# Improved Language and Reading Skills by Students in NSW Australia who used Fast ForWord® Products

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## ABSTRACT

**Purpose:** This study investigated the effects of the Fast ForWord products on the language and reading skills of students with language or learning difficulties. **Study Design:** The design of this study was a case study using nationally normed assessments. **Participants:** Study participants were students aged 6-13 years who used Fast ForWord products as part of their speech therapy services at the Lindfield Speech Pathology and Learning Centre in Lindfield, Australia. **Materials & Implementation:** Following staff training on the Fast ForWord products, students participated in the Fast ForWord program at the Lindfield Speech Pathology and Learning Centre. Before and after Fast ForWord participation, student language ability was evaluated with the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), -Fourth Edition (CELF-4) or -Revised Edition (CELF-R). **Results:** After Fast ForWord product use, students significantly improved their early reading skills with average improvement on the subtests related to oral vocabulary ranging between five and sixteen percentile points. In addition, overall language ability had significant improvement with the group improving from the 14th percentile to the 32nd percentile.


**Keywords: Australia, observational study, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord to Reading 3, Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), -Fourth Edition (CELF-4), -Revised Edition (CELF-R).**

## 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).

Devon Barnes, the Director of Lindfield Speech Pathology and Learning Centre, was interested in evaluating the effectiveness of the Fast ForWord products as part of the Centre's therapy services for students with language and learning difficulties. The Fast ForWord software was implemented in the Centre with students using the products as part of their speech therapy sessions. In this study, commercially available computer-based products (Fast ForWord Language, Fast ForWord Language to Reading, and Fast ForWord to Reading 3) were used to evaluate the effectiveness of this approach at improving the language and reading skills of students.

## METHODS

### Participants

The Lindfield Speech Pathology and Learning Centre was established in 1997 by Devon Barnes, the current Centre Director. The Centre provides multi-disciplinary services for students with language and learning problems. It employs 16 professionals, including speech pathologists, and incorporates the latest advances in both Australian and overseas research. As part of their range of services, the Centre Director was interested in implementing Fast ForWord products as a way for improving student language and reading skills.

Study participants included in this report used Fast ForWord products and had pre- and post-Fast ForWord scores from one of the following Clinical Evaluation of Language Fundamentals (CELF) assessments: the CELF-3, the CELF-4 or the CELF-R. Participants were receiving services at the Lindfield Speech Pathology and Learning Centre in Lindfield, Australia and took part in the Fast ForWord program as part of their speech therapy. Twenty-three participants were included in this study. Participants were six through thirteen years of age (mean of 9.3) at the start of product use.

**Implementation**
The Centre staff 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 products used by the Lindfield Speech Pathology and Learning Centre, Fast ForWord Language, Fast ForWord Language to Reading, and Fast ForWord to Reading 3 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 variations across products related to the specific skills targeted and the approaches taken, there are several critical skills developed in all of the products, 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 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.

*Scrap Cat*[3]*:* In Scrap Cat, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the participant can click a button to hear any word and see it defined. This exercise trains decoding, vocabulary, and word recognition skills.

[1] Exercise from the Fast ForWord Language product.
[2] Exercise from the Fast ForWord Language to Reading product.
[3] Exercise from the Fast ForWord to Reading 3 product.

*Canine Crew*[3]*:* In Canine Crew multiple words are presented together in a grid and participants are asked to find pairs that match on the basis of the current criterion. This criterion shifts from words that rhyme, to synonyms, to antonyms, to homophones, as the participant progresses. This exercise trains vocabulary, decoding, and automatic word recognition.

*Chicken Dog*[3]*:* Participants hear a word and see it partially spelled. They must complete the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise trains basic spelling patterns, letter-sound correspondences, and decoding.

*Twisted Pictures*[3]*:* Participants are presented with a variety of pictures and asked to select the sentence that most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

*Book Monkeys*[3]*:* Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the participant use memory for literal detail, generation of inferences, or grasp of causal relationships to select the best answer from among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*[3]*:* In Hog Hat Zone, short passages from classic children's literature are presented, with occasional gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. The missing words are morphologically important items such as pronouns, auxiliary verbs, and words with suffixes and prefixes. This task develops paragraph comprehension, complex morphology, flexible reading, and vocabulary.

**Assessments**

Before and after Fast ForWord participation, students were evaluated with the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3), Fourth Edition (CELF-4) or Revised Edition (CELF-R).

**Clinical Evaluation of Language Fundamentals (CELF):** The CELF is a comprehensive language test widely used to measure a student'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 subtests listed in Table 1 are appropriate outcome assessments 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.

Performance on this test can be reported in terms of two subtest scores or composite scores: the *Receptive Language Score*, and the *Expressive Language Score*. An overall score, the *Total Language Score*, can also be reported.

| CELF Subtest | Description of Subtest |
|---|---|
| Concepts and Directions | a receptive language assessment that tests the student's ability to interpret and execute commands of increasing complexity |
| Recalling Sentences | an expressive language assessment that tests the student's ability to remember and reproduce sentences of increasing length and difficulty |
| Word Classes | a receptive language assessment that tests the student's ability to understand relationships between words and categories |
| Formulated Sentences | an expressive language assessment that tests the student's ability to formulate a sentence using a specific word or related to a specific picture |

*Table 1. Receptive and Expressive Language subtests from the CELF are recognized by the Institute for the Development of Educational Achievement as appropriate assessments for measuring early reading skills, specifically vocabulary.*

**Analysis**

Scores were reported in terms of standard scores. Twenty-three students had pre- and post-tests available for analysis. The 23 available scores were analyzed using repeated measures multivariate analysis of variance (MANOVA). 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 level). At the Lindfield Speech Pathology and Learning Centre, students used the products in two-hour sessions, five days per week. All study participants began participation with the Fast ForWord Language product; nearly half continued use with the Fast ForWord Language to Reading or Fast ForWord to Reading 3 products. Detailed product use is shown in Table 2.

Figures 1 and 2 show the average daily progress through the Fast ForWord Language and Fast ForWord Language to Reading product exercises for students who had scores available for analysis. The final day shown is determined by the maximum number of days that at least two-thirds of the students participated. For students who used the product 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 | Days Participated | Percent Complete |
|---|---|---|---|
| Fast ForWord Language | 23 | 23 | 87% |
| Fast ForWord Language to Reading | 9 | 31 | 89% |
| Fast ForWord to Reading 3 | 1 | - | - |

*Table 2. Usage data showing the number of students who used each Fast ForWord product, along with group averages for the number of days participated, and the percentage of product completed. Due to the low number of students who participated in the Fast ForWord to Reading 3 product, usage data for this product is not shown.*

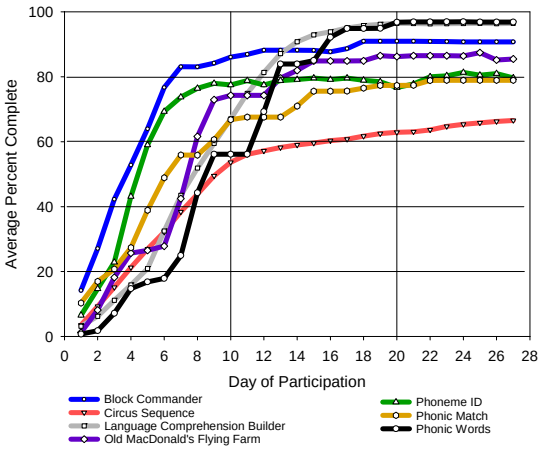


*Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 23 students are shown.*

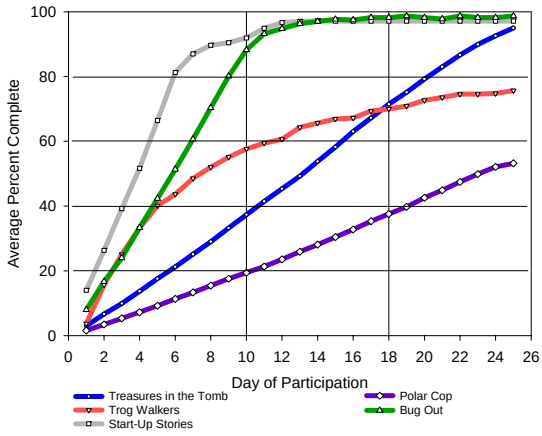


*Figure 2. Average daily progress through the Fast ForWord Language to Reading product exercises. Results from 9 students are shown.*

**Assessment Results**

Clinical Evaluation of Language Fundamentals (CELF): Of the 23 students included in this study, 19 had Receptive, Expressive and Total Language scores from before and after product use available for analysis. A MANOVA revealed a significant time effect ($F=13.7$, $p<0.002$) but no test or time by test effect. Therefore, the Total Language Score is reported in Figure 3 to show student gain. On average, student language ability was in the below average range before Fast ForWord use. Students, on average, made significant gains in overall language ability after Fast ForWord participation, improving nine points in score and reaching the average range on their language skills (Table 3).

The CELF includes subtests to assess vocabulary skills, a component of early reading skills. Pre- and post-Fast ForWord scores for these subtests were available for 23 students and analyzed using a MANOVA. On average, students had a significant effect of time indicating significant improvements on the subtests between their pre- and post-Fast ForWord scores ($F=16.1$, $p<0.001$) with average improvement on each subtest improvement ranging from five to sixteen percentile points. There was no significant effect of test or time by test.

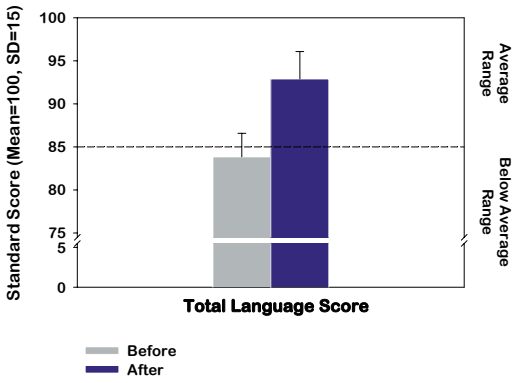


*Figure 3. Students, overall, made significant improvements in total language ability following Fast ForWord product use. Results from 19 students are shown.*

| | | Before | | After | | MANOVA f |
|---|---|---|---|---|---|---|
| | n | Mean | SE | Mean | SE | time |
| Receptive | 19 | 84.6 | 2.79 | 94.9 | 3.59 | |
| Expressive | 19 | 85.3 | 3.12 | 92.6 | 2.91 | |
| | | | | | | 13.74* |

*Table 3. After Fast ForWord use, students, on average, had significant gains in language and reading ability. *p<0.05.*

## DISCUSSION

A group of 23 students receiving services at the Lindfield Speech Pathology and Learning Centre used Fast ForWord products and participated in the study reported here. On average, students made significant gains in language and reading ability after Fast ForWord product use. Students as a whole improved nine points in Total Language Score after Fast ForWord participation – nearly two-thirds of a standard deviation. Their average pre-participation score of 83.8 corresponds to the 14th percentile while their average post-participation score of 92.9 corresponds to the 32nd percentile.

About half of the students (9) had corresponding age equivalent scores and pre- and post-test dates. These students had a language age equivalent of 7.7 years with an average age of 10.6 years before Fast ForWord use. In the approximately nine months between test administrations, students improved, on average, 1.4 years in overall language and reading age. These findings demonstrate that an optimal learning environment coupled with a focus on cognitive and early reading skills can help students attain a higher level of reading and language achievement.

## 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 in the Lindfield Speech Pathology and Learning Centre made significant gains in their early reading and language skills with the group moving from the 14th percentile to the 32nd percentile. This suggests that using the Fast ForWord products strengthened the students' foundational skills, allowing them to benefit more from classroom curriculum.

Notes:

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## REFERENCES

Lyon, G.R. (1996). Learning Disabilities. *The future of children: Special education for students with disabilities.* 6:54-76.

Merzenich MM, Jenkins WM, Johnston P, Schreiner CE, Miller SL, & Tallal P (1996). Temporal processing deficits of language-learning impaired children ameliorated by training. *Science,* 271, 77-80.

Miller, S.L., Merzenich, M.M., Tallal, P., DeVivo, K., Linn, N., Pycha, A., Peterson, B.E., Jenkins, W.M., (1999). Fast ForWord Training in Children with Low Reading Performance, *Nederlandse Vereniging voor Lopopedie en Foniatrie: 1999 Jaarcongres Auditieve Vaardigheden en Spraak-taal*. (Proceedings of the 1999 Dutch National Speech-Language Association Meeting).

Semel, E., Wiig, E. H., & Secord, W. A. (1987). *Clinical Evaluation of Language Fundamentals: Revised Edition*. San Antonio, TX: The Psychological Corporation.

Semel, E., Wiig, E. H., & Secord, W. A. (1995). *Clinical Evaluation of Language Fundamentals: Third Edition.* San Antonio, TX: The Psychological Corporation.

Semel, E., Wiig, E. H., & Secord, W. A. (2003). *Clinical Evaluation of Language Fundamentals: Fourth Edition*. San Antonio, TX: The Psychological Corporation.

Tallal P, Miller SL, Bedi G, Byma G, Wang X, Nagarajan SS, Schreiner C, Jenkins WM, Merzenich MM (1996). Language comprehension in language-learning impaired children improved with acoustically modified speech. *Science* 271:81-84.