Webber® HearBuilder® Phonological Awareness Efficacy Study: Improved Phonological Awareness Skills for At-Risk Students

Amber B. Hodgson
N. Elizabeth Holland
Super Duper® Publications, Greenville, SC

Purpose: This study examined the effects of *Webber® HearBuilder® Phonological Awareness*, an interactive computer program that uses a systematic approach to auditory training, on the phonemic and phonological awareness skills of students considered to be "at-risk."

Method: This study was conducted in Las Vegas, Nevada, in 8 Clark County School District elementary schools; 68 total students participated. The students used *Webber® HearBuilder® Phonological Awareness* for at least 8 weeks at 2 times per week for 30-minute sessions or 3 times per week for 20-minute sessions. Students were pretested and posttested using Section 1 of the *Emerging Literacy & Language Assessment*®, which is a comprehensive, norm-referenced assessment.

Results: There was a statistically significant improvement in scores for the whole group of students in the study from pretest to posttest.

Conclusion: The results of this research study show that *Webber® HearBuilder® Phonological Awareness* is an effective instructional component for improving the phonemic and phonological awareness skills of students in general and special education programs when used in a variety of settings.

Introduction

Phonological awareness is the ability to think about oral language in terms of its structure (i.e., sentences, words, syllables, and sounds). It is considered a critical early literacy skill associated with reading success. Speech and language therapy interventions that include phonological awareness training may reduce the risk of, or even prevent, reading failure (Nathan et al., 2004). In addition, research indicates that phonological awareness can be taught and that increasing students' awareness of phonemes has a facilitating effect on subsequent reading acquisition (Lundberg et al., 1988). Research also shows that children with auditory processing difficulties, language difficulties, learning difficulties, and/or low literacy achievement demonstrate lower performance in phonological awareness tasks (Catts et al., 2002; Schuele & Boudreau, 2008; Sharma et al., 2009; Torgesen et al., 1994).

Webber® HearBuilder® Phonological Awareness is an interactive, theory-based approach to auditory training. It is a therapy tool that purportedly helps students improve auditory attention, auditory analysis, and auditory processing of spoken English. *Webber® HearBuilder® Phonological Awareness* uses a systematic approach to auditory training that offers minimal increases in difficulty across the multiple levels in each activity. Students are required to listen, identify, and analyze speech sounds which allow for cultivation and enhancement of phonological awareness skills. See Appendix A for examples of the different phonological awareness skills targeted in *Webber® HearBuilder® Phonological Awareness*.

The following study was conducted to assess the effectiveness of *Webber® HearBuilder® Phonological Awareness* in developing/improving phonemic and phonological awareness skills in children with and without diagnosed language and/or learning disabilities.

Method

Participants

This *Webber® HearBuilder® Phonological Awareness* study was conducted in Las Vegas, Nevada, from January to May of 2010 in 8 Clark County School District elementary schools with one speech-language pathologist per school to administer standardized testing and oversee the implementation of *Webber® HearBuilder® Phonological Awareness*. Sixty-eight (68) total students participated in this study. Fifty-seven percent (57%) of the students were male and 43% were female. There were 5 students in preschool, 16 in kindergarten, 24 in first grade, 11 in second grade, 10 in third grade, and 2 in fourth grade. Fifty-three percent (53%) of the participants reportedly had Individualized Education Plans (IEPs) for special education services, and 35% of the students were described as having a Learning Disability and/or a Language Impairment. Other diagnoses reported included Mental Retardation, Developmental Delay, Autism Spectrum Disorder, Apraxia, and Attention Deficit Hyperactivity Disorder. Forty-seven percent (47%) of the students did not have special education Individualized Education Plans (IEPs), although many of the students without IEPs had previously been or were currently included in a Response to Intervention (RtI) program. Parents of the participants were asked to indicate students' race/ethnicity with the following results reported: 72.1% Hispanic, 17.6% Black, 8.8% White, and 1.5% Asian. Reportedly, 37% of the students lived in homes where English was the primary language, and 63% of the students lived in homes where Spanish was spoken. Seventy-four percent (74%) of the sample were reported to qualify for free and reduced-priced meals and 90% of the sample reportedly received Title I support. See Appendix B for specific participant information.

Implementation

Students used *Webber® HearBuilder® Phonological Awareness* for at least 8 weeks at 2 times per week for 30-minute sessions or 3 times per week for 20-minute sessions. The software was used in a variety of settings that included classrooms, therapy rooms, and computer labs. Students performed the software tasks independently and the speech-language pathologists were instructed to give minimal assistance. *Webber® HearBuilder® Phonological Awareness* provided students individualized practice of 9 activities that targeted students' abilities to hear, process, and manipulate spoken language structure including words, syllables, and speech sounds. The students were instructed to work on 3 different software activities during each computer session. Students were to complete all levels of earlier developing phonological awareness skills (Sentence Segmentation, Syllable Blending, Syllable Segmentation) before advancing to the next, higher-level tasks (Rhyming, Phoneme Blending, Phoneme Segmentation & Identification), which were then to be completed before advancing to the highest level tasks (Phoneme Deletion, Phoneme Addition, Phoneme Manipulation).

Assessment

Students were pretested and posttested using the *Emerging Literacy & Language Assessment®* (ELLA®) which is a comprehensive, norm-referenced assessment designed to evaluate aspects of the foundations for literacy for students ages 4;6 to 9;11. It is divided into three sections. For this study, only Section 1: Phonological Awareness and Flexibility of the *ELLA®* was administered, as it assesses phonological awareness through letter-sound identification, rhyming, initial sound identification, blending, segmentation, deletion, and substitution, which corresponds with the skills that are targeted in *Webber® HearBuilder® Phonological Awareness*. As the focus of the study was to include students struggling in phonological awareness, students who obtained a standard score of 85 or less on Section 1 of the *ELLA®* qualified to participate, as well as a few students with standard

scores greater than 85 who participated based on low subtest scores and speech-language pathologist/classroom teacher reports of significant needs in phonological awareness.

Analysis

This study employed a differential research, one-group pretest-posttest design. Data was analyzed using paired-sample t-tests in order to compare the pretest and posttest raw score totals obtained from Section 1 of the *ELLA®*. All analyses used a *p*-value of 0.05 as the criterion for identifying statistical significance.

Results

There was a statistically significant improvement in scores for the whole group of students (*N*=68) who participated in the study from pretest (*M*=52.97, *SD*=29.92) to posttest (*M*=83.04, *SD*=32.98); *t*(67)=-16.47, *p*<.001. These results suggest that

the use of *Webber® HearBuilder® Phonological Awareness* had an overall significant effect on the students' phonological awareness skills as shown by pretest and posttest scores obtained from the *ELLA®* (see Figure 1). In addition to statistically significant results when data for all students was analyzed, statistically significant *p*-values were generated when pretest and posttest raw score totals were compared for specific subgroups; groupings containing more than 9 students yielded *p*-values of <.001. The subgroups that were analyzed included students: without an IEP; with a Learning Disability and/or Language Impairment diagnosis; in grades preK through third; considered to be White, Black, or Hispanic; receiving/not receiving Title I support; and eligible/not eligible for free and reduced-priced meals. Figures 2 through 6 depict the pretest and posttest data derived from ELLA® raw score averages for all of the groups listed previously as well as the *p*-values and the number of students in each grouping.
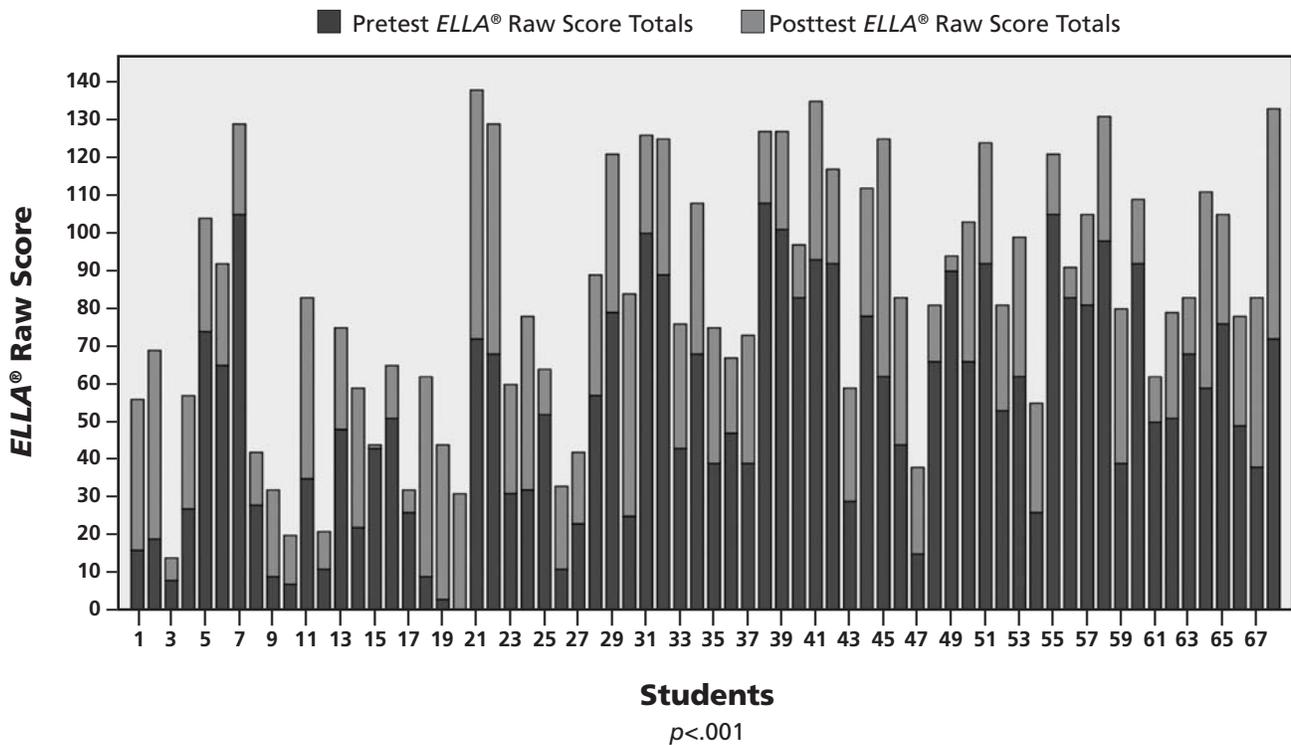

■ Pretest *ELLA®* Raw Score Totals   ■ Posttest *ELLA®* Raw Score Totals

Students

p<.001

Figure 1. Statistically significant pretest and posttest data based on ELLA® *raw scores representing improvement in phonological awareness skills for all students in study.*
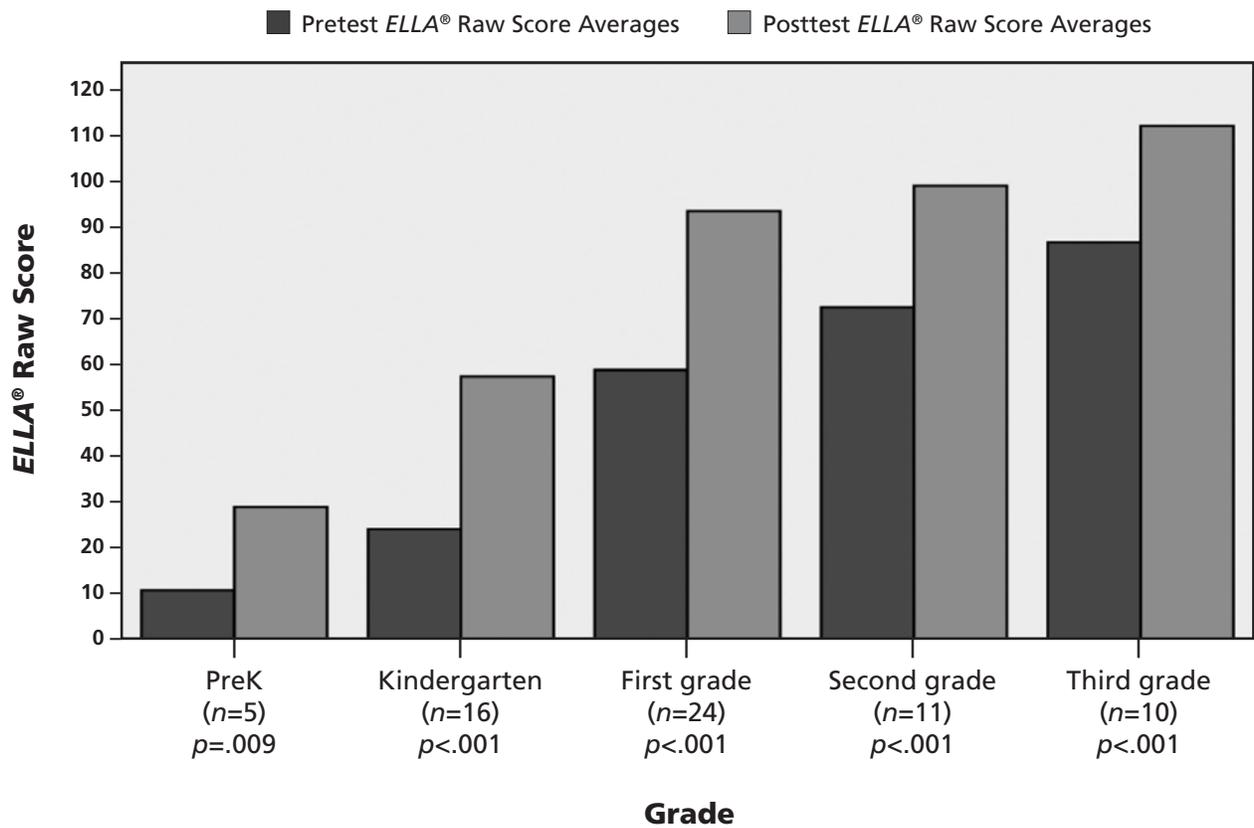
■ Pretest *ELLA*® Raw Score Averages   **□ Posttest *ELLA*® Raw Score Averages**

Figure 2. Statistically significant pretest and posttest data displaying ELLA® *raw score averages based on grade with* n *representing number of students in each group.*
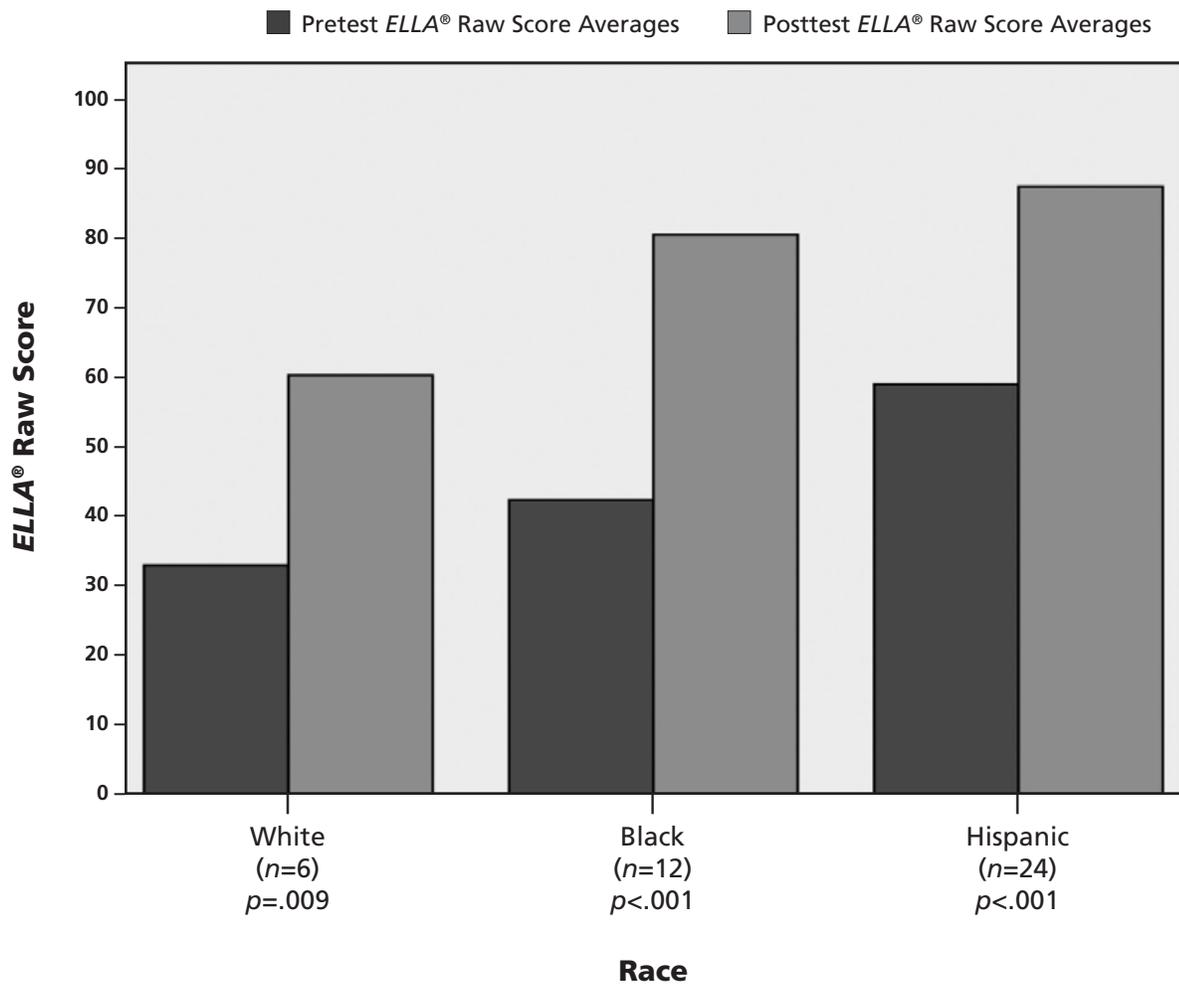
Figure 3. Statistically significant pretest and posttest data displaying ELLA® *raw score averages based on race with* n *representing number of students in each group.*
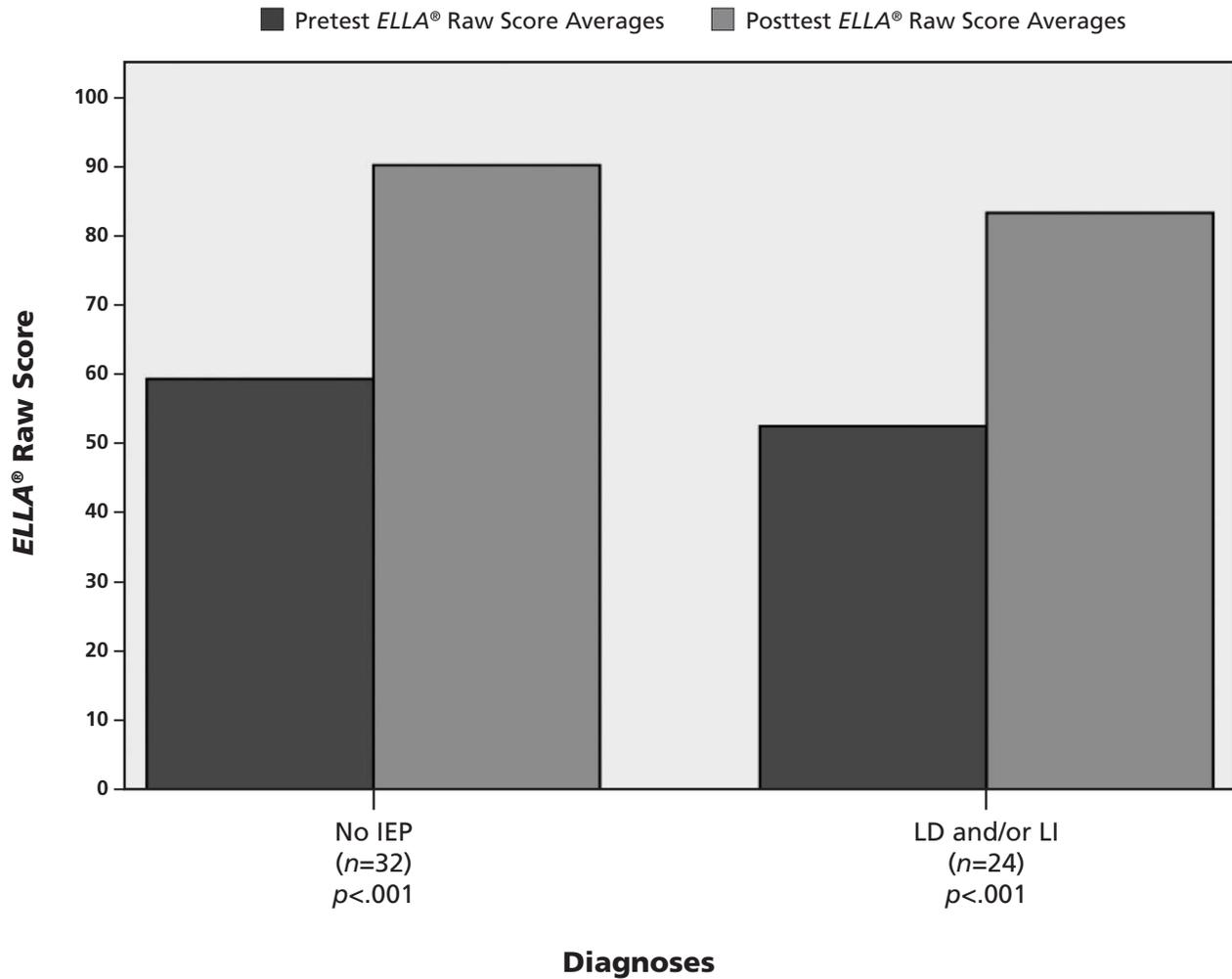
■ Pretest *ELLA*® Raw Score Averages ■ Posttest *ELLA*® Raw Score Averages
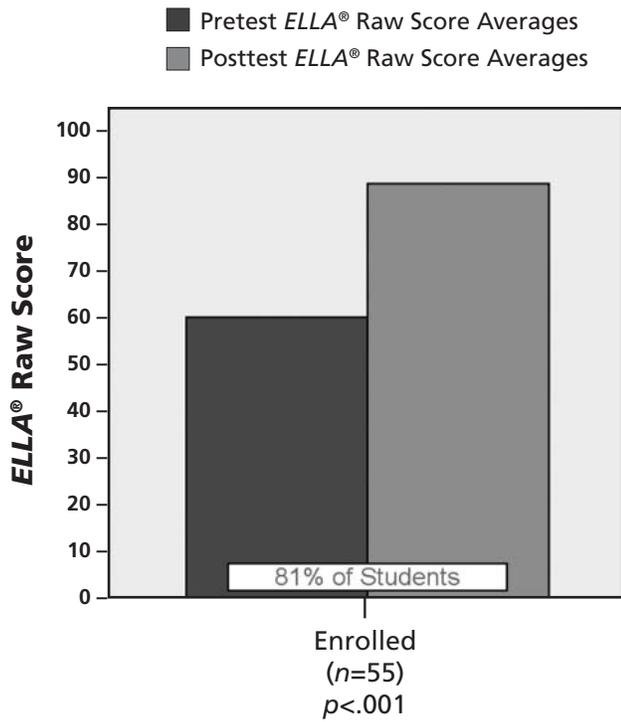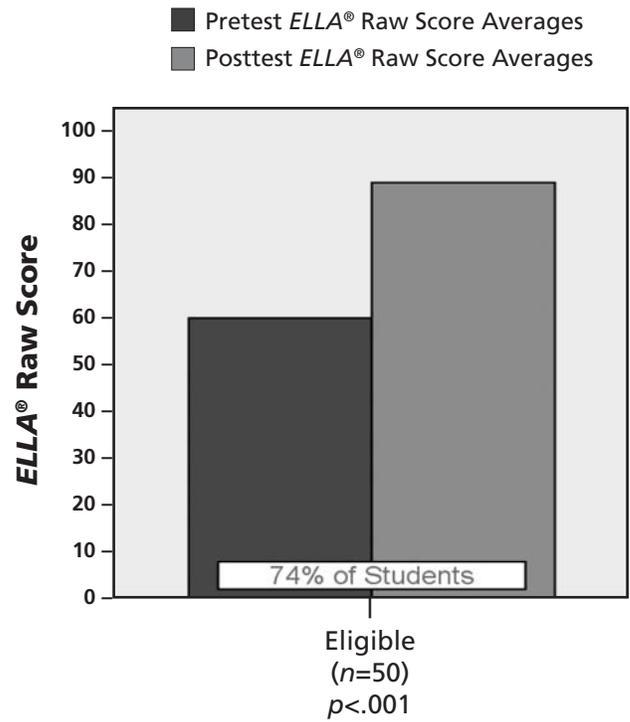
Diagnoses

Figure 4. Statistically significant pretest and posttest data displaying ELLA® *raw score averages based on diagnosis with* n *representing number of students in each group.*
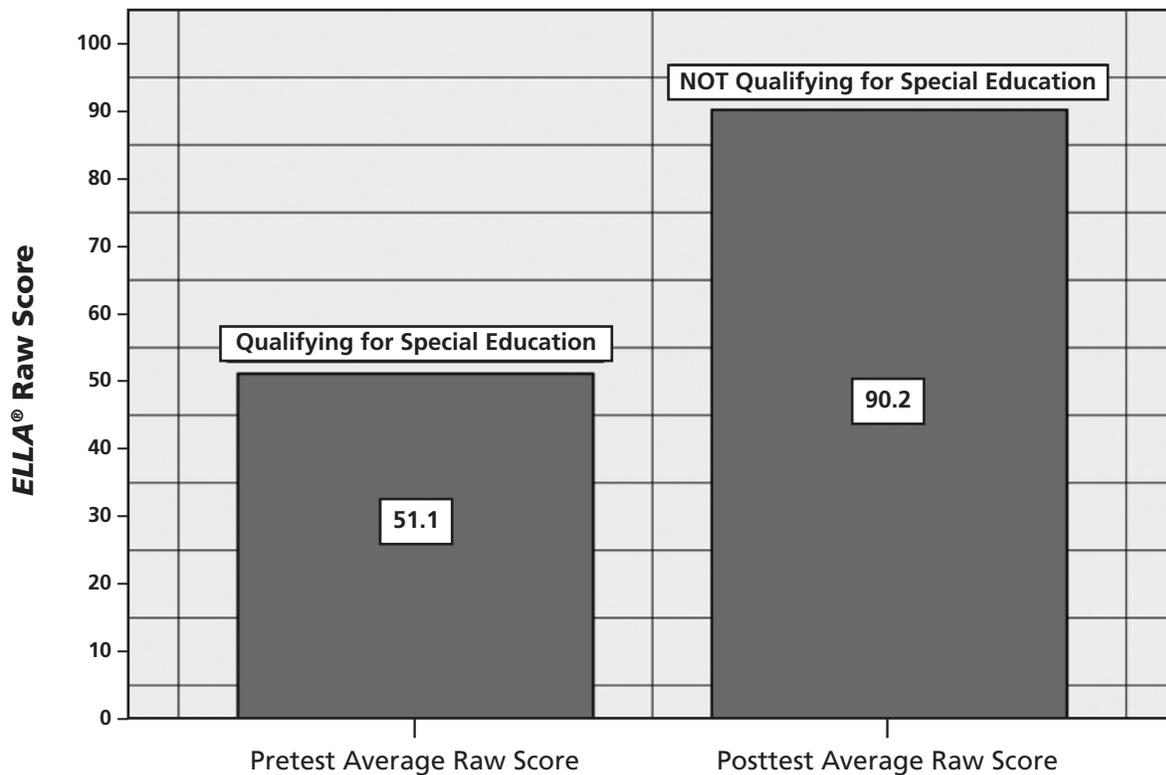
Figures 5 & 6. Statistically significant pretest and posttest data displaying ELLA® *raw score averages based on enrollment in Title I and Eligibility for Free and Reduced-Priced Meals with* n *representing number of students in each group.*

Students Scoring Below SS77 Pretest and At/Above SS77 Posttest (*n*=29)

Figure 7. Statistically significant pretest and posttest data displaying average raw scores for students who would have initially qualified for Special Education services based on standard scores obtained from the ELLA® *but no longer qualified after use of* Webber® HearBuilder® Phonological Awareness.

Conclusion

The results of this research study show that *Webber® HearBuilder® Phonological Awareness* is an effective instructional component in improving the phonemic and phonological awareness skills of students in general and special education programs when used in therapy, classroom, or computer lab settings. Torgesen and his colleagues (1994) recommend "that training in phonological awareness be included in any preventative or remedial program for children either at-risk for or identified with reading disabilities" (p. 285). All of the students in this study were considered to be "at-risk" based on having a diagnosed disability, enrollment in Title I/free and reduced meals program, limited English proficiency, and/or standardized test scores. The *ELLA®* assessed the student's phonological awareness, and in eight weeks time, as indicated by posttest scores, all students showed improvements in their phonemic and phonological awareness skills.

Future research regarding *Webber® HearBuilder® Phonological Awareness* should include alternate pretest and posttest assessments, control groups, greater sample sizes, and varied demographics from across the country in order to increase validity of all results obtained.

References

Flexer, C.A. (1999). *Facilitating hearing and listening in young children* (2nd ed.). San Diego: Singular Publishing Group.

Catts, H.W., Fey, M.E., Tomblin, J.B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research*, *45*, 1142–1157.

Kominski, R., Jamieson, A., & Martinez, G. *At-risk conditions of U.S. school-age children.* (2001). US Bureau of the Census. Retrieved from http://www.census.gov/population/www/documentation/twps0052/twps0052.html

Lundberg, I., Frost, J., & Petersen, O. (1998, Summer). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly*, *23*(3), 263–284.

Nathan, L., Stackhouse, J., Goulandris, N., & Snowling, M.J. (2004). The development of early literacy skills among children with speech difficulties: A test of the "Critical Age Hypothesis." *Journal of Speech, Language, and Hearing Research*, *47*, 377–391.

Schuele, M.C., & Boudreau, D. (2008). Phonological awareness intervention: Beyond the basics. *Language, Speech, and Hearing Services in Schools*, *39*, 3–20.

Sharma, M., Purdy, S., & Kelly, A. (2009, June). Comorbidity of auditory processing, language, and reading disorders. *Journal of Speech, Language, and Hearing Research*, *52*, 706–722.

Torgesen, J., Wagner, R., & Rashotte, C. (1994). Longitudinal studies of phonological processing and reading. *Journal of Learning Disabilities*, *27*, 276–286.

Wiig, E. & Secord, W. (2006). *Emerging literacy and language assessment*® (ELLA®). Greenville, SC: Super Duper Publications.

APPENDIX A

The Nine Different Areas of Phonological Awareness Targeted in
Webber® HearBuilder® Phonological Awareness

Sentence Segmentation

This activity targets a student's ability to identify words as separate units within a phrase. It presents levels 1–7 with exaggerated pauses to help students distinguish each word. The activity then presents levels 8–14 with normal speech prosody. Students will identify the album that has a specific number of words in its title. *Click on the one with two words: Today is Monday, What a Day, Lunch Break.*

Students also learn to count the number of words by listening to a phrase, clicking on a drum for the number of words in the phrase, and then clicking on the cymbal to complete the answer. *Hit the drum for each word in the album title, then hit the cymbal when you are finished: He Said Hello.*

Syllable Blending

This activity targets a student's ability to listen to spoken syllables and blend them together to make a word. Students will listen to separate spoken syllables, then blend them together and choose the word they make. *Click on the word made by blending these syllables: fra-gile. (fragile, candle)*

Students will also listen to a word and choose which set of syllables makes the word when blended together. *Click on syllables that make this word: Saturday. (Sa-tur-day, for-mu-la)*

Syllable Segmentation

This activity targets a student's ability to identify syllables as separate parts of a word. It presents levels 1–7 with exaggerated pauses to help students distinguish each syllable. The activity then presents levels 8–14 with normal speech prosody. Students will choose the picture representing a song title that has a specific number of syllables. *Click on the one with two syllables: Mustard, Entertainment, Remarkable.*

Students will also learn to count syllables by listening to a word and clicking on the bass for the number of syllables in the word, and then clicking on the cowbell to complete the answer. *Click on the bass for each syllable in the word; hit the cowbell when you are finished: Square.*

Rhyming

This activity targets a student's ability to identify and categorize rhyme. First, students will identify whether words rhyme given auditory and visual cues, followed by a level of only auditory cues. They will identify whether a pair or group of words rhymes by clicking on the stage light that states either, "These words rhyme" or "These words do not rhyme." *Click here if they rhyme, click here if they don't rhyme: hair, square.*

Students will then identify the word that does not rhyme by clicking on the picture or symbol. Again, levels will move from both auditory and visual cues, to only auditory cues. *Click on the word that does not rhyme: mad, king, ring, wing.*

Next, students will identify a word that rhymes with a given word out of three, four, or five choices. The levels of difficulty increase with number of choices as well as movement from auditory and visual cues, to only auditory cues, to only visual cues. *Click on the word that rhymes with this word: duck. (sink, dig, sick, truck, dress)*

Finally, students will categorize words into a group of rhyming words. They will choose four words that rhyme out of ten given words with auditory and visual cues. *Click on all four words that rhyme: spoil, make, soil, boil, guard, four, foil, chip, loan, pull.*

Phoneme Blending

This activity targets a student's ability to listen to separate phonemes, and blend them together to

make a real word. Students will hear 2–5 phonemes, and then blend them together and identify the word. The number of answer choices increases as the difficulty level increases. *Click on the word made by blending these sounds. t-e-n-t. (toast, tent, tiger)*

Students will then listen to a target word and identify the group of phonemes that make the word when blended together. *Click on the group of sounds that makes this word: cat (a-c-t, a-t-k, c-a-t)*

Phoneme Segmentation & Identification

This activity targets a student's ability to identify phonemes as separate units within a word. Students will click on a turntable for each phoneme in the word. They will identify the separate phonemes by clicking the correct number of phonemes to build the word. *Click on the turntable for each sound in the word, when you are finished building the word click here. Cup: c-u-p*

Next, students will identify specific phonemes within a word, by clicking on the piano key that plays the correct sound. *Click on the sound you hear at the beginning of this word: room.*

Finally, students will identify the phonemes that make up a word by clicking on the correct color-coded piano keys (blue=initial, purple=medial, green=final) to build the word. Small square icons will fill in with a corresponding color note as the student chooses each phoneme. Each phoneme is in a group of up to 4 choices. *Click on the keys to make this word; click here when you are finished: plant. (r, g, p — sh, n, l — a, u, i— h, n, r — th, t, p)*

Phoneme Deletion

This activity targets a student's ability to delete a phoneme from a word to make a new word. Students will click on the icon that represents the correct new word. *Click on the word you get when you remove a sound. What is "drink" without /d/? (eat, rink)*
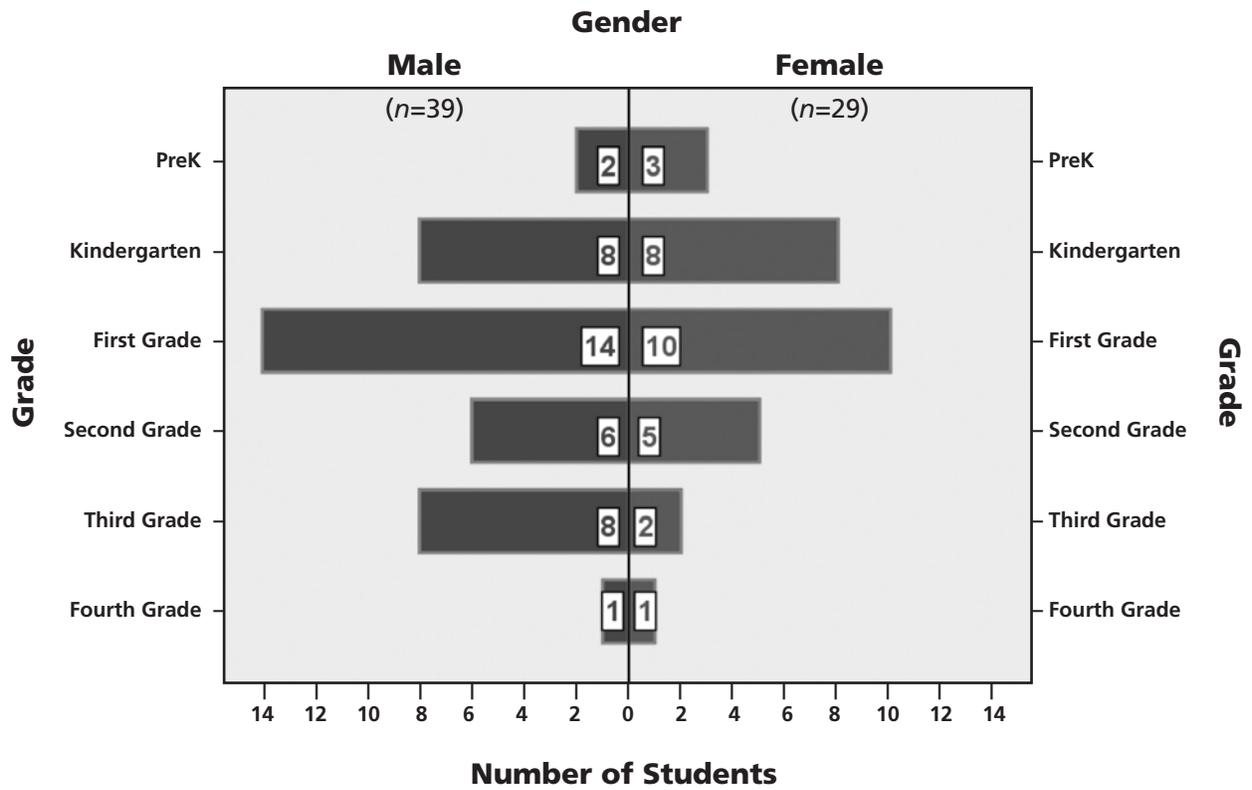
Phoneme Addition

This activity targets a student's ability to add a phoneme to a word to make a new word. Students will click on the icon that represents the correct new word. *Click on the word you get when you add a sound. What is "ace" with /f/ at the beginning? (ham, face)*
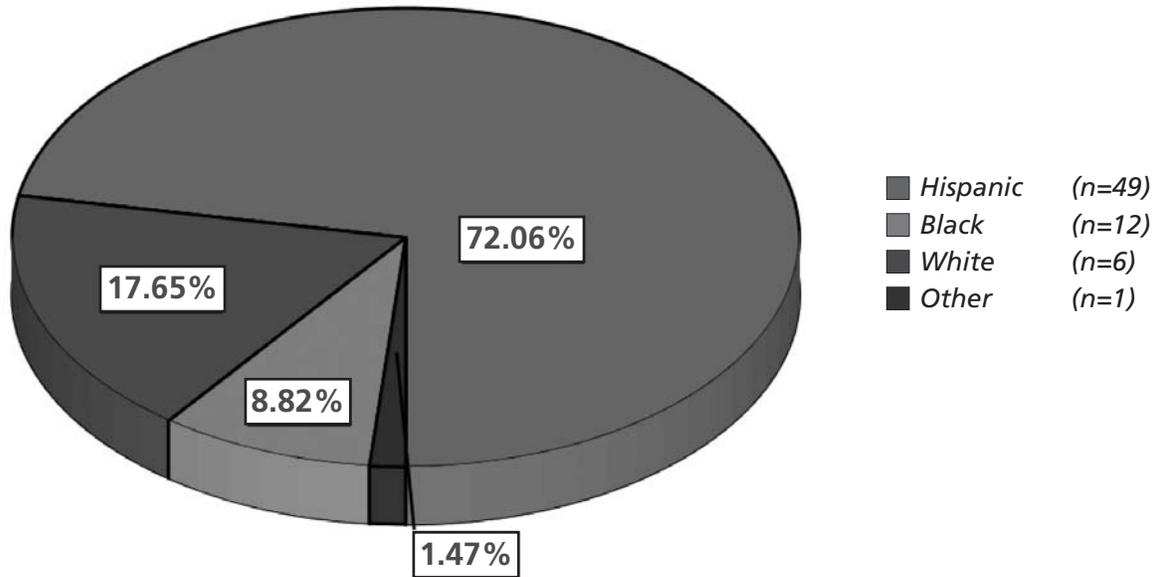
Phoneme Manipulation

This activity targets a student's ability to substitute one phoneme in a word for another phoneme to make a new word. Students will click on the icon that represents the correct new word. *Click on the word you get when you change a sound. Sail—Change /s/ to /m/ (deep, mail)*

Demographics

Gender

Male	Female
(*n*=39)	(*n*=29)

Grade (left) / **Grade** (right)

PreK — 2 | 3

Kindergarten — 8 | 8

First Grade — 14 | 10

Second Grade — 6 | 5

Third Grade — 8 | 2

Fourth Grade — 1 | 1

14 12 10 8 6 4 2 0 2 4 6 8 10 12 14

Number of Students

Demographics

Hispanic (n=49)
Black (n=12)
White (n=6)
Other (n=1)

72.06%
17.65%
8.82%
1.47%

Total Number of Students = 68

Diagnoses

No IEP/RtI (n=32)
MR (n=4)
LD and/or LI (n=24)
DD (n=3)
ASD (n=1)
Other (n=4)

4.41% 1.47% 5.88%
35.29%
47.06%
5.88%

Total Number of Students = 68