



YMCA Report – Four Year Olds

2018-2019 Zoo-phonics Study

Home-based Programs

August 2019

Zoo-phonics Program Overview

Program Description

The *Zoo-phonics Mnemonic and Multisensory Language Arts Program*® (*Zoo-phonics*) is a commercially available, comprehensive, non-textbook-based, early language arts program with specific developmentally appropriate units for Pre-school. *Zoo-phonics* uses a systematic, kinesthetic, multi-sensory approach to teach early reading in ways that maximize understanding, attention, memory, utilization and transference to all areas of the reading, spelling and the writing process. The program a “phono” (hearing), “oral” (speaking), “visual” (seeing), “kinesthetic” (moving), and “tactile” (touching)—whole brain approach.

The Pre-school program focuses on Alphabets beginning with lower- and upper-case letters and sounds. Each letter has an animal, drawn in the shape of a lowercase letter. The alliterative name of each animal helps the child learn the sound (Pictorial Mnemonics). Pictorial Mnemonics helps children remember the shapes *and* sounds of the letters as they begin to build fluency. *Zoo-phonics* teaches the alphabet as a whole entity, teaching the lowercase letters and sounds first; capital letters are taught later. Children stand, sit on the carpet, or at their desks when signaling and sounding the alphabet and words and play physical games that connect with the alphabet, graphemes and phonemes. This improves Auditory Discrimination, especially for second language learners. Visual, auditory and overall attention increase when the child’s eyes, mouth, ears, and body simultaneously support cognition and memory. Novelty is used to increase visual, auditory and overall attention; critical elements to long term memory, fluency and comprehension. Children signal and sound the letters through science, math, social studies, literature, snack, art, music, physical education, cooking, etc., thus anchoring the letter sounds in memory.

Study Description

A one-year study of 45 four-year-old preschool students who attended one of five home-based preschools to determine the efficacy of the *Zoo-phonics* program in a home-base

instructional setting. The schools were in Indiana, Texas, Minnesota, Arizona and Kansas. licensed within their state.

Teachers and Instructional Assistants in the study all held teaching credentials or certificates from their state's licensing agency. Training was provided in the form of online instruction provided by *Zoo-phonics, Inc.* Teachers and school administrators agreed to use the *Zoo-phonics* program with fidelity.

The primary assessment instrument used in the study was the PALS PreK. This instrument was developed by the University of Virginia and measures seven constructs of early literacy. Data were collected prior to the beginning of school during the first two weeks of school at the end of the school year in May.

Procedures

Prior to the beginning of the school year, all teachers received a *Zoo-phonics* home-based teaching kit; consisting of curriculum and instructional materials. Training in the use of *Zoo-phonics* instructional techniques and materials was available online. Additionally, direct access to Dr. Char Wrighton, the Director of the *Zoo-phonics* company was available throughout the study.

During the first two weeks of class, all students were assessed using the PALS-PreK. Students were assessed on name writing, lowercase and uppercase letter names, letter sounds, beginning sounds, printed word, rhyming and nursery rhyming in order to establish a baseline. The second assessment was conducted at the end of the school year, using the same measures as the pre-test.

Analysis

The findings of this study were derived from the PALS-PreK.

The data were analyzed using:

- Descriptive statistics (means, frequencies, standard deviations and gains between assessments)
- Paired Sample T-Tests to measure the significance between pre-and-post mean scores
- Group Statistics
- Cohen's *d* to test for effect size; used to indicate the standardized difference between two means.

The significance level for all tests was set at $p < .05$.

Findings

The findings are presented in three groups 1) Name Writing, 2) Alphabet and 3) use of language. T-tests were performed using pretest and posts test comparison to compare mean scores. The analysis will be used to determine if a significant gain was made in each measure during the school year.

Section 1 - Name Writing

T-Test Name Writing Pre-Post

Paired Samples Statistics

School			Mean	N	Std. Deviation	Std. Error Mean
Home School	Pair 1	Name Writing (Post-test)	5.87	45	1.902	.284
		Name Writing (Pre-test)	4.16	45	2.593	.387

Paired Samples Correlations

School			N	Correlation	Sig.
Home School	Pair 1	Name Writing (Post-test) & Name Writing (Pre-test)	45	.354	.017

Paired Samples Test

School	P ai r	Name Writing (Post-test) - Name Writing (Pre-test)	Paired Differences							
			Mea n	Std. Deviati on	Std. Error Mea n	95% Confidence Interval of the Difference		t	df	Sig. (2- tailed)
						Low er	Upp er			
Home School	1		1.71 1	2.617	.390	.925	2.49 7	4.38 7	45	.000

Name Writing: A paired-samples t-test was conducted with 46 students to compare Pretest and Posttest Name Writing. Posttest scores ($M=5.87$, $SD=1.90$) were significantly higher than the Pretest scores ($M=4.16$, $SD=2.29$) for Name Writing, $t(45)=4.39$, $p=.000$. The Pretest-to-Posttest mean gain for Name Writing was 1.71. Scores ranged between 0 and 7. A score of 7 indicates mastery.

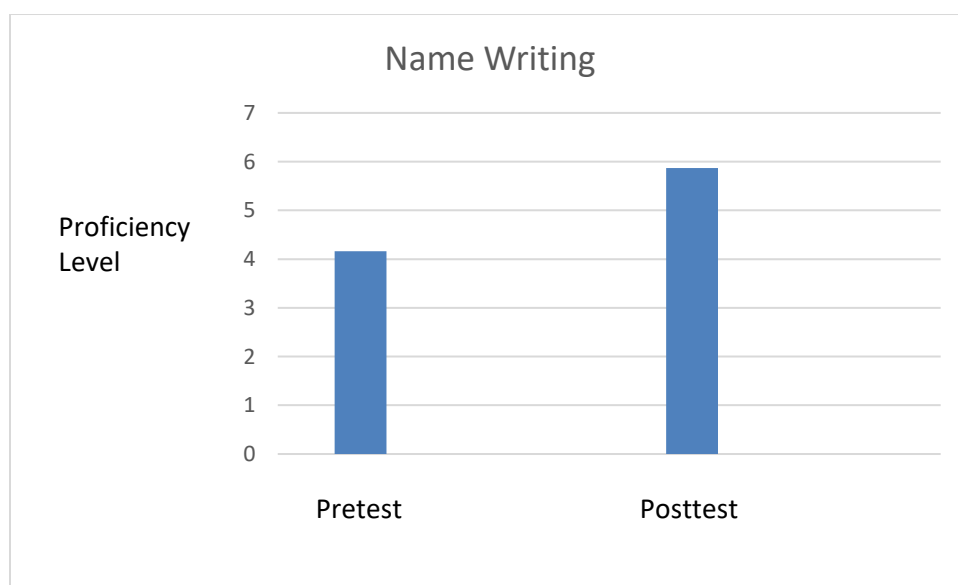


Figure 1. Name Writing. Mean scores for pretest and posttest writing proficiency.

The posttest mean score of 5.87 indicates that most students were able to write their name. The name at this level would be generally correct. It is acceptable for some letters to be written backward or the name written in a mirror image.

Section 2 - Alphabet

The assessments in Section 2 are based on scores of 0-26. Scores above 24 indicate mastery

T-Test Uppercase Alphabet Pre-Post

Paired Samples Statistics

School	Pair		Mean	N	Std. Deviation	Std. Error Mean
Home School	Pair 1	Uppercase Alphabet (Post-test)	23.40	45	4.933	.735
		Uppercase Alphabet (Pre-test)	14.18	45	9.488	1.414

Paired Samples Correlations

School	Pair		N	Correlation	Sig.
Home School	Pair 1	Uppercase Alphabet (Post-test) & Uppercase Alphabet (Pre-test)	45	.591	.000

Paired Samples Test

School		Pair		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
							Lower	Upper			
Home School	Pair 1	Uppercase Alphabet (Post-test) - Uppercase Alphabet (Pre-test)		9.222	7.684	1.145	6.914	11.531	8.051	44	.000

Uppercase Alphabet: A paired-samples t-test was conducted with 46 students to compare Pretest and Posttest Uppercase Alphabet. Posttest scores (M=23.40, SD=4.93) were significantly higher than the Pretest scores (M=14.18, SD=9.49) for Uppercase Alphabet,

$t(45)=8.05, p=.000$. The Pretest-to-Posttest mean gain for Uppercase Alphabet was 9.22 letters.

The posttest mean score for home-based students was 23.40 letters. The PALS developmental range was 12-21 letters. The home-based students out-performed the anticipated range with near-mastery of the uppercase alphabet.

T-Test Lowercase Alphabet Pre-Post

Paired Samples Statistics

School	Pair		Mean	N	Std. Deviation	Std. Error Mean
Home School	1	Lowercase Alphabet (Post-test)	22.87	45	5.115	.763
		Lowercase Alphabet (Pre-test)	11.53	45	8.805	1.313

Paired Samples Correlations

School	Pair		N	Correlation	Sig.
Home School	1	Lowercase Alphabet (Post-test) & Lowercase Alphabet (Pre-test)	45	.562	.000

Paired Samples Test

School	Pair		Paired Differences							Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	
						Lower	Upper			
Home School	1	Lowercase Alphabet (Post-test) - Lowercase Alphabet (Pre-test)	11.333	7.283	1.086	9.145	13.521	10.439	44	.000

Lowercase Alphabet: A paired-samples t-test was conducted with 45 students to compare Pretest and Posttest Lowercase Alphabet. Posttest scores ($M=22.87$, $SD=5.12$) were significantly higher than the Pretest scores ($M=11.53$, $SD=8.81$) for Lowercase Alphabet, $t(44)=10.44$, $p=.000$. The Pretest-to-Posttest mean gain for Lowercase Alphabet was 11.33 letters.

The posttest development range for PALS is 9-17. Home-based *Zoo-phonics* students had a mean score of 22.87. This indicates that the *Zoo-phonics* program prepared students above the typical development range.

T-Test Letter Sounds Pre-Post

Paired Samples Statistics

School	Pair		Mean	N	Std. Deviation	Std. Error Mean
Home School	1	Letter Sounds (Post-test)	21.96	45	3.309	.493
		Letter Sounds (Pre-test)	7.78	45	8.210	1.224

Paired Samples Correlations

School	Pair		N	Correlation	Sig.
Home School	1	Letter Sounds (Post-test) & Letter Sounds (Pre-test)	45	.343	.021

Paired Samples Test

School	Pair		Paired Differences					t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
						Mean	Lower			
Home School	1	Letter Sounds (Post-test) - Letter Sounds (Pre-test)	14.178	7.729	1.152	11.856	16.500	12.305	44	.000

Letter Sounds: A paired-samples t-test was conducted with 45 students to compare Pretest and Posttest Letter Sounds. Posttest scores ($M=21.96$, $SD=3.31$) were significantly higher than the Pretest scores ($M=7.78$, $SD=8.21$) for Letter Sounds, $t(44)=12.31$, $p=.000$. The Pretest-to-Posttest mean gain for Letter Sounds was 14.18 letters.

The PALS 4 yr. old development range for letter sounds is 4-6 letters. The Home-based students significantly outperformed this range with a mean score of 21.96.

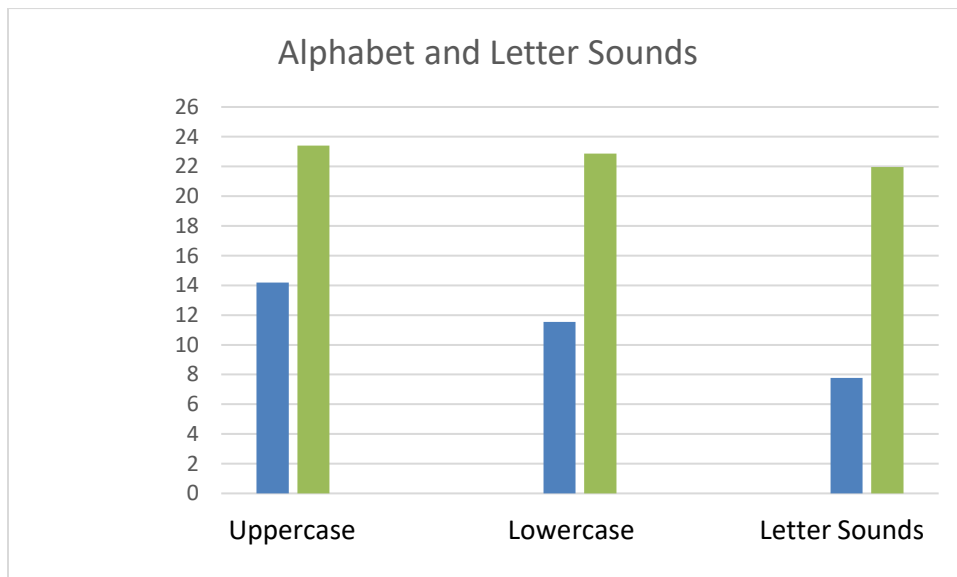


Figure 2 Alphabet and Letter Sounds. A comparison of pretest and posttest mean scores.

Section 3 – Use of Language

The tests in this section are based on a score between 0 and 10. A score of ten indicates mastery.

T-Test Beginning Sounds Pre-Post

Paired Samples Statistics

School	Pair	Mean	N	Std. Deviation	Std. Error Mean	
Home School	Pair 1	Beginning Sounds (Post-test)	9.47	45	1.342	.200
		Beginning Sounds (Pre-test)	6.91	45	3.437	.512

Paired Samples Correlations

School	Pair	N	Correlation	Sig.
Home School	Pair 1	45	.285	.058

Paired Samples Test

School	Pair	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
					Paired Differences				
Home School	Pair 1	2.556	3.314	.494	1.560	3.551	5.174	44	.000

Beginning Sounds: A paired-samples t-test was conducted with 45 students to compare Pretest and Posttest Beginning Sounds. Posttest scores (M=9.47, SD=1.34) were significantly higher

than the Pretest scores ($M=6.91$, $SD=3.44$) for Beginning Sounds, $t(44)=5.17$, $p=.000$. The Pretest-to-Posttest mean gain for Beginning Sounds was 2.56 letters.

The Beginning Sound Awareness range for 4 yr. olds is 5-8. Home-based students had a mean posttest score of 9.47. This significantly outperformed the PALS developmental ranges in most areas.

T-Test Printed Word Pre-Post

Paired Samples Statistics

School			Mean	N	Std. Deviation	Std. Error Mean
Home School	Pair 1	Printed Word (Post-test)	8.71	45	1.701	.254
		Printed Word (Pre-test)	7.67	45	2.730	.407

Paired Samples Correlations

School			N	Correlation	Sig.
Home School	Pair 1	Printed Word (Post-test) & Printed Word (Pre-test)	45	.194	.201

Paired Samples Test

School		Paired Differences		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation				Lower	Upper			
Home School	Pair 1	Printed Word (Post-test) - Printed Word (Pre-test)	1.044	2.923	.436	.166	1.923	2.397	44	.021	

Printed Word: A paired-samples t-test was conducted with 45 students to compare Pretest and Posttest Printed Word. Posttest scores ($M=8.71$, $SD=1.70$) were significantly higher than the

Pretest scores ($M=7.67$, $SD=2.73$) for Printed Word, $t(44)=2.40$, $p=.021$. The Pretest-to-Posttest mean gain for Printed Word was 1.04 letters.

Printed Word Awareness has a PALS range of 7-9. Home based students mean score of 8.79 is at the top of the range.

T-Test Rhyming Pre-Post

Paired Samples Statistics

School	Pair		Mean	N	Std. Deviation	Std. Error Mean
Home School	1	Rhyming (Post-test)	8.53	45	2.106	.314
		Rhyming (Pre-test)	6.16	45	3.089	.461

Paired Samples Correlations

School	Pair		N	Correlation	Sig.
Home School	1	Rhyming (Post-test) & Rhyming (Pre-test)	45	.413	.005

Paired Samples Test

School	P	Pair	Rhyming (Post-test) - Rhyming (Pre-test)	Paired Differences					t	df	Sig. (2-tailed)
				Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
							Lower	Upper			
Home School	1	1	2.378	2.933	.437	1.497	3.259	5.438	44	.000	

Rhyming: A paired-samples t-test was conducted with 45 students to compare Pretest and Posttest Rhyming. Posttest scores ($M=8.53$, $SD=2.11$) were significantly higher than the Pretest scores ($M=6.16$, $SD=3.09$) for Rhyming, $t(44)=5.44$, $p=.000$. The Pretest-to-Posttest mean gain for Rhyming was 2.38 letters.

The PALS development range for Rhyming is 5-7. A mean posttest score of 8.53 indicates that the Home-based student's notable outperformed the range in this category.

T-Test Nursery Rhyming Pre-Post

Paired Samples Statistics

School	Pair 1	Mean	N	Std. Deviation	Std. Error Mean
Home School	Nursery Rhyming (Post-test)	8.07	45	1.750	.261
	Nursery Rhyming (Pre-test)	5.67	45	2.663	.397

Paired Samples Correlations

School	Pair 1	N	Correlation	Sig.
Home School	Nursery Rhyming (Post-test) & Nursery Rhyming (Pre-test)	45	.322	.031

Paired Samples Test

School	Pair 1	Nursery Rhyming (Post-test) - Nursery Rhyming (Pre-test)	Paired Differences					t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower	Upper			
Home School	1		2.400	2.675	.399	1.596	3.204	6.019	44	.000

Nursery Rhyming: A paired-samples t-test was conducted with 46 students to compare Pretest and Posttest Nursery Rhyming. Posttest scores ($M=8.07$, $SD=1.75$) were significantly higher than the Pretest scores ($M=5.67$, $SD=2.66$) for Nursery Rhyming, $t(44)=6.02$, $p=.000$. The Pretest-to-Posttest mean gain for Nursery Rhyming was 2.40 letters.

The PALS posttest development range for Nursery Rhyming is 6-10. The posttest mean score of the Homebased students 8.07, indicating a strong understanding of this skill set.

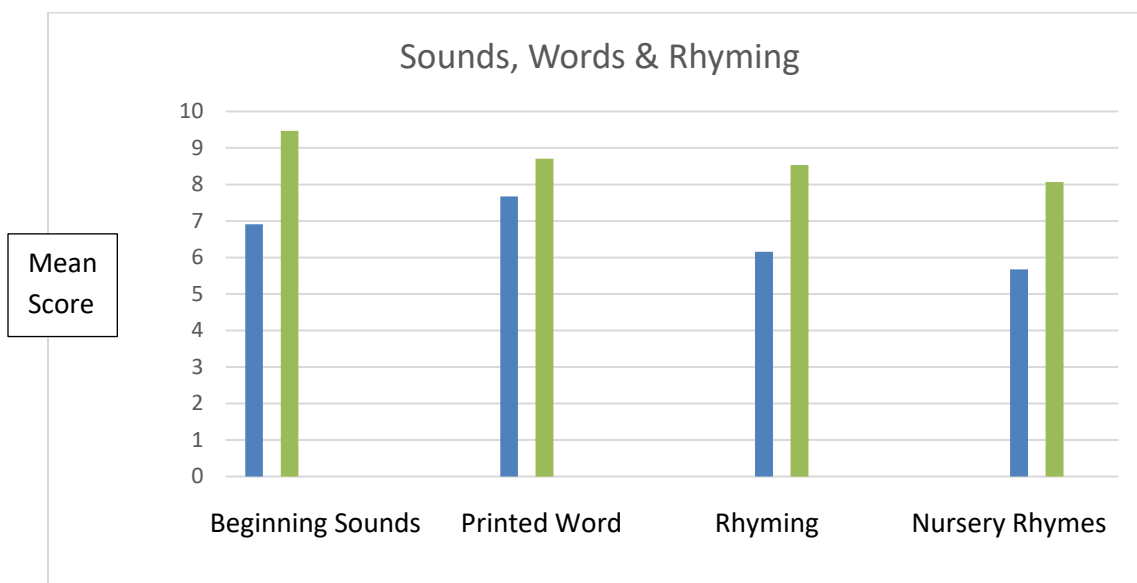


Figure 3. Use of Language. A comparison of pretest and posttest beginning sounds, printed words and rhyming mean scores.

PALS Posttest Mean Performance

Construct Mean Score	Scoring Range	Posttest Developmental Range	Posttest Mean Score
Name Writing	0 - 7	5 - 7	5.87
Uppercase Alphabet	0 - 26	12 - 21	23.40
Lowercase Alphabet	0 - 26	9 - 17	22.87
Letter Sounds	0 - 26	4 - 5	21.96
Beginning Sounds	0 - 10	5 - 8	9.47
Printed Word	0 - 10	7- 9	8.71
Rhyming	0 - 10	5 - 7	8.53
Nursery Rhyming	0 - 10	6 - 10	8.07

Figure 4. Posttest Mean Performance. Posttest mean scores are compared to PALS developmental range scores for each instructional construct.

Posttest Mean Performance – Experimental and Home-based Comparison

Construct Mean Score	Scoring Range	Posttest Developmental Range	Mean Score Experimental	Mean Score Home-based
Name Writing	0 - 7	5 - 7	6.93	5.87
Uppercase Alphabet	0 - 26	12 - 21	25.44	23.40
Lowercase Alphabet	0 - 26	9 - 17	25.44	22.87
Letter Sounds	0 - 26	4 - 5	24.25	21.96
Beginning Sounds	0 - 10	5 - 8	9.69	9.47
Printed Word	0 - 10	7- 9	8.31	8.71
Rhyming	0 - 10	5 - 7	9.13	8.53
Nursery Rhyming	0 - 10	6 - 10	8.38	8.07

Figure 5. Posttest Mean Performance. Posttest mean scores are compared to PALS developmental range scores for Experimental group and students in a home-based study.

Descriptives

Descriptive Statistics

School		N	Minimum	Maximum	Mean	Std. Deviation	Effect Sizes for Gains
Home School	Name Writing (Pre-test)	45	0	7	4.16	2.593	
	Uppercase Alphabet (Pre-test)	45	1	26	14.18	9.488	
	Lowercase Alphabet (Pre-test)	45	0	26	11.53	8.805	
	Letter Sounds (Pre-test)	45	0	26	7.78	8.210	
	Beginning Sounds (Pre-test)	45	0	10	6.91	3.437	
	Printed Word (Pre-test)	45	0	10	7.67	2.730	
	Rhyming (Pre-test)	45	0	10	6.16	3.089	
	Nursery Rhyming (Pre-test)	45	0	10	5.67	2.663	
	Name Writing (Post-test)	45	0	7	5.87	1.902	
	Uppercase Alphabet (Post-test)	45	4	26	23.40	4.933	
	Lowercase Alphabet (Post-test)	45	3	26	22.87	5.115	
	Letter Sounds (Post-test)	45	10	26	21.96	3.309	
	Beginning Sounds (Post-test)	45	3	10	9.47	1.342	
	Printed Word (Post-test)	45	1	10	8.71	1.701	
	Rhyming (Post-test)	45	2	10	8.53	2.106	
	Nursery Rhyming (Post-test)	45	4	10	8.07	1.750	
	Gain in Name Writing	45	-7.00	7.00	1.7111	2.61657	0.65
	Gain in Uppercase Alphabet	45	.00	23.00	9.2222	7.68378	1.20
	Gain in Lowercase Alphabet	45	.00	26.00	11.3333	7.28323	1.56
	Gain in Letter Sounds	45	-1.00	25.00	14.1778	7.72919	1.83
Gain in Beginning Sounds	45	-2.00	10.00	2.5556	3.31358	0.77	
Gain in Printed Word	45	-9.00	10.00	1.0444	2.92292	0.36	
Gain in Rhyming	45	-3.00	10.00	2.3778	2.93326	0.81	
Gain in Nursery Rhyming	45	-1.00	10.00	2.4000	2.67480	0.90	

Effect Sizes for Gains. Cohen's d is an expression of how large the relationship is between variables; and is independent of how many subjects were tested. This was used to compare pre- and post-mean scores to determine if the effect size of the gain on each measure was large or small. Cohen suggested that $d=0.2$ be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size.

Cohen's d results in the large effect range included gains in Upper Case Alphabet, Lowercase Alphabet, Letter Sounds, Beginning Sounds, Rhyming and Nursery Rhyming. Gains in the moderate range were only included Name Writing. The only measure in the small effect size was Printed Word, where students entered the school year with good proficiency.

Conclusions

The PALS-PreK assessment were not designed to specifically measure the instructional components of the *Zoo-phonics* program. Rather, it was intended to assess a wide range of programs in that was determined to include key literacy development concepts at the pre-kindergarten level. Using PALS Pre-K to assess students in the home-based environment and especially those using the *Zoo-phonics* program offers a unique insight as to how both the instructional program and teaching environment perform. Several conclusions can be drawn from this study that shed light on the instructional approach used and the small, focused setting of home-based schooling.

Conclusions:

- 1- Using the Paired Samples T-tests, it has been determined that the mean gains made between the pretest and posttest assessments were all significant. Figures 1-3 present this information graphically.
- 2- The mean scores for all constructs are within or above the developmental range established by PALS. Scores within the developmental range are all above the midpoint and five of the seven scores were above the developmental range entirely.

- 3- Using the PALS PreK assessment that was not designed to specifically to test the *Zoo-phonics* program's unique instructional methodology adds credibility that the *Zoo-phonics* program prepares students in the same basic early literacy constructs as students in other programs.
- 4- Strong effect sizes in nearly all measures support the evidence that students in Home-based programs are capable of proficiency levels equal to strong school-based programs and that the results of this study's assessments were not a result of chance.
- 5- The primary conclusion of this study is that home-based programs can match or out-perform nationally accepted early literacy outcomes using the *Zoo-phonics* program. The *Zoo-phonics* program is efficacious in this setting. Further study is warranted to validate the program's effectiveness across a larger base of students.