Improved Early Reading Skills by Students in the Philippines who used Fast ForWord® Products

ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the reading skills of English-speaking students in the Philippines.

Results: On average, students who completed the Fast ForWord products with i-Thinkers significantly improved their phonological processing and auditory discrimination. For example, phonological awareness improved from the 51st percentile to the 65th while phonological memory improved from the 38th percentile to the 67th, and the ability to discriminate between sounds in a quiet environment increased from the 30th percentile to the 46th.

Study Design: The design of this study was a case study using a normed assessment of reading ability. **Participants:** Study participants were students in 1st through 7th grade who were attending i-Thinkers in the Philippines. Many of the students had learning challenges such as ADHD, learning disabilities, or autism spectrum disorders.

Materials & Implementation: The Fast ForWord products were implemented by i-Thinkers. Before and after Fast ForWord participation, students had their early reading skills evaluated with the Comprehensive Test of Phonological Processing (CTOPP) and the Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW).

Keywords: Philippines, observational study, Fast ForWord Language, Fast ForWord Language to Reading, Comprehensive Test of Phonological Processing (CTOPP), Goldman-Fristoe-Woodcock Test of Auditory Discrimination (GFW).

INTRODUCTION

Numerous research studies have shown that cognitive and oral language skills are under-developed in struggling readers, limiting their academic progress (Lyon, 1996). University-based research studies reported the development of a computer software product that focused on learning and cognitive skills, and provided an optimal learning environment for building the memory, attention, processing and sequencing skills critical for reading success (Merzenich et al., 1996; Tallal et al., 1996). This prototype of the Fast ForWord Language software showed that an optimal learning environment and focus on early reading and cognitive skills resulted in dramatic improvements in the auditory processing and language skills of school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were experiencing academic reading failure (Miller et al., 1999).

Established in 2006, i-Thinkers is located in the Philippines and provides individualized speech therapy, educational therapy, reading remediation, and academic tutoring. A group of professionals with more than 25 years of combined experience in the fields of speech and language pathology and special education, i-Thinkers has implemented the Fast ForWord products as one approach for helping students improve their learning skills.

METHODS
Participants
The study reported here includes results from 16 students who were attending i-Thinkers. Study participants were 10 boys and 6 girls who were in 1st

through 7th grade (mean = 3.9). Most of the students had a learning disability with classifications ranging from attention deficit / hyperactivity disorder (six students) to autism spectrum disorders (two students). Students used the Fast ForWord products at the i-Thinkers' center, and were assessed with the Comprehensive Test of Phonological Processing and the Goldman-Fristoe-Woodcock Test of Auditory Discrimination before and after Fast ForWord participation. Staff at i-Thinkers administered the assessments and reported scores for analysis.

Implementation

All professionals involved in this study were trained in current and established neuroscience findings on how phonemic awareness and the acoustic properties of speech impact rapid development of language and reading skills; the scientific background validating the efficacy of the products; methods for assessment of potential candidates for participation; the selection of appropriate measures for testing and evaluation; effective implementation techniques; approaches for using Progress Tracker reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. Most of the students in the study used Fast ForWord Language and Fast ForWord Language to Reading. A few students used Fast ForWord Middle & High School or Fast ForWord Literacy Advanced (similar products but appropriate for older students) or one of the Fast ForWord Reading products. However, since most students used Fast ForWord Language and Fast ForWord Language to Reading, those will be the products described here. The products include five to seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are differences between the products, all help develop certain critical skills as detailed in the following exercise descriptions.

Circus Sequence[1] and Trog Walkers[2]: Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate

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[1] Exercise from the Fast ForWord Language product.
[2] Exercise from the Fast ForWord Language to Reading product.

between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

Old MacDonald's Flying Farm[1]: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

Phoneme Identification[1], Polar Cop[2], and Treasure in the Tomb[2]: Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

Phonic Match[1] and Bug Out[2]: Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square's match and clear the grid. The *Phonic Match* exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed. The *Bug Out!* exercise develops skill with sound-letter correspondences as well as working memory.

Phonic Words[1]: Students see two pictures representing words that differ only by the initial or final consonant (e.g., "face" versus "vase", or "tack" versus "tag"). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

Language Comprehension Builder[1]: Students listen to a sentence that depicts action and complex relational themes. Students must match a picture representation with the sentence they just heard. This exercise develops oral language and listening comprehension, improves understanding of syntax and morphology, and improves rate of auditory processing.

Block Commander[1]: In Block Commander, a three-dimensional board is filled with familiar shapes that students select and manipulate. The students are asked to follow increasingly complex commands. This exercise increases listening comprehension, improves syntax, develops working memory, improves sound

processing speed, and increases the ability to follow directions.

Start-Up Stories[2]: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

Assessments

Students' reading skills were evaluated with the Comprehensive Test of Phonological Processing and the Goldman-Fristoe-Woodcock Test of Auditory Discrimination. The tests were administered before and after Fast ForWord participation. The time between pre- and post-test was, on average, approximately four months.

Comprehensive Test of Phonological Processing (CTOPP): The CTOPP measures a student's awareness of, and access to, the phonological structure of oral language as well as phonological memory, the ability to rapidly execute a sequence of operations, and the ability to blend and segment words and non-words.

Goldman Fristoe Woodcock Test of Auditory Discrimination (GFW): The GFW is a screening measure of speech sound discrimination ability for students in quiet and noisy situations. Words are presented by means of a cassette tape in the absence of any noise and also in the presence of distracting background noise. The student hears a word and then points to a picture. Similar

words such as lake, make, rake, and wake are presented as foils.

Analysis

Scores for the Comprehensive Test of Phonological Processing and the Goldman-Fristoe-Woodcock Test of Auditory Discrimination were reported in terms of raw scores and percentile scores or standard scores. Data were analyzed using multivariate analyses of variance (MANOVA). Post-hoc paired t-tests were performed if appropriate. All analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

RESULTS

Participation Level

Research conducted by Scientific Learning shows a relationship between product use and the benefits of the product. Product use is composed of content completed, days of use, and adherence to the chosen protocol (participation and attendance levels). Most students with i-Thinkers used the 48- and 50-Minute protocols for the Fast ForWord products. These protocols called for students to use the product for 48 or 50 minutes a day, five days per week for eight to twelve weeks. Detailed product use is shown in Table 1.

	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language	12	34	61	80%	99%	81%
Fast ForWord Language to Reading	8	24	50	69%	99%	77%
Total	16	49	86	-	-	-

Table 1. Usage data showing the number of students who used each Fast ForWord product, along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, the participation level, and the attendance level. Total values reflect the average total number of days that students used products. Note: Students often use multiple products. Product use information is not shown for products with fewer than five students.

Assessment Results

Comprehensive Test of Phonological Processing (CTOPP): Students were evaluated on up to 12 subtests (depending upon the student's age) that can be combined into five composite scores. A multivariate analysis of variance (MANOVA) indicated that there was a time by test interaction meaning that improvements in scores varied across the five tests (Table 2). Therefore, paired t-tests were performed to determine the changes on each of the five composites (Figure 1; Table 3). The t-tests indicated that the students showed significant improvements on the phonemic awareness and phonological memory subtests, as well as the

alternative phonemic awareness subtest. The improvements on the rapid naming and alternative rapid naming subtest did not reach significance.

Comprehensive Test of Phonological Processing		
	df	F-statistic
Test	10	3.71*
Time	13	35.81*
Test x Time	10	4.57*

*Table 2. A multivariate analysis of variance (MANOVA) indicated that there was a significant test by time interaction. *: $p < 0.05$.*

	n	Before		After		
		Mean	SE	Mean	SE	t-statistic
Phonological Awareness	16	100.4	2.9	105.8	2.9	3.8*
Phonological Memory	16	95.5	3.2	106.4	3.9	3.7*
Rapid Naming	14	100.2	3.8	104.3	4.5	1.6
Phonological Awareness (Alternate)	14	93.6	4.6	109.5	3.2	5.7*
Rapid Naming (Alternate)	16	86.7	6.0	90.2	4.7	1.1

*Table 3. Students made significant improvements on tests of Phonological Awareness and Phonological Memory. Scores are reported in terms of standard scores which have a mean of 100 and a standard deviation of 15. *:p < 0.05.*
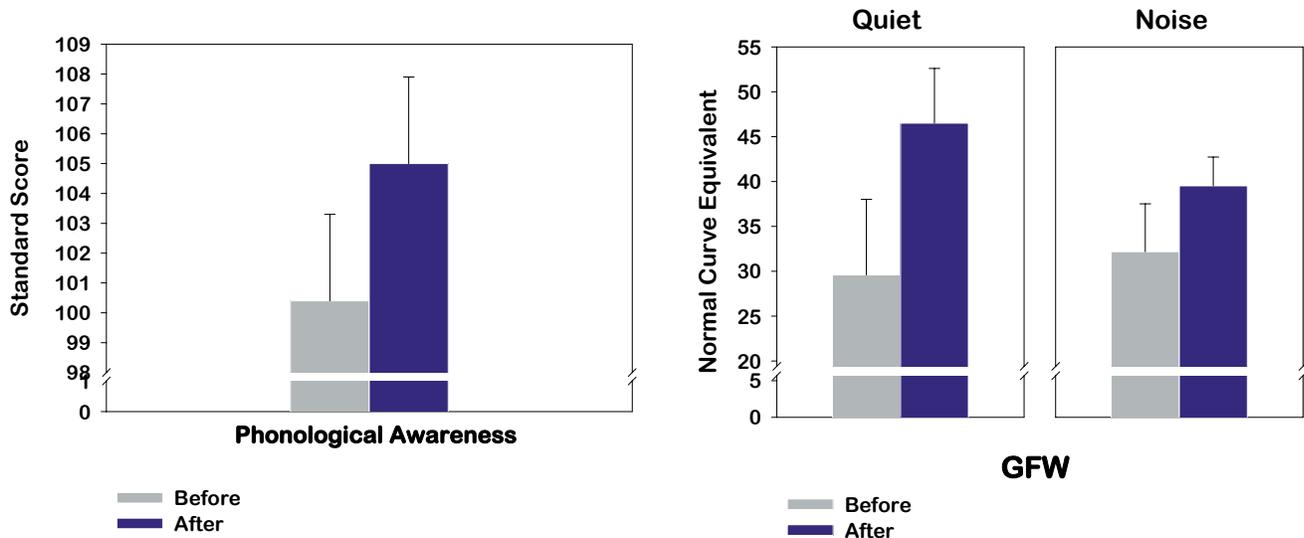

Figure 1. Standard score before and after Fast ForWord participation for the Phonological Awareness subtest of the CTOPP. Results for 16 students are shown..

Figure 2. Normal Curve Equivalents from before and after Fast ForWord participation for the GFW, a test of auditory discrimination, that was administered both in quiet and in noise. Results for 16 students are shown.

Goldman-Fristoe-Woodcock Test if Auditory Discrimination (GFW): Students were evaluated on the two subtests: auditory discrimination in quiet, and auditory discrimination in noise. A multivariate analysis of variance (MANOVA) indicated that there was a time by test interaction meaning that improvements in scores varied across the two subtests (Table 4). Therefore, paired t-tests were performed to determine the impact on the two subtests (Figure 2; Table 5). The t-tests indicated that the students showed significant improvements on auditory discrimination in quiet.

Goldman Fristoe Woocock Test of Auditory Discrimination		
	df	F-statistic
Test	15	.013
Time	15	5.6*
Test x Time	15	5.2*

Table 4. A multivariate analysis of variance (MANOVA) indicated that there was a significant test by time interaction on the GFW.
: p<0.05.

	N	Before		After		
		Mean	SE	Mean	SE	t-statistic
Quiet	16	29.6	8.4	46.5	6.1	3.1*
Noise	16	32.3	5.3	39.6	3.2	1.3

*Table 5. Students made significant improvements on the test of Auditory Discrimination in Quiet. Scores are reported in terms of normal curve equivalents which have a mean of 50 and a standard deviation of 21.1. *:p < 0.05.*

DISCUSSION

Following Fast ForWord participation, students attending i-Thinkers in the Philippines made significant gains in early reading skills.

The students' phonological processing skills were initially in the average range. After using the Fast ForWord products, two areas (phonological awareness and phonological memory) moved significantly higher within the average range. For Phonological Awareness, scores improved from 100.4 to 105.8 which corresponds to an improvement from the 51st

percentile to the 65th. For Phonological Memory, scores improved from 95.5 to 106.4 which corresponds to an improvement from the 38th percentile to the 67th.

Although the students' phonological processing skills were in the average range, the students were initially quite weak at discriminating between sounds common to the English language. After using the products, the students made significant improvements in their ability to discriminate between English sounds, better positioning themselves to fluently understand written and spoken English.

These findings demonstrate that an optimal learning environment coupled with a focus on cognitive and early reading skills can help students improve their reading skills.

CONCLUSION

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow directions and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After Fast ForWord use, students who were attending i-Thinkers in the Philippines made significant gains in skills critical for fluent reading. This suggests that using the Fast ForWord products strengthened the students' foundational skills, allowing them to benefit more from the classroom curriculum.

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