

Research Demonstrates the Effectiveness of the Zoo-phonics® Multisensory Language Arts Program with Kindergartners in California and Michigan Schools

2013 - 2014

***Study One: Research Demonstrates the Effectiveness of the Zoo-phonics Multisensory
Language Arts Program with Kindergartners in California and Michigan Schools***

***Study Two: Year-End Scores Compare Special Day Class Kindergarten Student Growth vs.
Regular Education Kindergarten Growth***



An Independent Study Conducted by E3 Research

Research Demonstrates the Effectiveness of the Zoo-phonics Multisensory Language Arts Program with Kindergartners in California and Michigan Schools

Introduction:

A study of the efficacy of the *Zoo-phonics Multisensory Language Arts Program* was conducted during the 2014-2015 school year by E3 Research, LLC. It was selected because it has demonstrated high potential as an integrated, active, multisensory curriculum. *Zoo-phonics* rapidly anchors the letter shapes and sounds in memory, preparing children for early reading, spelling and writing. Instruction aligns to the Head Start Guidelines, California Foundations, and Common Core Standards.

The *Zoo-phonics* methodology was determined to be efficacious (Griffith, 2014) and is founded in current neuroscience research. It uses pictorial mnemonics (Ehri, et al, 1984; Asher, 1993), movement (Asher, 1993; Jensen, 2000; Medina, 2008; Ratey, 2009), sensory exploration and novelty (Medina, 2008). *Zoo-phonics* quickly gains and keeps children's attention, moving newly taught information into long-term memory (Jensen, 2000; Medina, 2008; Ratey, 2009). Children learn more effectively when they move with purpose. Exercise and movement maximize attention, understanding, memory, utilization and transference to all areas of the language arts process (American Academy of Pediatrics, "The Crucial Role of Recess in School," 2012).

Earlier studies on the *Zoo-phonics Multisensory Language Arts Program* indicate that little boys learned language arts skills at the same rate as little girls, providing them confidence and a strong foundation for more advanced learning (Scott, Spielmanns, & Julka, 2012). Children with less enrichment and economic stability learn alphabetic skills just as quickly and easily as more affluent children (Kimmons and Staff, 2009). Additionally, English Language Learners and students with academic delays learned at the same or similar rate as traditional students in the area of alphabetic knowledge and other literacy skills. (Liu, 2014).

Participants, Studies 1 and 2:

In Study 1, conducted by E3 Research, the 240 students assessed were enrolled in four public schools, consisting of ten kindergarten classes. The participants consisted of four elementary schools located in Southern, Central, and Northern California, and in Michigan. 37% were White, 60% were Latino, 03% were Black. 37% were Non-English Proficient, 56% were Title 1 students. 80% of these students were on the "Free or Reduced" Lunch Program.

In Study 2, a single case study of 13 public school Special Day Class (SDC) kindergarten students was conducted. The participants included 11 boys and 2 girls.

All students in the participating schools received reading instruction using the *Zoo-phonics Multisensory Language Arts Program for Kindergarten*, implemented with fidelity by their teachers. Both studies used a "business as usual" model for teaching language arts skills. **NOTE:** End-of-the-year results from Study 1 are used in comparison to Special Day Class students in Study 2.

"Traditional seatwork engages less of the brain. If you want your learners to remember what they are learning, get them involved: Get them moving. Start 'playing' more and 'working' less" (2000, Jensen). The President's Council on Fitness and Sports recommends that all school age children need a minimum of 30 minutes a day of physical movement to stimulate the brain" (2000, Jensen). This research has been obviously ignored. Simply view the teaching practices of the last decade where recess and physical education classes have been dropped providing more time for reading lessons due to slumping reading scores of America's youth. Instead of changing the manner in which the alphabet, reading, spelling and writing are taught, the hour has been extended, killing the joy of learning for children. Jensen adds, "... some educators will still ignore the findings."

Zoo-phonics Multisensory Language Arts Program Description

The *Zoo-phonics Multisensory Language Arts Program* is a developmental, sequential and comprehensive, phonics- and literature-based language arts program for early and primary education: toddlers, preschoolers, kindergarten and 1st grade, as well as for various ages of English Language Learners and Special Needs students. Beginning with the teaching of the alphabet, phonemic and print awareness, the curricula (toddler/preschool, kindergarten, 1st grade) move children playfully, developmentally, and physically into each of the early reading, spelling and writing domains.

Children first learn through the *Lowercase Animal Alphabet* where animals are drawn directly into the shape of each lowercase letter (Ehri, et al, 1984). Each Animal Letter has a related body movement, called a Signal, that acts as the catalyst that cements the letter sounds to the letter shapes (alligator's jaws open and close, /a/; bear reaches for honey, /b/; cat washes her face, /c/, etc.). This transforms abstract symbolism into the concrete realm for student understanding and access.

Each Animal Letter has an Alliterative Name that helps children master the sounds of the letters quickly: **a**llie **a**lligator, **b**ubba **b**ear, **c**atina **c**at, etc. The children "see, say, hear and do" as well as touch, sing, dance, pantomime, toss, catch, slither, jump and run. The *Uppercase Animal Alphabet* is comprised of the capital letters with the same animals as the lowercase alphabet, which provides an associative affect for easy mastery.

Zoo-phonics teaches the alphabet as a whole entity and in alphabetical order. Zoo-phonics focuses on the lowercase letters and their sounds first, before teaching letter names and capital letters (95% of text is written with lowercase letters, see Zoo-phonics "Essences" below). Children learn the letter shapes and sounds of the letters so quickly for long-term memory, that there is no need to teach the most frequently used letters first. Within two to four months, most children have the entire lowercase alphabet to utilize.

As children learn the alphabet, fun and interesting information is directly connected through each letter sound in the areas of literature, math, music, art, sensory-drama, science, social sciences, cooking and nutrition, and physical education. These lessons are available in the *Zoo-phonics Adventuresome Kids Manual on CD* for preschool and kindergarten.

Once the alphabet is mastered, initial, ending and medial sounds are taught. These letters can then be strung together to form simple vowel-consonant (VC) and consonant-vowel-consonant (CVC) words. Children are taught to segment, blend, and rhyme at this time. Children continue to use their bodies to Signal out the sounds of the words, inputting new information into long-term memory. Soon, more complex phonetic concepts are sequentially taught (blends, digraphs, schwa, long vowels, r controlled vowels, silent letters, soft sounds etc.) still using the Body Signals, until mastery and independence is achieved. Children will now have strategies to decode large, unfamiliar words. Children learn to read words and simple-to-more-complex sentences as they master phonetic skills. Close reading experiences help children explore text that is read to them as well as when they later read independently.

A variety of instructional curricula and materials support each step of the language arts process, including both Animal Alphabets (pictorial mnemonics for lower- and uppercase letters), grade-specific decodable readers, music that teaches the alphabet and phonetic concepts, puppets for letter sound reinforcement, mini-books and readers, interactive technology, alphabet and phonics games, and a complete handwriting program. An assessment inventory provides quick tests for the teacher and supplies help to remediate, accelerate, and set goals and objectives for each student. A strong parent component is included in the daily lessons. The curricula are digitized for SmartBoards. *Zoo-phonics* also has a *Zoo-phonics en español Multisensory Language Arts Program*. Arabic and Danish versions are being developed.

"Brain-derived Neurotrophic Factor (BDNF) is...Miracle-Gro® for the Brain...a crucial link between thought, emotions, and movement... Eric Kandel [found] that repeated activation, or **practice**, causes the synapses themselves to swell and make stronger connections...exercise sparks the master molecule of the learning process...a direct biological connection between movement and cognitive function."

- *Spark*, (Ratey, 2008, pps. 40- 43).

"Zoo-phonics® is an amazing program which accelerates all students' learning. Most importantly, it helps our special needs and ELL students' progress at an amazing rate."

- Pam Evenson, Kindergarten Teacher, Study Participant - Quail Valley Elementary, CA

The Essences of Zoo-phonics

1. The Animal Alphabets helps children remember the shapes and sounds of the lower- and uppercase letters.
 2. Letter sounds are taught before letter names. You cannot sound blend with letter names.
 3. Lowercase letters are taught before capital letters. (Lowercase letters are used 95% of the time in text.)
 4. An animal-related body movement (called a Signal) for each Animal Letter helps “cement” the phonemic information into memory (connecting sounds to letter shapes) and adds a physical response for inputting and retrieving information.
 5. The alphabet is taught sequentially and as a whole entity, “a – z.” The alphabet is not fragmented.
 6. Short vowels are taught before long vowels because there are many short vowel words for children to master, including many High Frequency Words.
 7. Phonemic patterns (at, bat, fat, sat) are taught first. High frequency words that are easy to sound blend are also taught (up, on, at, not, did, etc.). More challenging high frequency words (of, it, was, etc.) are taught through their phonemic word families later. Children’s brains need patterns.
 8. The *Zoo-phonics* curricula are fully integrated with other academic subjects (math, science, art, music, social studies, physical education, sensory-drama, etc.) daily.
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Definitions

1. *Alphabetic Domain*: The Alphabetic Domain is defined as a combination of alphabet knowledge: lower- and uppercase letter shapes, sounds, letter names (in *Zoo-phonics*, Signals and Alliterative Animal Names are included); a beginning and ending sounds in words.
2. *Phonics Domain*: For these studies, this domain includes segmenting, blending, adding and subtracting sounds (phonemic manipulation); schwa, blend and digraph knowledge.
3. *Reading Fluency Domain*: This domain includes sound blending and reading vowel-consonant words (VC) and consonant -vowel-consonant words (CVC); sound blending and reading High Frequency Words.
4. *Comprehension Domain*: Understanding of the written word.
5. *Kindergarten*: Children normally begin kindergarten (or K) at five years of age. Rules vary by state.
6. *Zoo-phonics Basic Reading Assessment 2 (Z-BRA2)*: This assessment covers all aspects of phonemic awareness, alphabetics, the four reading domains, and written language.
7. *Baseline*: Also called Pre-Test. This is the test given at the beginning of the year to determine student alphabet, phonics, and word knowledge.
8. *1st Trimester*: The school year is divided into 3-month blocks of time. Assessments occur at the baseline (Pre-Test), 1st Trimester (two months from the Baseline Test or November), and 3rd Trimester (end of the year or Post-Test).
9. *Social-Economic Status (SES)*: This is the economic and ethnic make-up of participants in the study group.
10. *Special Day Class (SDC)*: The child does not achieve commensurate with his or her age and ability levels in or more of the areas listed below: oral expression, listening comprehension, alphabetics, written expression, basic reading skill, reading comprehension, mathematics calculation, and mathematics reasoning.
11. *Merged Animal Alphabet*: *Zoo-phonics* has drawn the animals in the exact shape of each lowercase letters for a **mnemonic affect** (Ehri, et al, 1984). The capital letters use the same animals for an **associative affect**.
12. *Signals*: The animal-related body movement that connects the sounds and shapes of the *Zoo-phonics Animal Alphabets* (Medina 2008; Ratey, 2009).

Study One: The Efficacy of the Zoo-phonics Multisensory Language Arts Program for Kindergarten Students in California and Michigan (Graphs 1 - 5)

Participants:

This study, conducted by E3 Research, assessed 240 students enrolled in four public schools, consisting of ten kindergarten classes. The participants consisted of four elementary schools located in Southern, Central, and Northern California, and in Michigan. The students in the participating schools received reading instruction using the *Zoo-phonics Multisensory Language Arts Program for Kindergarten*, implemented with fidelity. The study used a “business as usual” model for teaching language arts skills. *NOTE:* These end-of-the-year results from the study are used in comparison to Special Day Class students in Study 2.

Methodology:

A cross-sectional, multi-case method was used to determine the efficacy of the *Zoo-phonics Multisensory Language Arts Program for Kindergarten* in various demographics. The *Zoo-phonics Basic Reading Assessment 2 (Z-BRA2)* was used to assess the four domains of early literacy (Alphabetics and Phonemic Awareness, Reading Fluency, Comprehension and General Reading Achievement) through three assessment periods, Post-Test, 1st Trimester (November) and the Post-Test, during one school year.

Demographics:

Gender:

Boys.....	48%
Girls	52%

Ethnicity:

White	37%
Latino.....	60%
African American	03%

Socio-economic Status:

Free or Reduced Lunch.....	80%
English Language Learners (Non-English Proficient)	37%
Title 1	56%

Findings:

For each of the following tests (Graphs 1 - 5), significant gains are reported using 2-tailed T-Tests. The significance for nearly all tests was set at .000, meaning that the results did not happen by chance. Large effect sizes of 0.8 or greater were indicated, using Cohen’s d. The outcomes did not happen by coincidence, and they occurred over a relatively large and diverse sample of children.

Data shown in Graphs 1 - 5 demonstrate the academic growth of 240 kindergarten students in the areas of lower- and uppercase letter shapes, sounds, and names; and rhyming, segmenting and sound-blending words. Significantly, the mean scores in Graph 1, the Pre-Test (1st bar), show that students could identify an average of seven lower- and uppercase letters by names and sounds. The mean scores in the 2nd bar (1st Trimester) in each set show that students could identify 24 lower- and uppercase letters by names and sounds. The mean scores in the 3rd bar (Post-Test) in each set show that all students knew over 25 each of the lower- and uppercase letters, sounds and names.

Conclusions:

This study shows that all children, regardless of gender, ability, economics or ethnic groups became proficient in lower- and uppercase letter shapes, names and sounds by the end of the 1st Trimester of school through the *Zoo-phonics Program*. After the 1st Trimester, students were enabled to develop other language arts skills, such as rhyming, segmenting and sound-blending words. Mean scores of Post-Tests demonstrate proficiency in these areas for the majority of the students. It is the overall achievement seen in literacy gained across the school year that is most important. It is significant to note that the majority of students were considered low Social-Economic Status (SES), including 37% Non-Proficient English speakers.

“Physical movement from earliest infancy and throughout our lives plays an important role in the creation of nerve cell networks which are actually the essence of learning.”

- *Smart Moves, Why Learning is Not All in Your Head*, (Hannaford, 1995, p. 12)

Graph 1

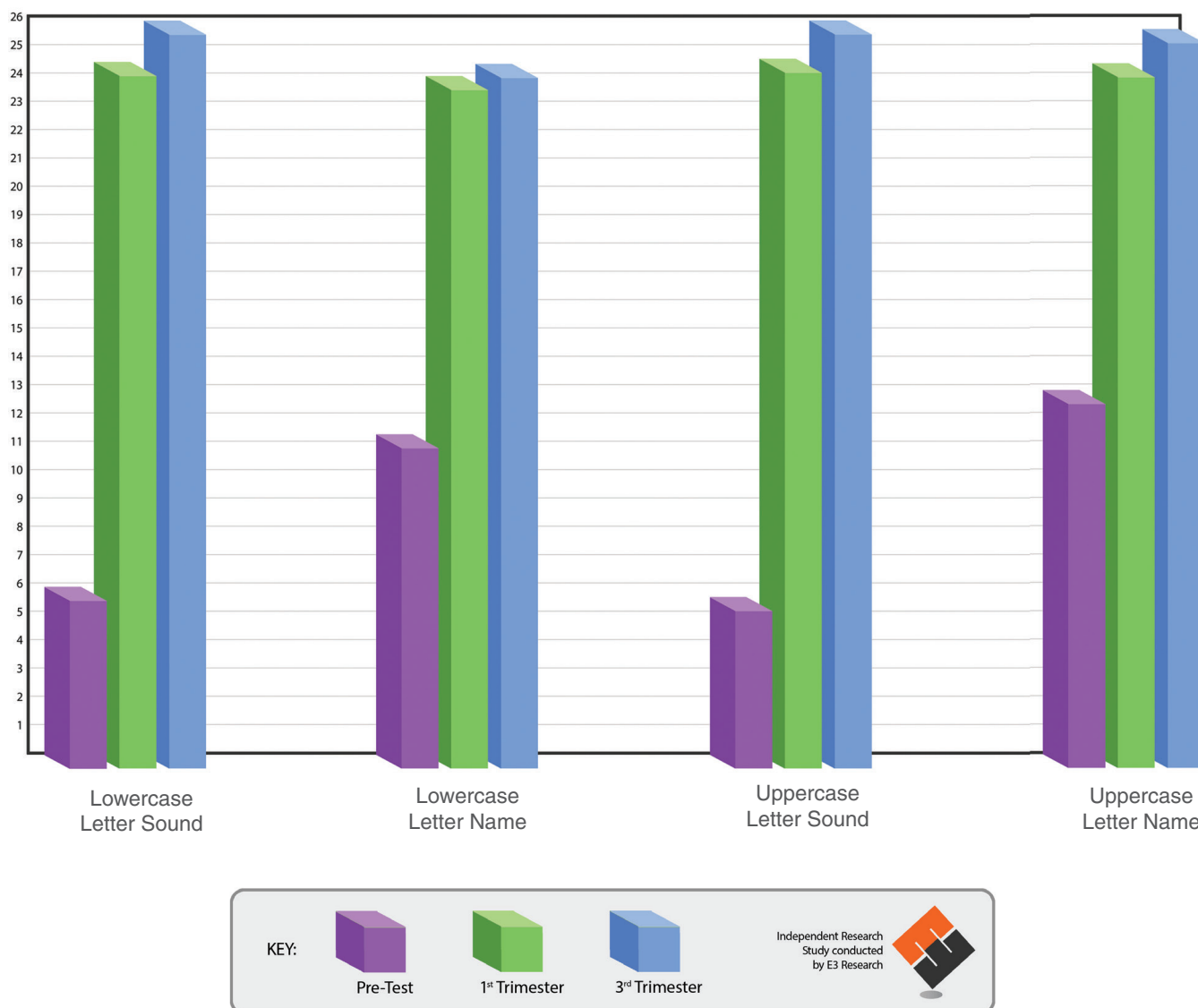
Alphabet Knowledge

Findings:

Note: Teachers assessed students with plain lower- and uppercase letters in the Pre-Test, prior to teaching the alphabet with the *Zoo-phonics Animal Alphabets*. At the 1st Trimester and Post-Test, teachers showed the *Zoo-phonics Merged Animal Alphabet* to assess letter knowledge.

Pre-Test mean scores demonstrate that kindergartners knew 6 lowercase letter sounds, 11 lowercase letter names, 5 uppercase letter sounds, and 12 uppercase letter names. Mean scores of the 1st Trimester (November) demonstrate that kindergartners knew 24 lowercase letter sounds; 23.5 lowercase letter names; 24 uppercase letter sounds and shapes; and, 24 uppercase letter names. Post-Test mean scores demonstrate that kindergartners knew 25.5 lowercase letter sounds; 24 lowercase letter names; 25 uppercase letter sounds and shapes; and 24 uppercase letter names. Males and females showed no statistical differences in scores.

Graph 1 – Alphabet Knowledge (Lower and Uppercase Letter Shapes, Names and Sounds)



Conclusions:

Knowledge of some letter names and capital letters at the Pre-Test suggests that parents and preschool teachers had taught capital letters and letter names to students prior to enrollment in kindergarten. Student knowledge of lowercase shapes and sounds was not evident in the Pre-Test. Mean scores demonstrate that all students were near alphabet proficiency by the 1st Trimester demonstrating quick growth. Knowing lowercase alphabet skills by November enabled children to use the alphabet immediately for letter and word play, leading to sound blending (segmenting and blending), reading, spelling and writing in the near future.

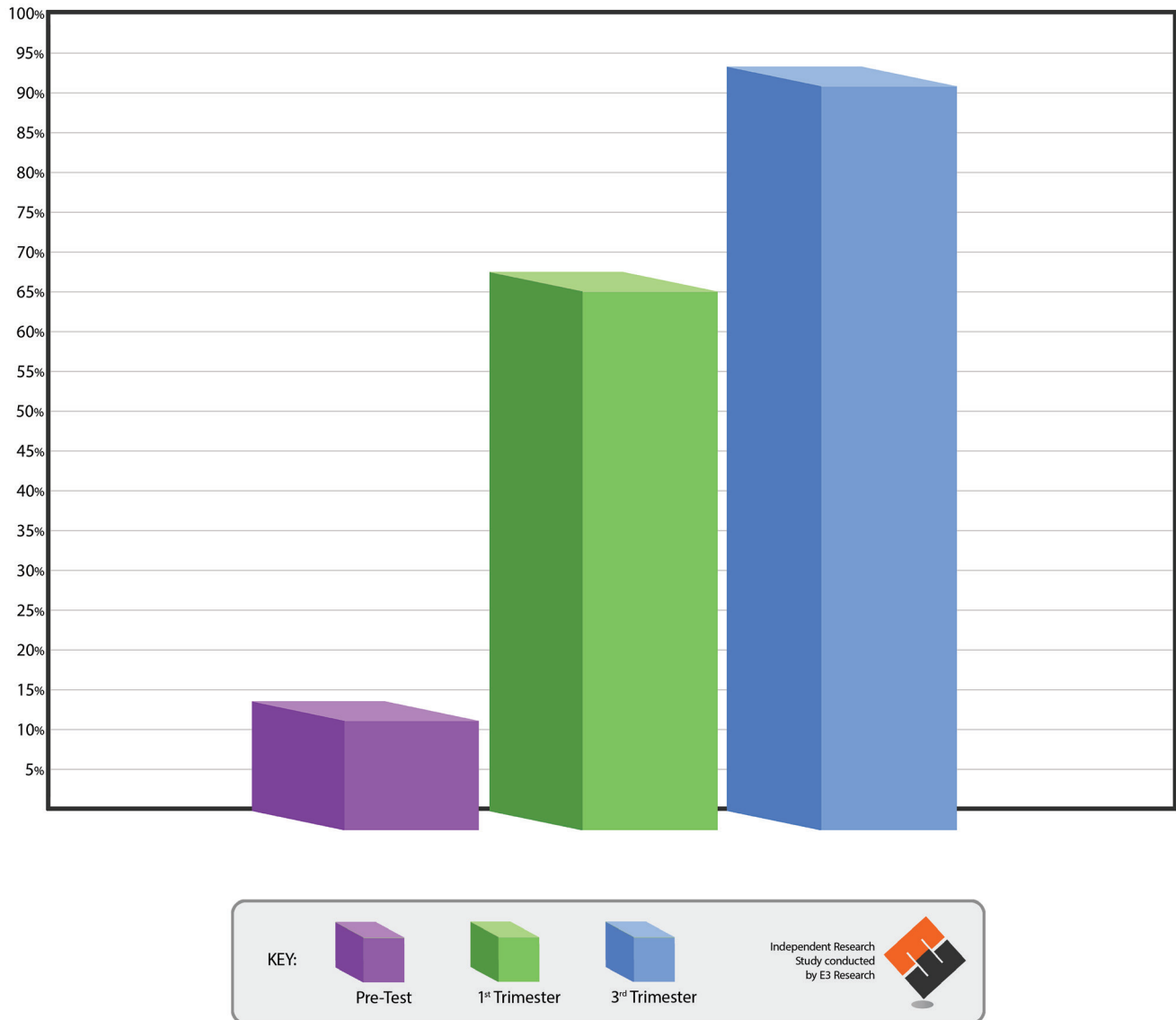
Graph 2

Beginning and Ending Sounds

Findings:

Graph 2 demonstrates the growth of kindergarten students in the area of beginning and ending sounds. In the Pre-Test (1st bar), mean scores show that students were able to identify only 15% of the beginning and ending sounds in words. At the 1st Trimester, mean scores show that students were able to identify 65% of the beginning and ending sounds. End-of-the-year mean scores demonstrate that students were able to identify over 90% of the beginning and ending sounds in the lowercase alphabet. Males and females showed no statistical differences in scores.

Graph 2 – Beginning and Ending Sounds



Conclusions:

Mean scores show that sustained growth was obtained all year, with the majority of initial and ending sound skill development happening in the 1st Trimester as the students learned the sounds, shapes and Signals of the lowercase alphabet through *Zoo-phonics*. All students gained phonemic skills much earlier in the school year, enabling them to begin the sound-blending and word building process in the second or third month of kindergarten.

Graph 3

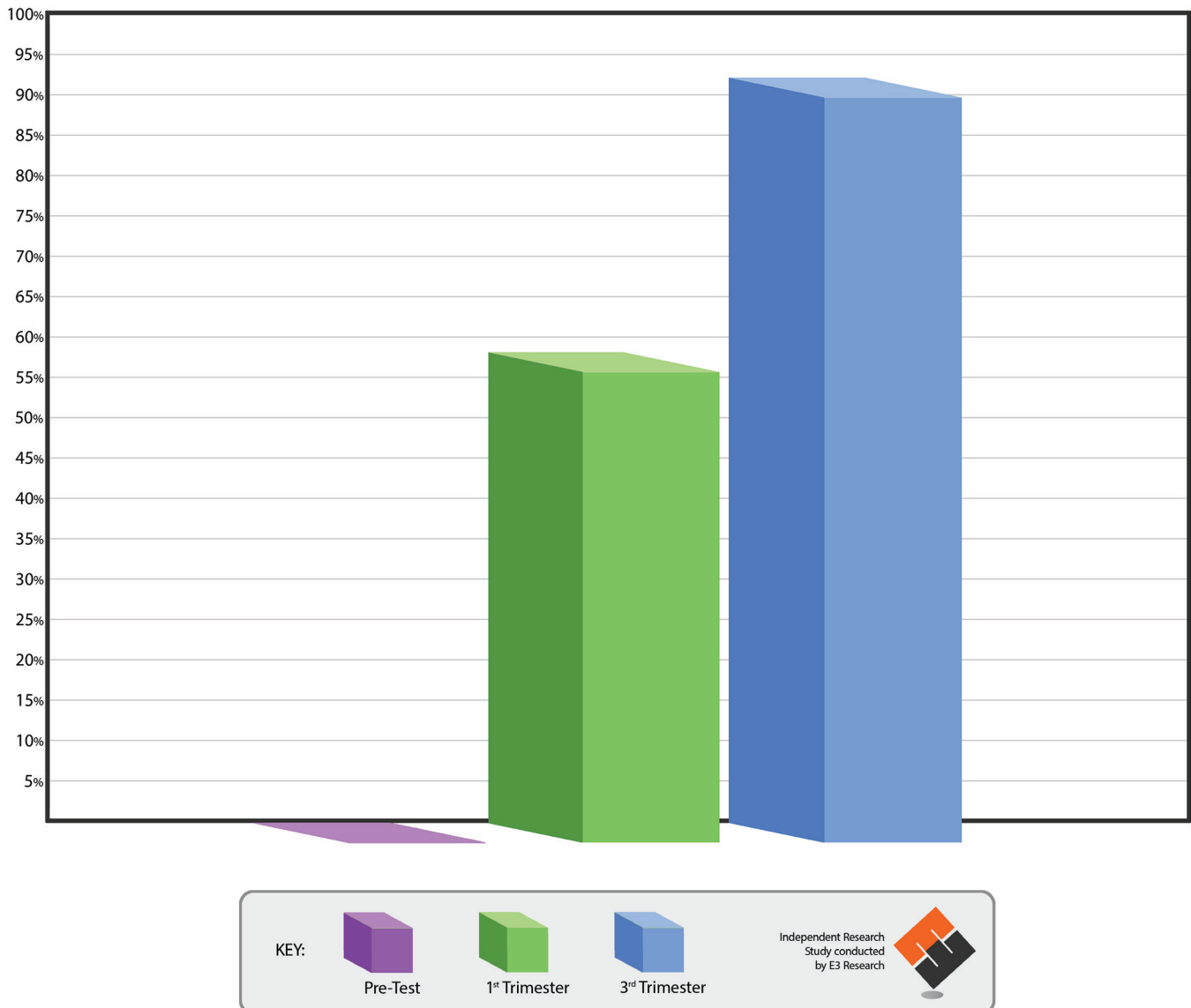
Detecting Rhymes

NOTE: The students were asked to identify rhymes in word lists of three (sit, pat, bat), and four (tack, blot, black, stack), and then in sentences.

Findings:

Pre-Test mean scores show that kindergartners could not determine any rhyming words. Mean scores in the 1st Trimester demonstrate that kindergartners could now determine rhyming words 55% of the time. Mean scores in the 3rd Trimester demonstrate that kindergartners could determine rhyming words 90% of the time. Males and females showed no statistical differences in scores.

Graph 3 – Detecting Rhymes



Conclusions:

Pre-Test mean scores show that students were not able to identify rhyming words. Sustained growth was obtained all year, with the majority of rhyming ability happening by the 1st Trimester as the students learned the sounds, shapes and Signals of the alphabet with *Zoo-phonics*. As students gained alphabet skills much earlier in the school year, they were able to hear the sounds in rhymes more easily. The ability to rhyme prepares students to read, spell and write in the near future.

Graph 4

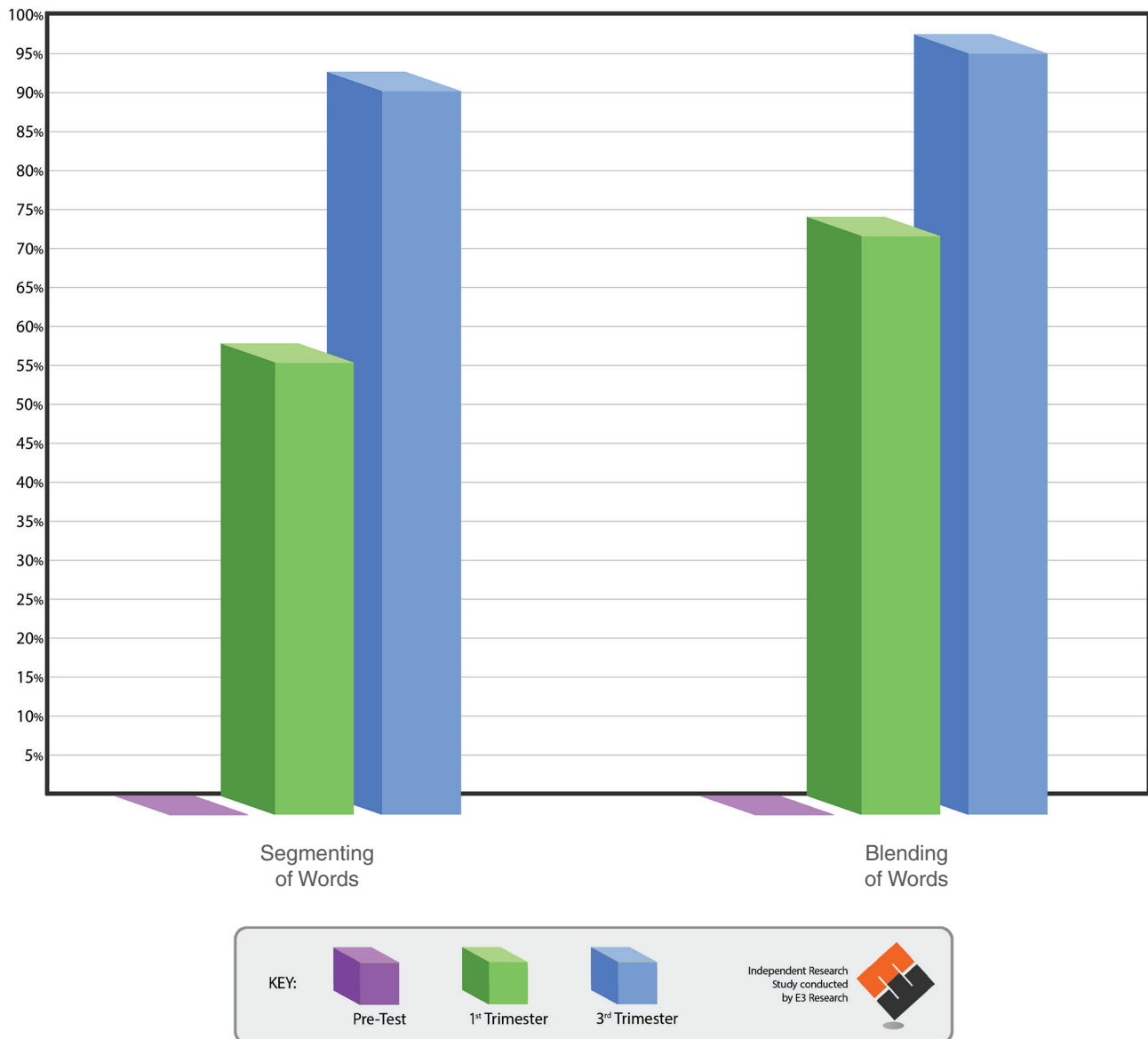
Segmenting and Blending of VC/CVC and Blend Words

NOTE: These graphs demonstrate the growth of kindergarten students in the area of segmenting and blending of vowel/consonant and consonant/vowel/consonant and blend words (glad, stop, etc.). In these tests, students were asked to segment ("hat" becomes h-a-t) and blend words (h-a-t becomes "hat").

Findings:

Pre-Test mean scores demonstrate that kindergarten students were unable to segment or blend any words. Mean scores of the 1st Trimester demonstrate that kindergarten students were able to segment 55% of the words and could blend 72% of the words. Post-Test mean scores demonstrate that kindergarten students were able to segment 90% of the words and could blend 95% of the words. Males and females showed no statistical differences in scores.

Graph 4 – Segmenting and Blending of CVC and Blend Words



Conclusions:

Mean scores show that in the Pre-Test, kindergarten students were not able to segment a word nor blend one (put a segmented sounds to form a word). Two months later, 1st Trimester data demonstrate that students made large and sustained strides in both segmenting and blending. By the Post-Test, most students had proficiency in both segmenting and blending.

Graph 5

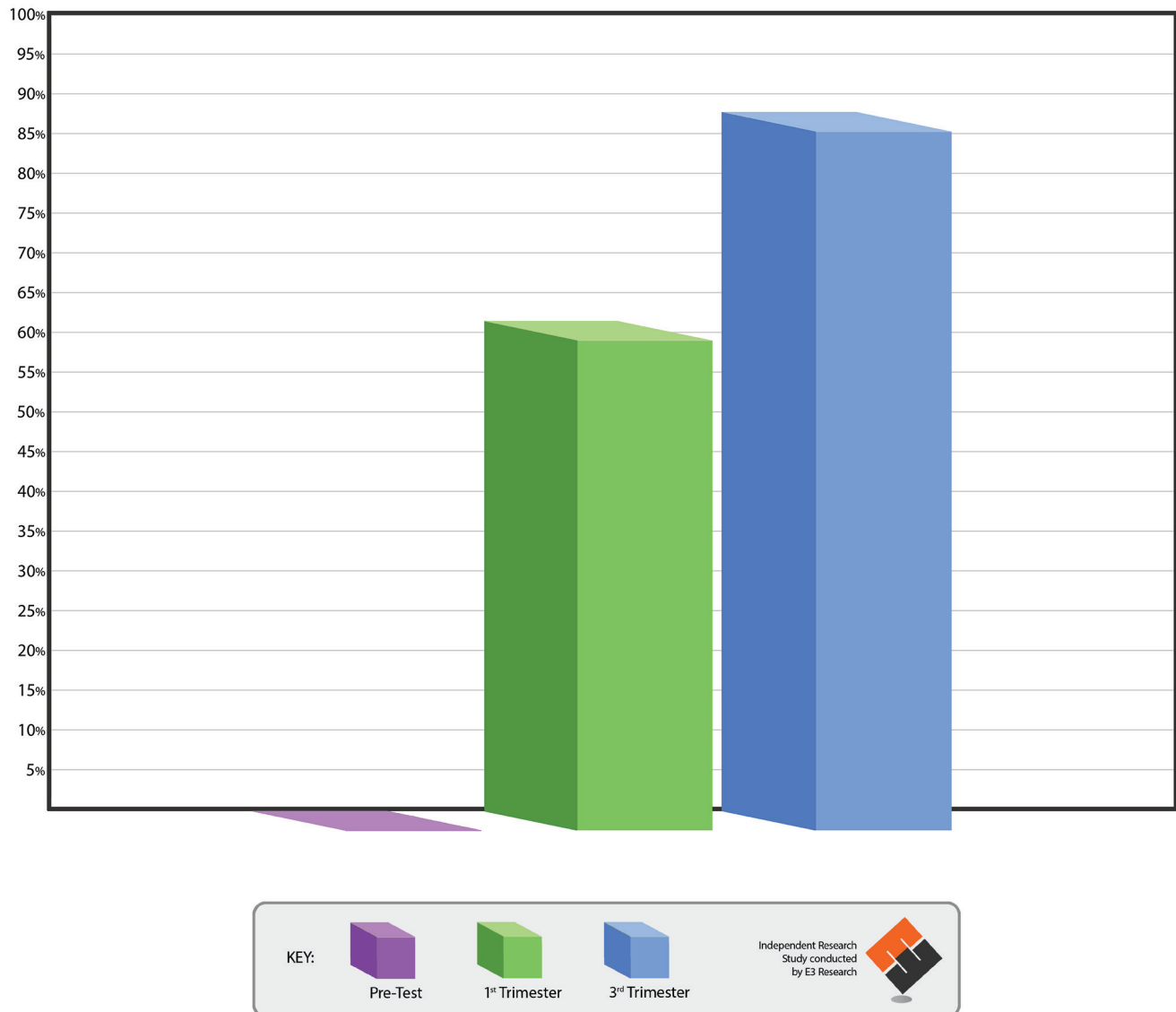
Determining Syllables in Words

NOTE: Students were asked to determine how many syllables were in 1 – 4 syllabic words.

Findings:

Pre-Test mean scores demonstrate that kindergarten students were unable to syllabicate words. Mean scores of the 1st Trimester demonstrate that kindergarten students were able to syllabicate 58% of the words. Post-Test mean scores demonstrate that kindergarten students were able to syllabicate 85% of the words. Males and females showed no statistical differences in scores.

Graph 5 – Determining Syllables in Words



Conclusions:

Mean scores show that kindergarten students were not able to syllabicate 1 – 4 syllabic words in the Pre-Test. By the 1st Trimester students were able to syllabicate well over half the words in the list with most students gaining full proficiency by the end of the year. In order to break down large words for sound blending, students need to hear and see the syllables in words. This skill is foundational for reading, spelling, and writing. If children's ears and eyes are trained to match sounds to letters early in the year, syllabication becomes easy for them.

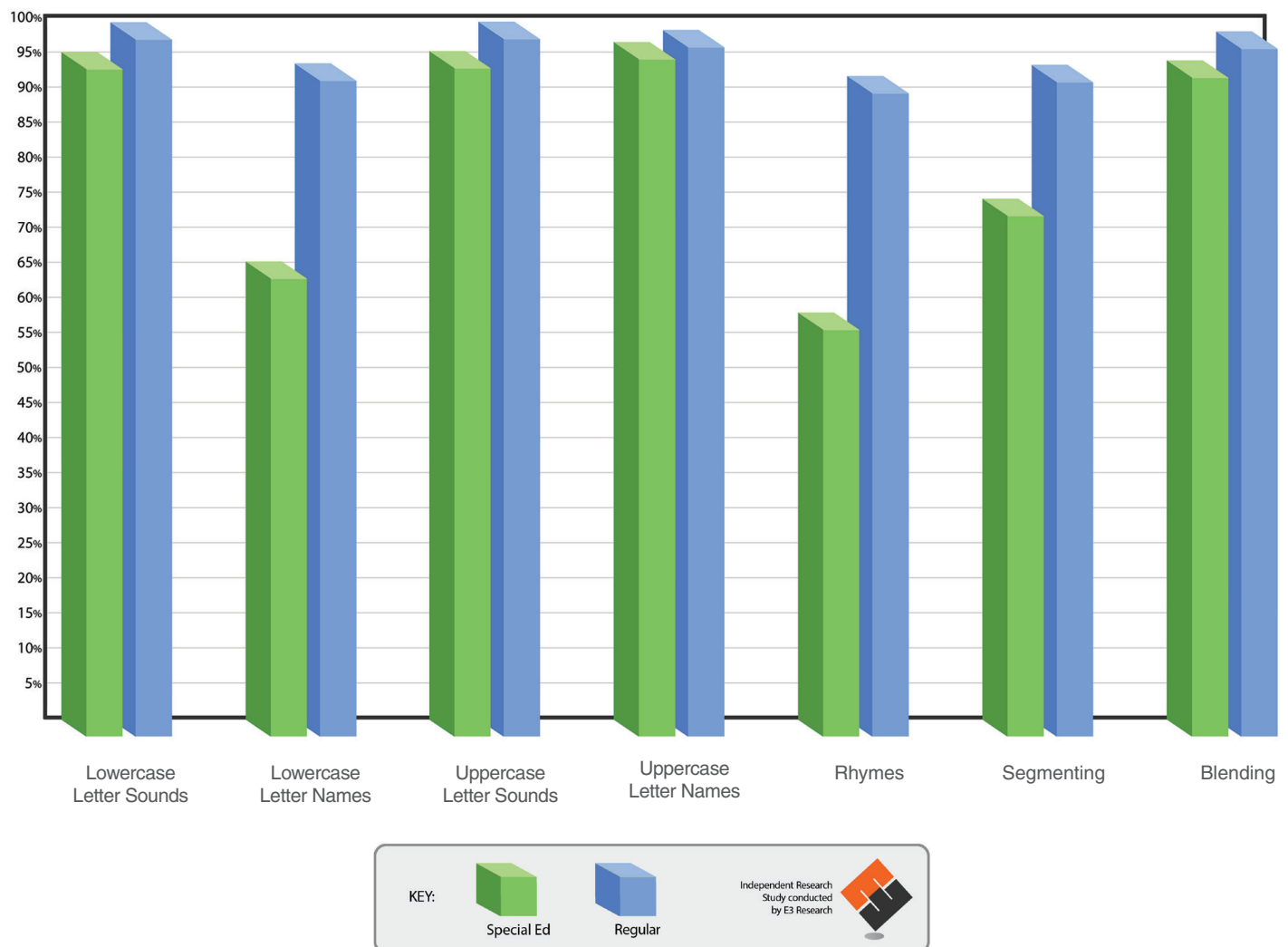
Study Two: Year-End Scores Compare Special Day Class Kindergarten Student Growth vs. Regular Education Kindergarten Student Growth

A single case study of 13 public school Special Day Class (SDC) kindergarten students was conducted using the *Zoo-phonics Multi-sensory Language Arts Program*. The participants included 11 boys and 2 girls. Mean scores demonstrated that SDC students learned at a similar rate as regular education students throughout the course of the year. At the end of the year, data shows that SDC students achieved similar scores as did regular education kindergarten students in seven language arts skills. Males and females showed no statistical differences in scores.

Findings:

There was no statistical difference between kindergarten-aged Special Day Class students and regular education kindergartners in alphabetic knowledge at the end of the year. As reading concepts became more complex, SDC students continue to show positive growth in all skill areas. Regular education kindergarten students slightly outpaced SDC kindergarten students in letter names, rhyming and segmenting only.

Graph 6 - Year End Scores Compare Special Day Class Kindergarten Students' Growth vs. Regular Education Kindergarten Students' Growth



Conclusions:

In most of the seven subjects assessed, SDC students scored same, similar or close to their regular education counterparts. Because of the playful, mnemonic, kinesthetic and concrete presentation of the *Zoo-phonics Animal Alphabet*, SDC kindergarten students were able to learn the alphabet and other related language arts skills equal or close to regular education students. Most of SDC students in this study were boys (11 boys to 2 girls), which is significant as young girls usually outscore young boys in language arts. This is a small study sample but the results are sufficiently compelling to encourage a larger study.



An Independent Study Conducted by E3 Research

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