

# Improved Reading Skills by Students who used Fast ForWord® to Reading Prep

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### ABSTRACT

**Purpose:** This study investigated the effects of the Fast ForWord products on the reading skills of Kindergarten students who used the products within the curriculum of a school setting. **Study Design:** The design of this study was a single school study using nationally normed assessments. **Participants:** A group of Kindergarten students attending an elementary school took part in this study. Students were randomly assigned to one of two groups: an experimental group that used the Fast ForWord to Reading Prep product or a comparison group that did not use the product and continued to participate in the classroom curriculum. **Materials & Implementation:** Students had their reading skills evaluated with a multitude of assessments. Before and after Fast ForWord participation, students were assessed with the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), the Woodcock-Johnson III (WJ III), and the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3). Following product use, students were also evaluated with Reading Edge and the Test of Phonological Awareness (TOPA). In addition, teachers filled in the Teacher Observation Of Learning (TOOL) for each student. **Results:** On average, both the experimental and comparison groups improved significantly in reading ability as measured by the DIBELS, WJ III, CELF-3, and TOOL. A MANOVA of the Letter-Word Identification subtest of the WJ III revealed that students who used Fast ForWord significantly outperformed the comparison group.

**Keywords:** Public elementary school, suburban district, observational study, Fast ForWord to Reading Prep, Dynamic Indicators of Basic Early Literacy Skills (DIBELS), Woodcock-Johnson III, Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), Reading Edge, Test of Phonological Awareness (TOPA), Teacher Observation Of Learning (TOOL) .

### INTRODUCTION

The National Reading Panel has identified phonemic awareness, phonics, vocabulary, fluency, and comprehension as critical early reading skills (Langenberg, 2000) These skills relate closely to oral language with tests of listening comprehension being appropriate measures of comprehension skills in early elementary school students and measures of vocabulary skills being appropriate tests of oral vocabulary. These early reading skills also relate to the alphabetic principle, namely that letters stand for phonemes. The actions of the National Reading Panel are supported by numerous research studies showing that cognitive and early reading skills are under-developed in struggling readers, limiting their academic progress (Lyon, 1996).

Studies on learning have suggested that for optimal learning conditions, a person needs feedback, motivation, practice, and items of a difficulty level that adapts to the skills of the person. Technology allows this type of environment to simultaneously reach a classroom of students. University-based

research studies reported the development of a computer software product that provided an optimal learning environment while focusing on learning and cognitive skills, 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 early reading 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).

Using the instructional paradigms incorporated into the optimal learning environment, but with the content refocused to cover letter identification, the sound-symbol correspondence that is at the root of reading, and decoding of simple words, the school district undertook a study to determine whether Kindergarteners in this environment for short, intense

periods of study, would make significant improvements in their early reading skills.

In this study, a commercially available computer-based product (Fast ForWord to Reading Prep) was used to evaluate the effectiveness of this approach for improving the reading achievement of Kindergarten students.

## METHODS

### Participants

During the 2005-2006 school year, a Kindergarten class of 75 students was assessed with the DIBELS. Students with a score in the lower two-thirds of the class were selected to participate in the study reported here. Forty-eight students were randomly assigned to an experimental group (n=25) that used the Fast ForWord to Reading Prep product first thing every morning for 30-minutes a day, or to a comparison group (n=23) that did not use Fast ForWord and instead participated in the classroom curriculum which included oral language and group activities.

A total of seven students in the study were receiving services. One student in the experimental group was receiving services for speech, and two students were receiving services for special education. Another student was an English language learner. In the comparison group, two students were receiving services for speech, and one for special education. All study participants were considered low-performing with more than half ranked at either “at-risk” or “some-risk” according to the DIBELS.

In addition to the DIBELS, both groups were assessed with the Woodcock-Johnson III and the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3) before and after they participated in Fast ForWord. The Reading Edge assessment and the Test of Phonological Awareness (TOPA) were used to assess student reading ability following the use of Fast ForWord to Reading Prep. For each student, teachers filled in a Teacher Observation Of Learning (TOOL). School personnel administered the assessments and reported scores for analysis.

### Implementation

Educators 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. The product used in this study, Fast ForWord to Reading Prep, includes six exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, letter-naming skills, letter-sound association, and language comprehension, as detailed in the following exercise descriptions.

*Inside the Tummy<sup>1</sup>*: Participants click and drag colored shapes into matching shape outlines in pre-defined patterns. This task helps participants improve fine motor skills, hand-eye coordination, and computer mousing skills.

*Hungry Tummy<sup>1</sup>*: Participants follow spoken directions to feed shapes of different colors and sizes to “Hungry Tummy” the bear. This task develops knowledge of basic colors (red, blue, green, yellow, and white), shapes (square, circle, and triangle) and relative size (big and small). Participants also develop their working memory, verbal decoding skills, and mousing skills as they practice following spoken instructions.

*Packing Pig Goes to Work<sup>1</sup>*: The name of a letter is presented aurally, and then that letter, along with up to four other letters, is displayed on the screen. The participant must click on the letter that was aurally presented. This task develops letter-name knowledge, auditory working memory, and visual-spatial memory abilities.

*Packing Pig Has Lunch<sup>1</sup>*: Participants match upper and lower case letter tiles in progressively larger grids. At the easiest levels, the tiles are face-up, with the letters visible throughout the trial. At the hardest levels the tiles are face-down, and letters are only briefly visible when clicked, so that it becomes a memory challenge. This task develops letter-name knowledge, association of upper and lower case letters, auditory working memory, and visual-spatial memory abilities.

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<sup>1</sup> Exercise from the Fast ForWord to Reading Prep product.

*Ghost Coaster*<sup>1</sup>: The participant works to associate a set of consonant phonemes (speech sounds) with the letters that represent them. Each phoneme/letter pair is presented in several trials, along with examples of words that start with the phoneme. This task builds letter-sound association skills and understanding of the alphabetic principle in written English.

*Houndini*<sup>1</sup>: Participants listen to sets of words, and must select the odd-one-out based on either beginning sounds or ending sounds. This task improves phonological processing skills including phoneme analysis and phonological working memory.

### Assessments

Before and after Fast ForWord use, study participants were assessed with the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), the Woodcock-Johnson III, and the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3). Teachers also filled in a Teacher Observation Of Learning (TOOL) for each student before and after Fast ForWord participation. The Reading Edge and the Test of Phonological Awareness (TOPA) were administered after students had completed the Fast ForWord product.

**Woodcock-Johnson III (WJ III):** The WJ III is a wide-range, comprehensive set of individually administered tests for measuring cognitive abilities, scholastic aptitudes, and achievement. The subtest used in this study was Letter Word Identification which measures the subject's reading identification skills for isolated letters and words. The subject is shown words or letters and asked to identify them. The subtest begins with pictures to teach the task and then moves to increasingly more complex words.

**Dynamic Indicators of Basic Early Literacy Skills (DIBELS):** The DIBELS are standardized, individually administered measures of early literacy development designed to monitor the development of pre-reading and early reading skills. Skills assessed range from phonemic awareness to phonics to fluency. The appropriate skills for measuring with the DIBELS vary with the grade of the students. The Institute for the Development of Educational Achievement, in accordance with the Reading First legislation, recognizes the DIBELS as an appropriate assessment for measuring improvement in the reading skills of children in early elementary school.

**Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3):** The CELF-3 is a comprehensive language test widely used to measure a child's ability to understand words and sentences, follow directions, recall and formulate sentences, and understand relationships between words and categories. The Institute for the Development of Educational Achievement, in accordance with the Reading First legislation, determined that the CELF-3 subtest used in this study, Recalling Sentences, is an appropriate outcome assessment for accurately measuring improvement in the vocabulary skills of children in early elementary school. As defined by the Reading First legislation, vocabulary skills are an essential component of early reading.

**Teacher Observation of Learning (TOOL):** The curriculum of the Kindergarteners in this study is aligned to the state curriculum. Teachers use the TOOL to record student growth in state content areas. Teachers identify whether a student is not yet demonstrating,

developing, or consistently demonstrating a skill. Skills range from personal and social development to writing. For the purposes of this study, we assigned a 0, 1, or 2 to a student's skill level, and summed them to get a resulting score for each category. There were seven listening skills, five speaking skills, 34 reading skills, and 30 writing skills.

**Reading Edge:** Reading Edge is a software program for evaluating phonological/early reading skills, including phonological processing, phonological awareness, phonemic decoding, and letter-sound identification. The Reading Edge composite score reflects a student's overall performance on the various phonological and reading tests in Reading Edge taking into account the relative importance of each test in predicting reading ability.

**Test of Phonological Awareness (TOPA):** The TOPA is a nationally-normed, group-administered measure of phonological awareness. The Institute for the Development of Educational Achievement, in accordance with the Reading First legislation, determined that the TOPA subtests are appropriate outcome assessments for accurately measuring improvement in phonemic awareness, an early reading skill, of children in early elementary school.

### Analysis

The CELF-3 and WJ III results were reported in terms of standard scores, DIBELS scores were reported in terms of raw scores, and the TOOL used levels (not yet demonstrating, developing, or consistently demonstrating). DIBELS and TOOL data were analyzed using t-tests. A MANOVA was performed on the standard scores of the WJ III and CELF. All analyses used a p-value of less than 0.10 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). During the 2005-2006 school year, the elementary school used the 30-minute Fast ForWord to Reading Prep protocol which calls for students to use the products for 30 minutes a day for twelve to sixteen weeks.

Students were assessed in mid-September. Students in the comparison group started using Fast ForWord to Reading Prep in early October. On average, students used the Fast ForWord to Reading Prep product for 33 days, completing 69% of the product content. All students were post-tested in mid-December. Detailed product usage information for the 25 students who used Fast ForWord to Reading Prep is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord to Reading Prep exercises for the experimental group. The final day shown on each graph is determined by the maximum number of days that at least two-thirds of the students participated.

For students who used the products fewer than the number of days shown, percent complete is maintained at the level achieved on their final day of product use.

	Number of Students	Average Days	Average Percent Complete	Participation Level (last 5 days)	Attendance Level (last 5 days)
Fast ForWord to Reading Prep	25	33	69%	99%	53%

Table 1. Usage data showing the number of students who used the Fast ForWord product along with group averages for the number of days of use, the percentage of product content completed, the participation and attendance levels for the last 5 days of use.

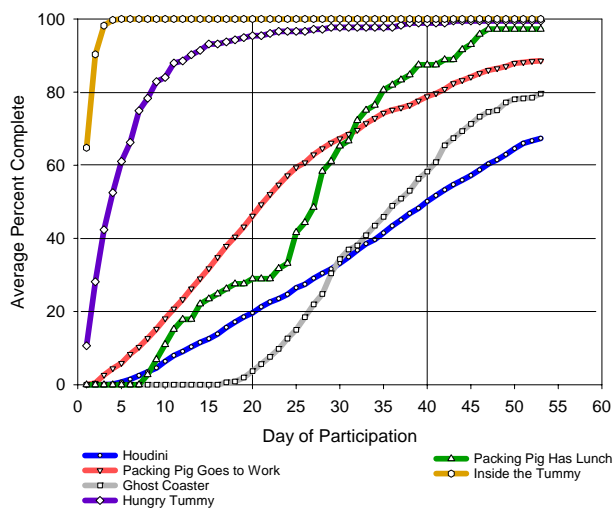


Figure 1. Average daily progress of students through the Fast ForWord to Reading Prep product. Results from 25 students are shown.

**Assessment Results**

MANOVA's of the WJ III and the CELF-3 showed significant improvements by both the Fast ForWord group and the comparison group. Since the DIBELS and TOOL did not have normed data available, a comparison was made of pre- and post-participation skills.

Woodcock-Johnson III: A MANOVA of the Letter-Identification subtest comparing performance between the two groups found that students who used Fast ForWord products had significant improvement relative to the comparison group at  $p < 0.10$  ( $p = 0.058$ ) (Figure 2, Table 2).

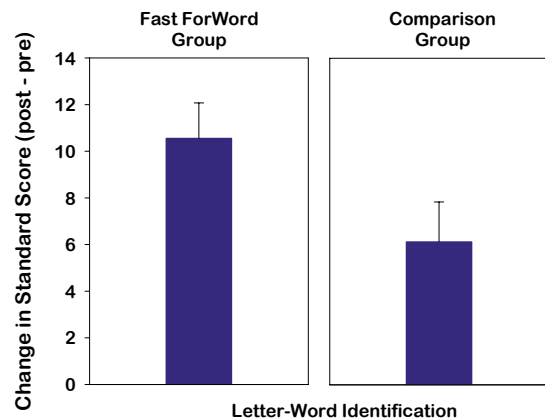


Figure 2. On average, students who used the Fast ForWord product had greater gains in reading skills. Results from 48 students shown.

	Fast ForWord		Comparison		MANOVA f	
	Gain	SE	Gain	SE	time	time x group
Letter-Word Id	10.5	1.51	6.13	1.70	53.8*	3.79*

Table 2. Improvements by the Fast ForWord group were, on average, significantly greater than the comparison group's. \* $p < 0.10$ .

Dynamic Indicators of Basic Early Literacy Skills:

Scores for the DIBELS measures are divided into three categories, At Risk, Some Risk and Low Risk, depending on the raw score. Table 3 shows the percentage of students at each risk category for the experimental and comparison groups before and after Fast ForWord participation.

DIBELS Category	Letter Naming Fluency			
	Fast ForWord Group		Comparison Group	
	Before	After	Before	After
At Risk	29%	17%	17%	13%
Some Risk	29%	29%	26%	26%
Low Risk	42%	54%	57%	61%
DIBELS Category	Initial Sound Fluency			
	Fast ForWord Group		Comparison Group	
	Before	After	Before	After
At Risk	29%	29%	30%	13%
Some Risk	33%	62%	30%	61%
Low Risk	38%	8%	39%	26%

Table 3. The percentage of students in each DIBELS risk category before and after the experimental group used the Fast ForWord product.

Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3):

Both the Fast ForWord group and the comparison group had significant gains on the Recalling Sentences subtest of the CELF-3 with no significant difference between the two groups (Table 4).

	Fast ForWord		Comparison		MANOVA f	
	Gain	SE	Gain	SE	time	time x group
Sentence Recall	6.5	1.5	10.0	1.5	60.3 *	2.8

Table 4. Both groups made significant improvements in their sentence recall scores. \* $p < 0.10$ .

Teacher Observation of Learning (TOOL):

The students were evaluated in September, and then again in January with the TOOL. On the seven listening skills, students in both groups had an average score of 7 corresponding to being at a developing level in each category. For the five speaking skills, the average score in both groups was a 5. For the 34 reading skills, the average score was 27, while for the 30 writing skills, the average score was 23 for the experimental group and 22 for the comparison group. There were not significant differences between the two groups and, while both groups made significant improvements, there were not significant differences in their scores at the end of the study.

School personnel attempted to administer the TOPA before Fast ForWord participation, however, the students were unable to understand the instructions well enough to provide valid results. Therefore, administration was stopped. Scores from after Fast ForWord participation were available. The students had improved so much that they were able to successfully complete the assessment, and both groups scored in the upper average range, with no significant differences between the two groups.

Reading Edge was also administered after Fast ForWord participation. Likewise, there was no significant difference between the two groups.

**DISCUSSION**

During the 2005-2006 school year, a group of Kindergarten students used the Fast ForWord to Reading Prep product. Students made substantial and significant improvements on tests of early reading skills. Students progressed from not being able to complete a phonological awareness test at the beginning of the year to having phonological awareness skills that were slightly above average in January.

It is interesting to note that despite the randomization, teachers believed that the experimental group started out the year with more academic challenges than the comparison group including: more students with attentional and/or behavior problems, and lack of readiness towards learning which is strongly influenced by parental attitude and mother's education level. Given this information, it is especially noteworthy that both groups achieved similar levels on the phonological awareness assessments and that the Fast ForWord group outperformed the comparison on the Letter-Word Identification of the WJ III.

**CONCLUSION**

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow instructions, and participate in class discussions. Reading readiness skills also provide a critical foundation for building reading and writing skills. The impressive gains made by Kindergarten students in this school district suggests that the elementary school's aggressive use of interventions in the early grades is improving the skills the students will need throughout their lives. The differential improvement on Letter-Word Identification of the students using the Fast ForWord to Reading Prep product suggests that it helped strengthen the students' foundational reading skills and helped them benefit more from the classroom curriculum.

**Notes:**

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