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First-year impact of an Early Reading First project on language and early reading skill development

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Abstract

This study is of a federally-funded Early Reading First project aimed at improving school readiness by creating "Centers of Excellence" which focus on language and early reading skills development of low-income preschool children. The project consisted of a content standards-based curriculum and instructional program, literacy enriched classrooms, ongoing professional development, and parent involvement. The analysis focuses on 65 randomly assigned preschoolers attending state preschools (treatment = 37 and control = 28), enrolled for at least 18 weeks, who would be eligible by birth date for entry into public kindergarten the following year. Results demonstrate the intervention to be effective in improving the receptive language and early reading skills of participating preschoolers.

Objectives or Purposes

We propose to present at AERA 2005 the first-year results of an Early Reading First-funded project that aims to improve school readiness by focusing on language and early reading skills development of rural preschool children who live at or below the federal poverty line. We value the opportunity to discuss these results with other literacy and language researchers (such as members of Division C, Section 1) whose feedback will be considered as we continue to implement and evaluate the multi-year project. Our research is believed to make an important contribution to the knowledge base regarding emergent literacy.

Perspective(s) or Theoretical Framework

Research informs us that preschool children who live in poverty are at-risk for reading difficulties (Snow, Burns, and Griffin, 1998; Smith and Dixon, 1995). Learning to read is affected by prerequisite skills related to oral language, print awareness, and phonological processing (Whitehurst & Lonigan, 2002). These are skills that children living in poverty often do not possess (Juel, Griffith, & Gough 1986; Raz and Bryant, 1990). Furthermore, children who struggle to read have difficulty catching up to their peers. There exists a strong correlation between early reading difficulties and lower academic performance later (Whitehurst & Lonigan, 2002).

In this Early Reading First project's first full year of implementation, existing preschool programs were restructured to create "Centers of Excellence" which are marked by their emphasis on language development and emergent literacy. These "Centers of Excellence" are intended to provide low-income children with high-quality instructional programs by utilizing research-based approaches that support age-appropriate development of: a) phonological awareness, b) oral language, c) print awareness, and d) alphabet knowledge.

The Early Reading First initiative has rekindled a considerable debate about the efficacy of using intentional and explicit language and literacy activities in preschool classrooms. There are few randomized controlled studies that demonstrate the value of focusing on early reading and language development (Barnett, 2001). This initial experimental study of a locally implemented Early Reading First program represents a significant contribution to the discussion.

Methods

Participants

The preschool students on which the analysis focuses were those who were randomly assigned to one of four state preschool classes all located in a single county. The students in the study were enrolled for a minimum of 18 weeks in the preschool and will be eligible to enroll in kindergarten by meeting the age eligibility criterion of being five years of age by December 2, 2004. The number of children in each of the two experimental and two control classes were 18, 19, 11, and 17, respectively, resulting in 37 experimental and 28 control cases. Their gender, age, and ethnic distributions by condition are provided in Table 1 in Appendix A, as is their parent's education level, for cases where it was available.

Measures

The Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997) is designed to measure receptive vocabulary and the comprehension of spoken English. The Test of Language Development – Primary, Third Edition (TOLD-P:3; Newcomer & Hammill, 1997) is intended to determine specific strengths and weaknesses in language development. The subscales used in this study are Word Discrimination (WD); Phonemic Analysis (PA); and, Word Articulation (WA). The Test of Early Reading Ability, Third Edition (TERA-3; Reid, Hresko, & Hammill, 2001) is designed to assess children's mastery of early developing reading skills. The use of these measures is supported by reviews found in the 14th and 15th Mental Measurements Yearbooks (see, for example, Bessai, 2001; Wasyliw, 2001; Madle, 2001; Stutman, 2001; de Fur, 2003; and, Smith, 2003). Please see Appendix B for further details. The Letter Recognition Assessment (LRA) is a locally developed instrument that measures children's ability to name capital and lower-case letters.

Near the start of the program, but referred to as "pretests," the students were assessed with the PPVT-III and the LRA. To gauge the program's impact within the first year, these same measures were given the following spring (approximately 8 months following the program's start, but referred to as "posttests"). In addition, during the spring only, students were assessed with the TOLD-P:3 and TERA-3.

Procedures

The project employs a randomized experimental design for impact assessment of children's and family outcomes. Children were randomly assigned to participate in the experimental group or control group. The only change to current practices of the participating preschools is that students who are not randomly assigned to receive the intervention are assessed with the same instruments being used in the experimental classes (e.g., the PPVT-III, TOLD-P:3, TERA-3, and LRA). In addition, the experimental group was treated with the intervention described below.

Of the 99 randomly assigned cases who met the minimum exposure criterion, 34 cases were excluded from the main analysis because they would not be eligible to enroll in a public kindergarten class the following year (due to not reaching 5 years in age by December 2, 2004). In the final analysis, we have 37 and 28 randomly assigned experimental and control cases, respectively.

Intervention

The intervention was multi-faceted consisting of the following four major components:

1. Professional development: Instructional staff participated in an ongoing training and coaching program targeting early reading research, instruction, curriculum, assessment, and classroom environment.

2. Curriculum and instruction: All treatment classrooms used a specific curriculum and instructional program that emphasized the use of scientifically-base strategies that address: a) oral language skills, b) phonological awareness; c) print awareness, d) emergent writing skills, e) motivation to learn, and f) appreciation for literate forms.

3. Environment: Each classroom was changed to create "Centers of Excellence" marked by meeting or exceeding quality indicators related to classroom environment, curriculum, and instructional practices.

4. Parent involvement and home literacy: Parents participated in monthly Partners in Literacy activities designed to provide parents the tools necessary to successfully promote home literacy. Participating parents were given books and other educational materials each month. Additionally, project staff made regular home visits to work with parents and children on educational activities designed to scaffold each child's individual growth and development and extend in-classroom learning.

Results

A preliminary analysis was first conducted to ensure that no initial systematic differences existed between the two groups. The experimental and control preschoolers were not found to differ to a statistically significant extent (when either a chi square-, Mann-Whitney-, or a t- test was employed with two-tails using alpha = .05) on any of the following variables: gender, ethnicity, age, the measure of receptive language, or parents' reports about a number of factors— their child's special needs status, prior preschool experience, knowledge of the alphabet, the number of books in the home, the parents' English fluency status, education level, and employment status. Since some of this information was collected via parent interviews and not all were able to be interviewed during the pre-measure collection period, we can only assume that the results would not differ if interview data were available for all participating parents. However, random assignment was employed with the children who all met certain qualification criteria to participate in these state preschools (e.g., financial needs). Thus, it is not surprising and quite reasonable to believe that the groups *are*, on average, and for most characteristics, equivalent.

The main analysis of program impact consisted of testing two models: an unadjusted and an adjusted one. In the first, the question addressed is whether the two groups differed when assessed in the spring (i.e., on posttest scores), after being in the program for a minimum of 18 weeks (45% the school year). The independent samples t-test was approached via the General Linear Model with the condition (experimental vs. control) being dummy coded wherein the regression coefficient reflects the mean difference, and a positive one shows the experimental group to have the advantage. The second model is an ANCOVA where receptive language ability or the ability to recognize letters (as measured by the PPVT-III or LRA) at the start of the program serves as the covariate. The question addressed is whether the two groups differed on

the adjusted posttest means (i.e., after variance due to initial levels of receptive language or letter recognition is accounted for). Again a positive coefficient indicates the experimental group to have the advantage. The 95% confidence interval for the unstandardized regression coefficient, b, is presented in Table 2 of Appendix C along with the correlations, partial correlations, and p-values for each of the two models for each of the six outcome measures.

Although the groups were not found to vary at the pretest on the PPVT (p= .167, 2-tail) and the LRA (p= .071, 2-tail), since the PPVT III and LRA were measures given in the spring used to gauge program impact, and since they were found to correlate not only with their own "posttest" scores but with those of other outcome measures, as well, the PPVT pretest scores were used as a covariate in analyses involving PPVT III, TOLD-P:3, and TERA-3 posttest scores. Similarly, the LRA pretest scores were used as a covariate in the analysis of LRA posttest scores. Both sets of analyses are offered, though some readers may prefer to interpret the results involving just the first model, considering that random assignment has been employed and the groups did not initially differ to an appreciable degree.

The results in Table 2 suggest that the treatment did positively impact language and early reading skills development within the first eight months of the program. The experimental group outperformed the control group, on average, on the PPVT III, TOLD-P:3-WD, TOLD-P:3-WA, TERA-3, and LRA (p < .05, two-tailed). Even when the posttest scores were adjusted by the covariate, the experimental group still performed better, on average, for all these measures except the TOLD-P:3 Word Discrimination (WD). The only measure for which no advantage was noted for either group was in regards to the TOLD-P:3 Phonemic Analysis (PA). Thus, receptive language, word articulation, early reading skills, and letter recognition were improved, on average, for those participating in the treatment, above what may be realized over the passage of eight months in time in a standard state-funded preschool class. The minimum and maximum amount of improvement is estimated by the 95% confidence interval boundaries which are in standard score units for the PPVT III and the TOLD-P:3 subscales. For example, we are 95% confident that those in the experimental preschool classes can recognize at least 6 and at most 14 more letters than those in the control classes (as per Model 1, when initial LRA scores are not used to adjust the posttest means).   The TERA-3 is expressed in terms of the score obtained by summing together three standard scores that reflect student mastery of conventions of meaning, alphabet knowledge, and print awareness.

Conclusion

Children in Early Reading First "Centers of Excellence" outperformed children in a control group on measures of receptive oral language and early reading skills (PPVT-III, TOLD P:3-WA, TERA-3, and LRA) after controlling for initial language and literacy levels. (In addition, when no covariate was used, the experimental group performed better than the controls on the TOLD-P:3-WD.) The gains by those children participating in the treatment were above what may be realized over the passage of eight months in time in a standard state-funded preschool class.

Educational or Scientific Importance of the Study

Barrett (2001) states that controlled experiments, in which children are randomly assigned to preschool programs, are "extremely valuable."   There is a need for scientifically validated interventions that prepare children to become successful readers. This is because so many children, especially those living in poverty, often lack the language and pre-reading skills that are necessary for reading success (Snow, Burns, and Griffin, 1998).

This study demonstrates that low-income children entering kindergarten can have a preschool experience that positively impacts their oral language and early reading skill development. The generalizability of this study's results, implications for current practice, and future research related to preschool education serving low income children are discussed in the paper.

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Appendix A

Table 1. Summary of participant characteristics by condition.

Participant Characteristic	Experimental (n=37)		Control (n=28)	
	n	%	n	%
Gender				
Male	20	54	12	43
Female	17	46	16	57
Ethnicity				
Unknown (not interviewed; did not complete survey)	*5*	*(13.5)*	*10*	*(36)*
Caucasian	25	78	12	66
Hispanic	3	9	3	17
Other	4	13	3	17
Parent's Education Level				
Unknown (not interviewed; did not complete survey)	*5*	*(13.5)*	*9*	*(32)*
Neither high school diploma or GED earned	5	16	5	26
HS diploma or GED Earned	15	47	7	37
Some college or college graduate	12	38	7	37
Age				
(as of December 2, 2004 when child must be 5 to enter a public kindergarten class in the same state)	n= 37 Mean= 5.49 SD= .31		n= 28 Mean= 5.57 SD= .32	

Appendix B

**Details from the Mental Measurements Yearbooks Regarding the
Outcome Measures and Covariates**

The Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997). As noted by Wasik and Bond (2001), "Similar to most interventions conducted to date, the PPVT-III was used as a baseline and outcome measure for receptive vocabulary skills." In his review of the test, Bessai (2001) concludes that it, "can be recommended for use in educational and clinical settings to measure receptive vocabulary and to screen for English language ability and general language development," adding that, "The current edition should be very useful for researchers interested in language development, verbal intelligence, and related cognitive functions." Likewise, Wasyliw (2001) commented that, "It should serve as a worthy successor to the highly popular PPVT-R, and would be a useful component of any testing armamentarium in educational, speech and language, or research settings."

The Test of Language Development- Primary, Third Edition (TOLD-P:3; Newcomer & Hammill, 1997) In his review of the test, Madle (2001) concludes that, "the TOLD-P:3 remains one of the best developed and psychometrically sound measures of children's language available today. Special care should be taken, however, when using it with children below the age of 5 ½ due to its limited floor." In her summary of the review she did on the measure, Stutman (2001) comments, "As an evaluative and diagnostic tool it serves its stated purpose." But she also notes that the strengths of this test include, "acceptable subtest reliability (except for the Word Discrimination subtest)."

The Test of Early Reading Ability, Third Edition (TERA-3; Reid, Hresko, & Hammill, 2001). In her review of this test, de Fur (2003) notes two of the identified purposes of this test to be (1) to document progress as a result of early reading intervention and (2) to serve as a measure in reading research. She concludes, "The TERA-3 represents a reliable and valid measure of early reading ability and reflects those skills that have been identified in reading research as critical to the development of reading. It provides data that suggest strengths or weaknesses in understanding the alphabet and its functions, understanding the conventions of print, and in deriving meaning from print. Citing the National Reading Panel (2000), de Fur notes, "The theoretical framework underlying the TERA-3 is well supported in current reading research." Smith (2003) concludes by saying, "Generally, the TERA-3 accomplishes its stated purposes, especially if used in conjunction with other assessments."

The Letter Recognition Assessment (LRA). This measure was locally modified from the Head Start Letter Assessment that presents all of the lower-case and capital letters on sheets of paper. Children are asked to name any letters they recognize.

Appendix C

Table 2. Correlation and regression results for outcomes measured eight months into the intervention to determine program impact both without (Model 1) and with adjusting for a cognitive measure (the PPVT, Model 2; or, LRA, Model 3) obtained near the start of the program.

Outcome Measure/ Model	n	r/ Partial r	R^2 Change	p	b	95% CI for b
PPVT						
Model 1	57	.327	.107	.013	9.256	2.036,16.476
Model 2	52	.307	.035	.028	5.586	0.615, 10.557
TOLD- WD						
Model 1	56	.360	.129	.006	2.927	0.855,4.999
Model 2	51	.254	.058	.075	1.940	-0.205,4.084
TOLD- PA						
Model 1	56	.164	.027	.228	1.146	-0.737,3.028
Model 2	51	.104	.007	.472	0.600	-1.063,2.262
TOLD- WA						
Model 1	56	.561	.314	<.001	3.021	1.804,4.238
Model 2	51	.522	.257	<.001	2.776	1.460,4.092
TERA						
Model 1	55	.360	.129	.007	3.860	1.102,6.619
Model 2	50	.372	.095	.009	3.393	0.905,5.881
LRA						
Model 1	57	.562	.316	<.001	10.434	6.283,14.584
Model 3	50	.524	.219	<.001	8.569	4.484,12.654

Notes.
1. Model 1 uses condition (treatment vs. control) as the only predictor.
2. Model 2 uses the pre- PPVT standard score as a covariate that enters prior to condition, the indicator for program impact.
3. Model 3 uses the pre- LRA score as a covariate prior to condition, the indicator for program impact.
4. The standard scores of each measure are employed; for the TERA, the sum of 3 standard scores (for Alphabet, Convention, and Meaning) is used.
5. PPVT is the Peabody Picture Vocabulary Test-III designed to measure receptive vocabulary and the comprehension of spoken English.
6. TOLD is the Test of Language Development – Primary, Third Edition intended to determine specific strengths and weaknesses in language development. WD is the word discrimination scale; PA is the phonemic analysis scale; WA is the word articulation scale.
7. TERA is the Test of Early Reading Ability, Third Edition designed to assess children's mastery of early developing reading skills.
8. LRA is the Letter Recognition Assessment designed to assess the number of letters that the child can recognize.
9. The R^2 Change for Model 1 is in comparison to a model with no predictors whereas for Model 2 and Model 3 it is in comparison to a model without any covariate.