

Advancing Early Literacy Achievement: A Longitudinal Study of an American Indian Early  
Childhood Education Program

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The quasi-experimental study explored the effectiveness of a United States Department of Education Early Reading First (ERF) program that featured cultural wrap-around adaptations specially designed for young children from one non-mainstream culture, namely a rural and remote western United States Indian Nation. Program effectiveness was evaluated on preschool vocabulary skills development and then subsequently kindergarten first sound fluency, letter name fluency and phonemic segmentation fluency skills. Results for the children ( $N=60$ ) across four schools indicated that the program with its cultural wrap-around component resulted in significant beginning reading skills development gains, especially for those children most at-risk. Specifically there were significant vocabulary gains across preschool as well as first sound, letter name, and phonemic segmentation fluency gains across kindergarten.

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## Introduction

In the mid-1990s, neuro-biological, behavioral and social science research converged to strengthen the fact that early language experiences have powerful effects on language development over the entire life-span (National Early Literacy Panel, 2008). Skills gained early in life help children acquire additional skills in the next stage of development (Carneiro & Heckman, 2003). And as a corollary, skills missed early in life are hard to compensate for later on, as shown in the early language studies of Hart and Risley (1995). Simply put, early disadvantages accumulate. This fact supports the value of early interventions for children at-risk (Christie, Enz, & Vukelich, 2013; Roskos & Christie, 2007;) and was the foundation of Early Reading First (ERF); a competitive United States Department of Education funded early intervention effort through the *No Child Left Behind Act* (2001). The ERF effort was designed to help at-risk preschoolers develop the necessary early language and literacy skills needed for success in school. The most recent cohorts of ERF programs contained the following components: 1) a scientifically-based early literacy curriculum; 2) a full-day, 42 week instructional year; 3) response to intervention strategies for children struggling with the regular curriculum; 4) coaching by mentor teachers; 5) professional development; 6) continuous progress monitoring; and 7) engagement with family and community. These components were in place to effectively support preschoolers' early language and literacy skills and bolster readiness skills at kindergarten entry (Zucker, Cabell, Justice, Pentimonti, & Kadervek, 2013; Wilson, Dickinson, & Rowe, 2013). Emphasis was placed on supporting the development of oral language, phonological awareness, alphabet knowledge, print awareness and emergent writing

since these foundational skills that have been shown to be strong predictors of successful literacy development in school (National Early Literacy Panel, 2008).

While all ERF projects used high quality curriculums supported by scientifically-based research, the early funded ERF programs favored loosely structured curriculums. For example in 2003, almost half of projects used the *Creative Curriculum*, (Jackson, et al., 2007). *Creative Curriculum* at the time focused primarily on organizing the pre-K classroom around “interest areas” or centers. However, later funded ERF projects used more structured curriculums such as *Opening Worlds of Learning* (Pearson), *Where Bright Futures Begin* (Houghton-Mifflin Harcourt), and *Doors to Discovery* (McGraw-Hill). These more structured curriculums provided teachers with an extensive set of instructional material – big books, regular-size books, rhyme charts, vocabulary cards, alphabet cards and friezes, assessment instruments – and teacher manuals with detailed daily lesson plans that were geared toward teaching early literacy skills in 0a developmental sequence. These curriculums greatly reduced the amount of time needed to prepare lessons and helped ensure that basic early literacy skills were being taught in a systematic manner. Unfortunately, these programs came at a cost. The content of these curriculums were aimed at a generic, national audience, trying to connect with children who live in all sections of the country and are from different socioeconomic and ethnic backgrounds. This resulted in content and activities that did not really connect with any specific group of children – just the hypothetical ‘average’ mainstream child. This “one size fits all” approach to curriculum and instructional activities does not pose much of a problem for children who come from the cultural mainstream. However, children who have more diverse home and cultural backgrounds could experience difficulty relating to content in these curriculums. For example, children who live in rural and remote environments would have difficulty understanding a story set in a large

city with subways, high-rise buildings, and lots of stores. Similarly, children in a large city would have difficulty relating to a story set in a rural and remote American Indian Nation with no subways, no high rise buildings, few stores but lots of wide-opened spaces with horses and sheep.

This study explored the effectiveness of an Early Reading First (ERF) program in a quasi-experimental design that featured cultural wrap-around adaptations designed for young children from a non-mainstream culture, namely a rural and remote western United States Indian Nation. Specifically, the study explored the effects of the program on the skill development of preschool vocabulary and then subsequently kindergarten first sound fluency, letter name fluency and phonemic segmentation fluency.

#### Community and Educational Setting

Growing up within United States Indian Nation communities can be an educational challenge. Evidence of this challenge and its influence on success in school can be found in the U.S. National Assessment of Educational Progress (NAEP; National Center on Educational Statistics, 2013a). NAEP data has documented a widening achievement gap between Indian children and all other children in the United States (National Center on Educational Statistics (2013b).

The four schools in the current study were located within a remote, rural western United States Indian Nation (reservation). Each school was approximately 50 miles from the other. The schools were staffed by certified teachers and instructional aides and supported by mentor literacy coaches. Children that attended the preschool classrooms during the 2010-2011 school year and attended traditional kindergarten classrooms during 2011-2012 were the focus of the study. District policy dictated which children were eligible to attend the ERF preschool. For

admittance eligibility all potential children were screened before school started using the Peabody Picture Vocabulary Test (PPVT-4, Dunn & Dunn, 2007). According to district-directed policy, children in the lowest quartile on the PPVT, that is, below one standard deviation ( $<85$ ) were admitted first followed by children with higher scores until each class from each of the four schools contained 15 children. This district policy was designed to ensure that first priority was given to children identified as most at-risk for academic challenges. Thus the ERF teachers, staff and researchers played no role in the screening and selection process. In addition, the rural and remote settings of the preschool with one classroom in each building did not permit a comparable control group. In addition, while there was one town within the school district, the town preschools did not permit comparable a control group because of significant differences in social economic status, hence the need for a quasi-experimental, no-treatment control, pre-post test methodological design.

In 2010-2011 the district policy yielded a range of PPVT scores for children in the classrooms from 45 to 124, with only 11 of the 60 children (male=30; female 30) scoring at or above age-appropriate performance (score = 100). As a result, the admittance policy created two groups of interest to the study: one group of children with  $<85$  PPVT scores ( $N=26$ ;  $m=15$ ;  $f=11$ ) that placed the group more than one standard deviation below age-appropriate performance, and the one group with 85 and  $>$  scores ( $N=34$ ;  $m=15$ ;  $f=19$ ).

### Strategies and Practices

As noted, the current preschool program implemented a multi-component approach that included: 1) a scientifically-based early literacy curriculum; 2) a full-day, 42 week instructional year; 3) response to intervention strategies for children struggling with the regular curriculum; 4) mentor-teacher coaches; 5) professional development; 6) continuous progress monitoring; 7)

engagement with family and community; and 8) monthly fidelity of implementation assessment. Importantly, each of these eight components featured much needed adaptations that included local-based culturally sensitive content and activities for children, teachers and families. Given the rural and remote settings of the four preschools, these adaptations were necessitated by the need for local, tribal-based culturally sensitive content and activities. Consider one example. The curriculum (*Where Bright Futures Begin*, Houghton-Mifflin Harcourt, 2005) provided teachers with an ample amount of instructional materials, such as big books, regular children's books, vocabulary picture cards and oral language discussion cards, but these materials were often distal to the daily experiences of the children. One of the big books dealt with an underground subway in a large city; there are no subways in the children's communities -- just narrow highways and unpaved roads. Another oral language card showed the picture of a lush farm that had nothing in common with the dry, high-altitude, arid lands where the children live. While these and other materials were kept in the curriculum to widen the children's knowledge about the world, however, it was nevertheless to adapt the curriculum to include culturally relevant content, that is, content that provided social, historical and emotional links and built upon the strengths of the children's experiences (Demmert, 2011; Gillard & Moore, 2007; Gutierrez-Gomez & Pauly, 2006; Marks, Moyer, Roche, & Graham, 2003; Paulson, Kelly, Jepson, van den Pol, Ashmore, Farrier, & Guilfoyle, 2003; Thompson, Hare, Sempier, & Grace, 2007). This was done in the hope of improving beginning literacy skills development in preschool and the hope that preschool gains would positively effect kindergarten literacy skills development. For all practical purposes, the adaptations meant developing and then embedding culturally relevant content into all aspects of the program components for children and teachers as well as families. The adapting process was led by the ERF early literacy mentor coaches and

all were native-language speaking members of the same tribal nation as the children. The process was also aided by the presence in each classroom of staff that were tribal members and native language speakers. The completed process resulted in daily lesson plans that featured mainstream curriculum and activities as well as cultural wrap around adaptations through the day (i.e., morning message, large group, story time, small group, play, etc). Here are some results of that process at work.

The number of oral language words was increased by adding words from the children's native language that matched the English words. For example, In the *Welcome To School* thematic unit teachers introduced *shi k'is* (my friend) along side the English word for friend.

The numbers of vocabulary picture discussion cards were expanded with images representative of experiences common to the children. For example, a discussion card of a red fire truck was accompanied by a picture of a yellow tribal fire truck.

Culturally relevant artifacts and props were added. These came from the families and surrounding tribal communities and accompanied each thematic unit. For example, in the *My Community, My Family* thematic unit the dramatic play center featured a rodeo theme and included a saddle, ropes and all the trappings of an Indian rodeo.

Language, songs, and movement activities were expanded through the use of the children's native language. For example, in circle time English rhymes such as *Mary Had A Little Lamb* were presented in English and their native language. This is an especially good example, because sheep and lambs are very common.

The number of culturally relevant books was increased. However, to add these books teachers and coaches had to create their own. This was the case because published books for young Indian children that have any relevance for the thematic units of the curriculum were

almost non-existent. So, the teachers and coaches created and printed their own books. For example, in the *My Community, My Family* thematic unit books were created about a boy riding a sheep at a rodeo event (called *wooly riders*) as well as about a visit to a livestock feed store.

It must be noted that as each thematic unit of the curriculum changed every month the content of the cultural wrap-around activities, including the artifacts and props were changed in the various centers, like the writing, library, dramatic play, manipulative). Thus the monthly transition from thematic unit to unit encompassed much work by the teachers and coaches.

Upon completion of the ERF preschool program, children attended kindergarten the next school year, guided by state-directed reading standards using a comprehensive reading curriculum from the same publisher as *Where Bright Futures Begin* (Houghton-Mifflin Harcourt). All kindergarten assessments were selected and administered by the school district pursuant to state directives. All data were provided to the ERF researchers by the school district. In addition, no attempt was made by the researchers to influence, direct or document kindergarten instructional or non-instructional strategies and practices.

### Measures

The current article examined children's data on the following measures during preschool and kindergarten:

1. Preschool: Receptive vocabulary: Peabody Picture Vocabulary Test 4; (PPVT, Dunn & Dunn, 2007)
2. Kindergarten: First sound fluency: Dynamic Indicators of Basic Early Literacy Skills (DIBELS-Next; Good & Kaminski, 2011);
3. Kindergarten: Letter naming fluency: Dynamic Indicators of Basic Early Literacy Skills (DIBELS-Next; Good & Kaminski, 2011);

4. Kindergarten: Phonemic Segmentation Fluency: Dynamic Indicators of Basic Early Literacy Skills (DIBELS-Next; Good & Kaminski, 2011).

*Peabody Vocabulary Test (PPVT)*. The PPVT is a measure of receptive vocabulary and was administered in fall and spring of preschool and was also used by the school district as a screening instrument to determine admittance priority to preschool. The PPVT determines the size of a child’s receptive vocabulary lexicon. Receptive vocabulary skill is considered such an important mediator of literacy development that government initiatives such as the U.S. *No Child Left Behind Act* has mandated measurement of receptive vocabulary in young children. A large body of research has documented the importance of receptive vocabulary in the development of literacy skills (National Early Literacy Panel, 2008). For example, a recent longitudinal investigation documented that five-year-olds’ receptive vocabulary skills were significantly associated with later literacy skills development (Schoon, Parsons, Rush, & Kaw, 2010).

*First sound fluency (FSF)*. DIBELS Next First Sound Fluency phonemic awareness assessment was administered twice during kindergarten (fall, winter; Table 1).

Table 1

*Preschool and Kindergarten Assessment Administration Schedule*

Administration	Assessment			
	PPVT	FSF	LNF	PSF
Fall Preschool	x			
Spring Preschool	x			
Fall Kindergarten		x	x	
Winter Kindergarten		x	x	x
Spring Kindergarten			x	x

The timed assessment (one minute) requires the identification of the first sound of spoken words with one point awarded per word (maximum score: 60). FSF is a measure of phonemic awareness. Phonemic awareness reflects children's understanding that spoken language is composed of individual phonemes and that the manipulation of these phonemes underlies speech and is also important to the development of literacy skills (National Early Literacy Panel, 2008). Phonemic awareness is a sophisticated, componential skill of phonological awareness, which includes the recognition and manipulation of individual phonemes as well as onsets, rimes, syllables and words. The role of phonemic awareness in literacy skills development is well documented and has been the subject of numerous studies across languages and across orthographies (August & Shanahan, 2006; National Early Literacy Panel, 2008). In fact, relational and causal links between phonemic awareness and later literacy skill development among young monolingual children have been empirically supported in a variety of studies (e.g., Hulme, Snowling, Caravolas, & Carroll, 2005; Schatschneider, Francis, Carlson, Fletcher, & Foorman, 2004).

*Letter naming fluency (LNF).* LNF was administered three times during kindergarten (fall-winter-spring; see Table 1). The timed assessment (one minute) requires the spoken identification of upper and lower case letters with one point awarded per letter (maximum score: 110).

Letter name knowledge has been shown to be a foundational skill in early literacy skills development (National Early Literacy Panel, 2008). As a result it is a strong predictor of later literacy skills development and likely has a causal relationship with later literacy skills (Piasta & Wagner, 2010; see Piasta, Petscher & Justice, 2012 for discussion).

*Phonemic segmentation fluency (PSF)*. PSF was administered twice during kindergarten (winter-spring; see Table 1). The timed phonemic segmentation fluency assessment requires the segmentation of spoken words into component phonemes with points awarded per phoneme (maximum score: 79). PSF is also a measure of phonemic awareness but it is more complex in its demands than the first sound fluency assessment (Cummings, Kaminski, Good & O'Neil, 2011). PSF is more complex because it requires that children segment two- to five-phoneme spoken words into their individual phonemes fluently (in one minute).

## Results

### Data Analysis

Across preschool (PPVT) and kindergarten (FSF, LNF, PSF) data were collected from the school district on each measure at each administration to formulate a data representation of children's literacy skills development.

Using these preschool and kindergarten secondary data, descriptive and inferential analyses were completed. As noted, the school district admitted children based on PPVT scores given prior to entry into preschool. Average age of the children during the fall administration (prior to entry) was four years and five months (range = 4.1 to 5.1). Children with a score of <85 (the lowest quartile and below one standard deviation) were admitted first. Thus this district admittance policy created three groups for analysis: 1) children as a whole; 2) children <85; and 3) children 85 and >. Analyses for the latter two groups permitted an exploration of entry-level vocabulary proficiency on preschool and kindergarten beginning reading skills development.

*Preschool receptive vocabulary (PPVT)*. Distributions of the PPVT receptive vocabulary scores for the group as a whole at fall and spring of preschool confirmed that the average score at fall was  $M = 86.02$  ( $SD = 16.92$ ) at the spring of preschool was  $M = 98.15$  ( $SD = 19.41$ ; Table 2).

A paired sample t-test revealed the differences between the means of the two administrations to be statistically significant ( $t(59) = 6.64, p < .001$ ). The spring mean score was within the standard error of measurement ( $SEM=3.6$ ) for age-appropriate performance (score of 100).

Further analyses by preschool entry-level PPVT scores revealed that for the < 85 group (Table 2), the average score at fall of preschool was, as expected, considerably below the average standard score of children for their age  $M = 72.50$  ( $SD = 11.49$ ), but by the spring had improved to  $M = 90.04$  ( $SD = 18.85$ ). According to the authors of the PPVT (Dunn & Dunn, 2007), a gain of four or more standard score points is considered significant. Furthermore, a paired sample t-test indicated that differences between the means of the two administrations were statistically significant ( $t(25) = 6.97, p < .001$ ).

Table 2

*Preschool PPVT scores*

Time	<i>M</i>	<i>MdN</i>	<i>SD</i>	N
All Children				
PPVT Fall	86.02	85.0	16.92	60
PPVT Spring	98.15	98.0	19.41	60
< 85 on PPVT screening				
PPVT Fall	72.50	74.0	11.49	26
PPVT Spring	90.04	92.0	18.85	26
85 and > on PPVT screening				
PPVT Fall	96.35	94.0	12.56	34
PPVT Spring	104.35	104.0	17.69	34

For the 85 and > group (Table 2) the average score at fall of preschool was  $M = 96.35$  ( $SD = 12.56$ ) and spring was  $M = 104.35$  ( $SD = 17.69$ ). The mean differences between the two administrations were found statistically significant ( $t(33) = 3.35, p < .001$ ).

Results of a mixed model ANOVA between the groups (< 85 and 85 and >) further

indicated that the overall change from fall to spring administration for the two groups was significant ( $F(1,58) = 53.14$   $p < .001$ ). However, growth over time was different for the two groups ( $F(1,58) = 7.41$   $p < .01$ ), indicating that the  $< 85$  group had larger gains.

*Kindergarten first sound fluency (FSF)*. Distributions of FSF scores for the group as a whole at fall of kindergarten was  $M = 12.58$  ( $SD = 12.68$ ) and at the winter was  $M = 30.72$  ( $SD = 16.61$ ; Table 3). A paired sample t-test revealed the differences between the means of the two administrations to be statistically significant ( $t(58) = 8.62$ ,  $p < .001$ ). As Table 4 indicates, the *Benchmark Goal* for fall kindergarten was 10 and the winter of kindergarten was 30. The *Cut Point For Risk* was 5 and 20 respectively. On both assessment occasions the children's kindergarten FSF scores exceeded, on average, the *Benchmark Goal*. Score distributions indicated variability at the fall of kindergarten and less so by the winter (Table 3).

Table 3

*Kindergarten First Sound Fluency Scores*

Time	<i>M</i>	<i>MdN</i>	<i>SD</i>	N
All Children				
Fall	12.58	14.0	12.68	59
Winter	30.72	33.5	16.61	60
< 85 on PPVT				
Fall	5.31	0	8.58	26
Winter	25.58	24.5	19.09	26
85 and > on PPVT				
Fall	18.30	18.0	12.54	33
Winter	34.65	35.5	13.43	34

Table 4

*FSF Cut Point and Benchmark*

Assessment	Cut Point	Benchmark
Fall	5	10
Winter	20	30

Further analyses for the < 85 group indicated that the average score at the fall was  $M = 5.31$  ( $SD = 8.58$ ) and at the winter of kindergarten was  $M = 25.58$  ( $SD = 19.09$ ). These analyses indicated that, on average, children did not meet the *Benchmark Goal* by the winter of kindergarten but as a group did exceed the *Cut Point For At Risk* criterion indicator (see Table 4). Additionally, mean differences between the two FSF administrations were found statistically significant ( $t(25) = 5.94, p < .001$ ), indicating a substantial gain for these children between fall and winter FSF scores.

For the 85 and > group, the average score at the fall was  $M = 18.3$  ( $SD = 12.54$ ) and at the winter of kindergarten was  $M = 34.65$  ( $SD = 13.43$ ). Mean differences between the two FSF administrations were found statistically significant ( $t(32) = 6.28, p < .001$ ). These scores indicated that, on average, the children exceeded the *Benchmark Goal* on both assessment occasions (Table 4).

Results of a mixed model ANOVA further indicated that the overall change from one administration to the other for the two groups was significant ( $F(1,57) = 75.65, p < .001$ ). The difference in mean scores for the two groups was also found significant ( $F(1,57) = 13.29, p < .001$ ) and the change over time was statistically no different for the two groups ( $F(1,57) = 1.13, p > .05$ ).

> .05). Which means that both groups made large and equivocal gains.

*Kindergarten letter name fluency (LNF)*. Distributions of LNF scores for the group as a whole at fall, winter and spring of kindergarten indicated that the average score at the fall was  $M = 26.37$ , ( $SD = 14.08$ ) at the winter was  $M = 44.68$  ( $SD = 17.94$ ) and at the spring of kindergarten was  $M = 56.71$  ( $SD = 19.00$ ). DIBELS does not provide benchmarks for LNF, however, a one-way within subjects ANOVA revealed that the differences between the means were statistically significant across the three administrations ( $F(1.66) = 125.62$   $p < .001$ ), partial  $\eta^2 = 0.70$ . Post hoc tests using the Bonferroni correction indicated that LNF mean scores were 18.56 points higher in the winter administration when compared to the fall LNF scores, this difference was found statistically significant ( $p < .001$ ). LNF spring scores were 29.01 points higher when compared to the fall administration and 10.5 points higher than the winter administration and in both cases mean differences were found statistically significant ( $p < .001$ ).

Table 5

*Kindergarten Letter Name Fluency Scores*

Time	<i>M</i>	<i>MdN</i>	<i>SD</i>	N
All Children				
Fall	26.37	28.0	14.08	59
Winter	44.68	43.0	17.95	60
Spring	56.71	57.0	19.01	55
< 85 on PPVT				
Fall	19.58	18.0	13.55	26
Winter	38.42	36.5	19.43	26
Spring	49.96	52.0	21.05	23
85 and > on PPVT				
Fall	31.73	32.0	12.19	33
Winter	49.47	46.5	16.25	34
Spring	61.56	59.0	16.02	32

For the < 85 group, the average score at the fall of kindergarten was  $M = 19.58$  ( $SD = 13.55$ ), at the winter was  $M = 38.42$  ( $SD = 18.43$ ) and at the spring of kindergarten was  $M = 49.96$  ( $SD = 21.05$ ). A one-way within subjects ANOVA indicated that mean differences across the three administrations were statistically significant ( $F(1.546) = 40.89$   $p < .001$ , partial  $\eta^2 = 0.65$ ).

For the 85 and > group, the average score at the fall of kindergarten was  $M = 31.73$  ( $SD = 12.19$ ), at the winter of was  $M = 49.47$  ( $SD = 16.25$ ) and at the spring of kindergarten was  $M = 61.56$  ( $SD = 16.02$ ). Statistical significant mean differences were also found across the three administrations ( $F(1.546) = 93.62$   $p < .001$ , partial  $\eta^2 = 0.76$ ).

Results of a mixed model ANOVA between the groups further indicated that the overall change from one administration to the other for the two groups was significant ( $F(2,104) = 122.19$   $p < .001$ ). The difference in mean scores for the two groups were significant as well ( $F(1,52) = 7.6$   $p < .001$ ) and the change over time was statistically no different for the two groups ( $F(2,104) = 0.249$   $p > .05$ ). Again indicating large and equivocal gains.

*Phonemic segmentation fluency (PSF)*. Distributions of the PSF scores for the group as a whole at winter and spring of kindergarten was  $M = 34.59$  ( $SD = 23.76$ ) and  $M = 45.45$  ( $SD = 21.87$ ) respectively (Table 6). A paired sample t-test revealed the differences between the means of the two administrations to be statistically significant ( $t(54) = 5.91$ ,  $p < .001$ ). On both occasions the scores exceeded the *Benchmark Goal* (Table 7).

Table 6

*Kindergarten Phonemic Segmentation Fluency Scores*

Time	<i>M</i>	<i>MdN</i>	<i>SD</i>	N
All Children				
Winter	34.59	40.0	23.77	59
Spring	45.45	51.0	21.88	55
< 85 on PPVT				
Winter	29.32	21.0	25.96	25
Spring	40.61	37.0	26.69	23
85 and > on PPVT				
Winter	38.47	44.0	21.59	34
Spring	48.94	51.5	17.28	32

Table 7

*Phonemic Segmentation Fluency Cut Point and Benchmark*

Assessment	Cut Point	Benchmark
Winter	10	20
Spring	25	40

For the < 85 group, the average score at the winter was  $M = 29.32$  ( $SD = 25.96$ ) and at the spring of kindergarten was  $M = 40.61$  ( $SD = 26.69$ ). The 11 point score gain between the two administrations was found statistically significant ( $t(22) = 4.34, p < .001$ ). On both assessments the majority of the children were not at risk and met the *Benchmark Goal*.

For the PPVT 85 and > group, the average score at the winter was  $M = 38.47$  ( $SD = 21.59$ ) and at the spring of kindergarten was  $M = 48.94$  ( $SD = 17.28$ ). The mean differences were

also found statistically significant ( $t(31) = 4.10, p < .001$ , with all children meeting the *Benchmark Goal* at each administration.

Results of a mixed model ANOVA between the groups indicated that the overall change from one administration to the other for the two groups was significant ( $F(1,53) = 34.04, p < .001$ ). The difference in mean scores for the two groups were not significant ( $F(1,53) = 2.27, p > .05$ ), and the change over time was not statistically different for the two groups ( $F(1,53) = 0.108, p > .05$ ).

## Discussion

This quasi-experimental study sought to explore how one Early Reading First (ERF) preschool program, with a cultural wrap-around component, influenced children's beginning reading skills development across preschool and then across kindergarten in a rural and remote Indian Nation of the United States. It was hoped that, by connecting a science-based curriculum to the children's social, historical and emotional experiences, beginning reading skills development would improve in preschool and these improvements would continue in kindergarten. In particular, the study focused on the program's influence on the development of children's preschool vocabulary skill as well as kindergarten first sound fluency, letter name fluency and phonemic segmentation fluency skills.

### Preschool Measures

*PPVT*. Considering the children as a whole group, in the fall of preschool their scores averaged 86, which placed them almost one standard deviation below age-appropriate performance. However by the spring their vocabulary scores increased to 98, close to a one standard deviation gain for the year. As a group this placed them only two-points below age-appropriate performance and within the standard error of measurement. Considering the children

as two groups, the <85 group scored on average 72 on the fall assessment and 90 on the spring: A significant and robust gain of 18 points. Recall that the authors of the PPVT consider a gain of only 4 points significant. The 85 and > group scored 96 on the fall assessment and 104 on the spring: A significant gain of 8 points. Clearly both groups profited from the program and the <85 group appeared to have profited the most from the program's curriculum since they demonstrated the largest gains on vocabulary throughout the preschool year. This finding supports the role that early interventions can play in vocabulary development especially for children considered most at risk of academic failure.

#### Kindergarten Measures

*First Sound Fluency (FSF)*. For the group as a whole, first sound fluency scores presented a substantial improvement across kindergarten. On average the scores increased by 18 points from the fall to the winter administration. In both administrations, the children were above DIBELS *Benchmark Goal*. However, the group data as a whole masks the differences between the two groups. The fall average score for the <85 group was 5 points, and the 85 and > group was 18. This placed the <85 group above the *Cut Point For At Risk* but below the DIBELS *Benchmark Goal* while the 85 and > group exceeded the DIBELS *Benchmark Goal*. A Similar pattern was observed for the winter FSF scores. The <85 group was again above the *Cut Point For At Risk* but below DIBELS *Benchmark Goal* with an average score of 26, whereas the 85 and > group exceeded DIBELS *Benchmark Goal* with a score of 35. For both groups the gains in first sound fluency were significant and in both cases the size of the gains were roughly equivalent. Clearly both groups developed first sound fluency skill and the most at-risk group rose from very limited first sound fluency skill to a level where they appeared to be developing the skill.

*Letter name fluency (LNF).* For the group as a whole the letter name fluency scores increased by 18 points from the fall to the winter administration and 30 points from fall to spring of kindergarten administration. All gains were found to be statistically significant. This indicated that children identified a significantly higher number of letters by the time the kindergarten year ended. Considering a comparison between the two groups, the <85 group was below the 85 and > group in number of letters identified, but both group's gains were significant. As was the case with first sound fluency, the size of the gains was approximately equivalent. In short, both groups profited.

*Phonemic segmentation fluency (PSF).* For the group as a whole, children's scores increased by 11 points, presenting a statistically significant gain from the winter to the spring of kindergarten. For both administrations, children met the DIBELS *Benchmark Goal*. As was the case with PVIP, FSF and LNF, there are group differences across the administrations. The average PSF winter of kindergarten score for the <85 group was 29 compared to 38 for the 85 and > group. By the spring of kindergarten the scores were 41 and 49 respectively. These improvements were significant for the two groups and in both testing occasions the two groups exceeded DIBELS *Benchmark Goal*. As was the case with the FSF, LNL measures the gains in phonemic segmentation fluency were roughly equivalent.

A final note on all assessments, whereas the < 85 group was considered the most at-risk group, they appeared to make the most progress. For example, by the spring of preschool, the <85 group, on average, was close to age-appropriate vocabulary skill development. By the spring of kindergarten, the group was approaching the first sound fluency *Benchmark Goal* and met it on phonemic segmentation fluency. The latter finding on PSF is important. PSF is a more complex measure of phonemic awareness than FSF. First sound fluency assessment stopped in

the winter of kindergarten and was replaced by PSF. The fact that the <85 group met the *Benchmark Goal* for PSF indicated that they had significant and meaningful progress in the development of phonemic awareness skill. Thus across all assessments, the ERF program appears to have provided the largest benefit for the children who were most at-risk.

### Conclusion

The Early Reading First program in this study and its cultural wrap-around component resulted in significant beginning reading skills development gains. Vocabulary scores improved across preschool and so did DIBELS-Next test scores across kindergarten. The gains were large enough that the children, on average, met age-appropriate norms on vocabulary (PPVT) at the start of kindergarten. The children, on average, also met DIBELS-Next *Benchmark Goals* for first sound fluency (FSF) and phonemic segmentation fluency (PSF) at the initial kindergarten assessment administration and continued to improve significantly. Concerning DIBELS-Next letter name fluency (LNF), children demonstrated at least some skill in rapidly identifying letters at the start of kindergarten and this skill increased significantly across kindergarten (*Benchmark Goals* not available).

In multiple reviews of early childhood intervention studies (e.g., Chrisler & Ling, 2011), researchers have documented that effective early childhood literacy interventions must include multiple components and thus are comprehensive (Barnett, 2011). Comprehensive intervention components were included in the current research, namely, a science-based early literacy curriculum; extended instructional year; response to intervention for children struggling with the regular curriculum; professional development; coaching by mentor teachers; continuous progress monitoring; and engagement with family and community. In the current study a cultural wrap-around instructional component. The results of this study document the fact that Indian children

living in rural and remote communities can profit from comprehensive early interventions that attended to their cultural experiences through classroom activities. It also adds to an almost virtually non-existent research base (Demmert, 2011; Marks, Moyer, Roche, & Graham, 2003) on preschool language and literacy intervention studies with Indian children living within reservations and attending schools within reservations. In addition, the study adds support to the hypothesis that the gains made by the children were due, in some part, to increased social, historical and emotional engagement in the culturally relevant curriculum activities. This cultural relevance engagement hypothesis deserves further study (see Dunst, Jones, Johnson, Raab, & Harnby, 2011, for discussion).

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