Child-level variables included in the analyses were the *TERA-3* pretest raw scores, ALRI pretest scores, and gender. All continuous variables were grand-mean centered. Class-level variables included in the analyses were preschool class assignment as *ELLM* or wait-list control and kindergarten school assignment. Modeling was done with SAS Release 9.1 using the Proc Mixed procedure. The predictors are listed in Table 4.

Table 4

Child- and Class-Level Predictors Used in HLM

Name	*Description*
TERA-3 Pretest	The *TERA-3* pretest raw score; grand-mean centered
ALRI Pretest	The number of upper- and lowercase letters the child recognized at pretest; grand-mean centered
Gender	Gender of the child; boys coded 0 and girls coded 1
Status	Control coded 0 and ELLM coded 1

The following equation was fit to all scales.

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}\left(\text{TERA-3 Pretest}\right)_{ijk} + \pi_{2jk}\left(\text{ALRI Pretest}\right)_{ijk} + \pi_{3jk}\left(\text{Gender}\right)_{ijk} + e_{ijk}$$

$$\pi_{0jk} = \theta_0 + \gamma_{01}\left(\text{Status}\right)_j + b_{00j} + c_{00k}$$

where Y_{ijk} is the kindergarten TERA-3 scale score of

the i^{th} child in the j^{th} preschool site and the k^{th} kindergarten site,

where $i = 1,\cdots,176$ children, $j = 1,\cdots,24$ preschool sites, and $k = 1,\cdots,76$ kindergarten sites;

TERA-3 Pretest is the fall preschool TERA-3 scale score of

the i^{th} child in the j^{th} preschool site and the k^{th} kindergarten site, grand-mean centered;

ALRI Pretest is the fall preschool ALRI score of

the i^{th} child in the j^{th} preschool and the k^{th} kindergarten site, grand-mean centered;

Status_j is the treatment status of the j^{th} preschool class, coded 0 for wait-list control and 1 for ELLM preschool classes;

b_{00j} is the contribution preschool j averaged across kindergarten sites; and

c_{00k} is the contribution of kindergarten k averaged across preschool sites.

The variance components estimated lie within cells, between preschool sites, and between kindergarten sites.

Hierarchical Linear Model Analysis of Year 1 Treatment Effects

Examination of the *TERA-3* and ALRI preschool pretest scores indicated that those of the children in *ELLM* classes were not statistically different from those of the wait-list control children. However, at the end of preschool, the scores of the children in the *ELLM* classrooms were higher than those of the wait-list control children on all measures.

Hierarchical linear modeling (HLM) was used to test the statistical significance of these observed differences. Statistical significance was set at $p < .05$ for one-tailed tests. Results of this analysis for a larger sample have been reported elsewhere (Cosgrove, Fountain, Wehry, Wood, & Kasten, 2006). The effectiveness of *ELLM* for this subset of children from 14 *ELLM* and 14 control classrooms confirmed that *ELLM* was more effective than traditional approaches in raising the emergent literacy achievement of children as measured by all *TERA-3* scales (see Table 5). Resulting effect sizes were 25 percent of a standard deviation or larger.

Cross-Classified Hierarchical Linear Model Analysis of Year 2 Treatment Effects

Across all measures, the spring kindergarten adjusted mean scores of the *ELLM* children were higher than those of the wait-list control children. The differences between the *TERA-3* Reading Quotient and Alphabet mean scores of the *ELLM* and wait-list control children were statistically significant. Effect sizes were .26 and .34, respectively, for the statistically significant differences. The pattern of between-preschool and between-kindergarten sites variance estimates is also of interest. The correlation of the scores of children in the same preschool site may be explained by factors that determine parental choice of preschool sites and the children's participation in 3-year-old preschool programs. The correlation of scores in the same kindergarten may be explained by the similar abilities that children bring to kindergarten as well as by the common instruction they experience in kindergarten. As indicated in Table 5, none of the variance in the kindergarten children's Meaning scores was accounted for by participation in their kindergarten class. None of the variance in the kindergarten children's Conventions of Print scores was accounted for by participation in their preschool class.

Table 5
HLM Analysis Using TERA-3 Raw Scores

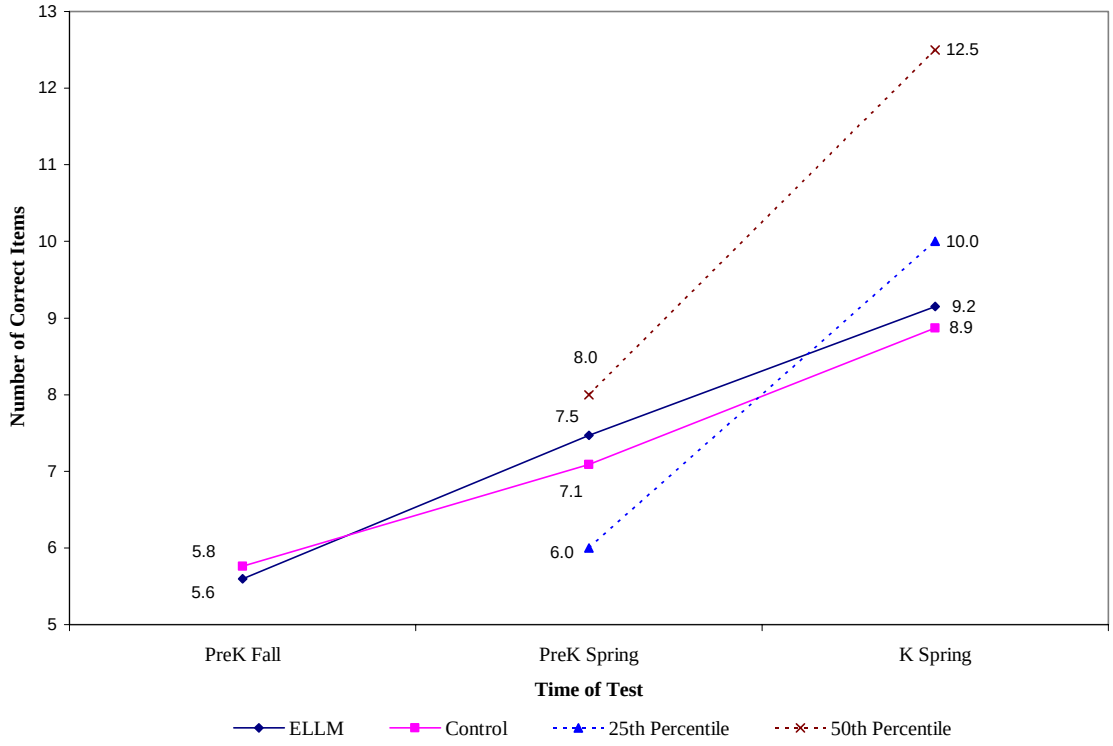
Year	Level		**Reading Quotient**			**Alphabet**			**Conventions of Print**			**Meaning**		
		Effect	Estimate	*t*	p-value	Estimate	*t*	p-value	Estimate	*t*	p-value	Estimate	*t*	p-value
Fall 2002	Child	Intercept	84.79	67.41	<.0001	4.28	8.33	<.0001	2.02	9.36	<.0001	5.60	21.66	<.0001
		Status	2.68	1.51	**.1317**	1.06	1.47	**.1435**	0.15	0.48	**.6324**	0.17	0.46	**.6477**
		Variance	137.66			22.94			4.06			5.81		
Spring 2003	Child	Intercept	23.18	25.65	<.0001	11.10	16.14	<.0001	4.75	12.97	<.0001	7.27	33.58	<.0001
		TERA-3 Pretest	0.47	5.05	<.0001	0.18	1.51	.1322	0.27	2.67	.0084	0.34	6.67	<.0001
		ALRI Pretest	0.24	5.76	<.0001	.2314	6.69	<.0001	0.07	5.27	<.0001	0.02	2.69	.0081
		Gender	1.64	1.78	.0777	0.74	1.05	.2935	0.65	1.75	.0819	0.52	2.27	.0243
	Class	**Status**	2.75	2.45	**.0119**	1.63	1.91	**.0352**	0.79	1.73	**.0481**	0.48	1.80	**.0441**
		Child Variance	69.77			34.73			7.64			2.77		
		Class Variance	16.44			8.61			0.43			0.63		
		ICC	.19			.20			.05			.18		
		Effect Size	**0.30**			**0.25**			**0.28**			**0.26**		
Spring 2004	Child	Intercept	39.22	38.69	<.0001	20.78	36.85	<.0001	9.42	18.47	<.0001	8.91	23.59	<.0001
		PreK TERA-3 Pretest	0.57	5.25	<.0001	0.02	0.20	.8440	0.60	4.12	<.0001	0.37	4.21	<.0001
		PreK ALRI Pretest	0.12	2.47	.0145	0.11	3.60	.0004	0.07	3.74	.0003	0.07	5.87	<.0001
		Gender	2.09	1.94	.0539	0.41	0.65	.5162	1.15	2.13	.0347	0.82	2.09	.0378
	Class	**Status**	2.36	1.96	**.0262**	1.54	2.29	**.0129**	0.30	0.49	**.3127**	0.62	1.35	**.0932**
		Child Variance	76.66			18.17			15.67			8.98		
		PreK Class Variance	0.74			0.95			0.01			0.67		
		K Class Variance	7.54			1.73			1.02			0.00		
		PreK ICC	.01			.05			.00			.07		
		K ICC	.09			.08			.06			.00		
		Combined ICC	.10			.13			.06			.07		
		Effect Size	**.26**			**.34**			**.07**			**.20**		

Secondary Findings

In ancillary analyses the researchers addressed a number of related questions. First, we examined the actual growth in the children's scores in kindergarten compared with the growth needed to match the expected growth of the normative population in the scale scores. Examination of the standardized scores on the *TERA-3* and the ALRI, as reported in Table 3, included the counter-intuitive finding that the children's standardized scores on the Meaning subscale were lower in the spring of kindergarten than they were in the fall and spring of preschool. The explanation for these lower mean rankings on the Meaning standardized scores lies in the children's growth compared to the growth necessary to sustain the rankings of the preschool Meaning scores. These results are illustrated in Figure 1.

Figure 1

Expected and Actual Kindergarten Growth in *TERA-3* Meaning Raw Scores



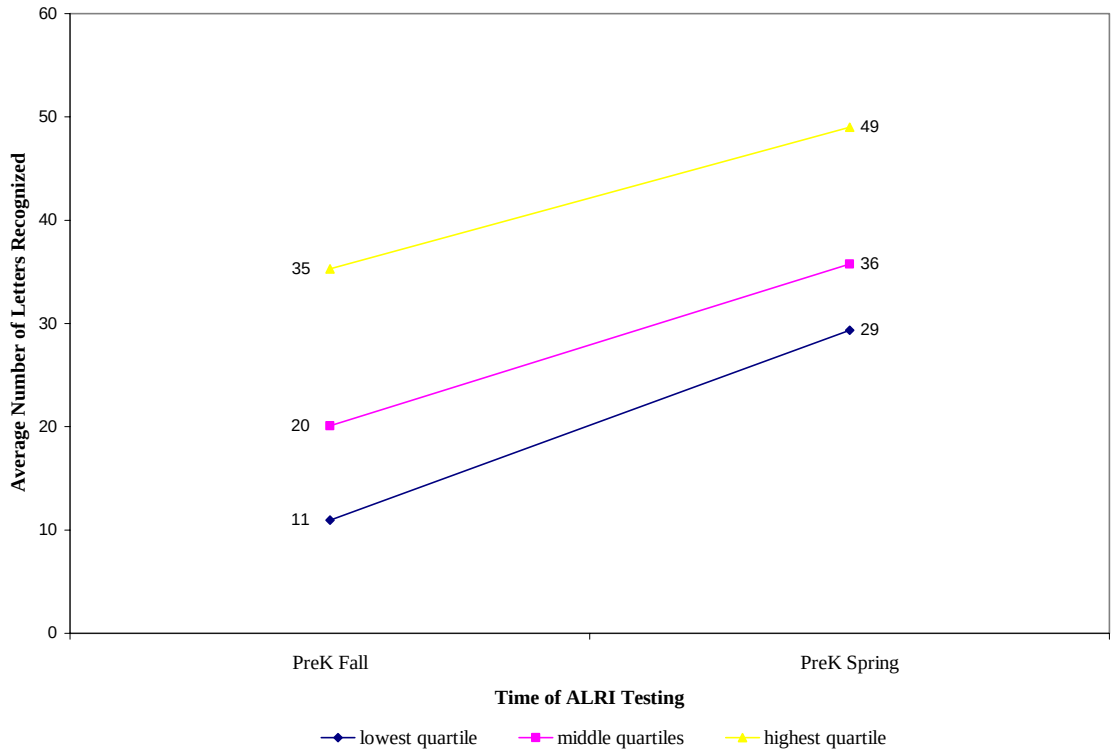
Correctly responding to about four additional items represents the expected growth over the kindergarten year. The children's actual growth in kindergarten represented approximately one-half of the expected growth.

Second, we examined the saliency of the ALRI scores as predictors of other measures of kindergarten emergent literacy achievement. The fall preschool ALRI scores predicted all other

measures of kindergarten emergent literacy achievement. Figure 2 shows the relationship between the percentile ranking of the kindergarten Reading Quotient standardized scores and the preschool ALRI scores.

Figure 2

Preschool Letters Recognized by Kindergarten Reading Quotient Quartiles



Children in all quartiles demonstrated approximately the same rate of learning as measured by the Reading Quotient scores. Children in the lower quartile on the Reading Quotient scores, for example, recognized 11 letters in the fall of preschool and 29 letters in spring, a gain of 18 letters. By comparison, children in the middle quartiles recognized 20 letters in the fall of preschool and 36 letters in the spring, a smaller gain of 16 letters. However, for children whose kindergarten Reading Quotient scores ranked in the bottom quartile, half of their yearly growth was required to match the initial recognition level of the children whose scores ranked in the middle quartiles.

The ALRI measures an explicitly taught skill. At the beginning of preschool, the scores largely represent the cumulative effect of children's opportunity to learn the alphabet from their home environments or early child care experiences.

Finally, the kindergarten scores were examined for gender effects. The results indicated that, on average, girls correctly responded to about one more item than boys on the Conventions of Print and Meaning scales.

Conclusion

The main finding of this study is that, when analyzing raw scores, the children who participated in *ELLM* enhanced preschool classes the year before entering kindergarten had statistically higher mean emergent literacy achievement on the *TERA-3* Reading Quotient and the Alphabet scales at the end of their kindergarten year than children who did not participate in *ELLM* enhanced preschool classes.

Children's learning difficulties can be predicted from low family income, high family stress, and residence in neighborhoods lacking resources to support children's learning. Ensuring that children from these circumstances have access to high-quality early learning and child care is the single most important policy measure that could be used to address the learning gap when children enter school. Policy has the greatest potential for supporting children's early learning if it is directed at organized child-care settings rather than the informal learning that takes place in families, neighborhoods, and churches. This study demonstrated that a research- and standards-based curriculum enhancement coupled with job-embedded coaching, learning-rich environments, and children's access to appropriate resources and materials can significantly increase children's achievement and that the effects can be sustained through the first year of formal schooling.

The importance of preschool achievement cannot be overstated. The ability of 4-year-old children to recognize the letters of the alphabet at the beginning of preschool predicted their kindergarten year-end literacy achievement, suggesting that early childhood policy must address opportunity-to-learn prior to age five in order to ensure that all children develop the emergent literacy skills they need for academic success.

Policy can also be an effective lever for raising public awareness of the importance of early learning, of the critical role that families play as children's first teachers, and of the dramatic variation in the quality of early child care, particularly the care available to low-income families.

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