Florida Center for Reading Research

Fast ForWord Language

What is Fast ForWord Language Software?

Scientific Learning's *Fast ForWord Language* is an adaptive computer program that is CD-ROM and internet-based. Drawing on 25 years of research on brain plasticity and the neurological basis of language, scientists developed the *Fast ForWord Language* product in an attempt to provide training in oral language comprehension and other skills critical for success in reading. The *Fast ForWord Language* product is designed as an immediate, intensive intervention for students in grades K-12 who experience difficulties with oral language skills, are students with a learning disability, are ESOL students, or are students performing at levels 1 and 2 on the FCAT.

The developers of the *Fast ForWord* Language product propose that language impairments may be caused by a slow rate of processing for the rapidly successive acoustic cues in speech. They hypothesize that students who have difficulty distinguishing phonemes at normal speeds of fluent speech may be successful when the speech is acoustically modified and slowed down. Moreover, through intensive, frequent exercises with gradual and progressive changes in difficulty, they maintain that the brain can be "rewired" to process speech at normal speeds. Based on the theory of brain plasticity, or the concept that the brain can change as people learn new skills, the *Fast ForWord Language* exercises were conceived to retrain the brain in making the connection between speech and meaning. In order to improve the rate of neural processing, the exercises are presented with altered speech sounds that have been slowed down and amplified or digitally enhanced to facilitate understanding. A special feature of the software is its ability to adapt to each student's incoming skill-level and rate of progress. As a student moves through an exercise, the level of difficulty gradually increases and the modified speech sounds gradually change toward natural speech sounds that the student processes at the individual phoneme level, in groups of phonemes, at the word level, and then the sentence level. The adaptive software immediately increases or decreases in difficulty based on the student's progress, thus creating a program that is challenging and rewarding at the same time.

The seven exercises in the *Fast ForWord Language* product are presented in an engaging format with a built-in system of rewards to increase student motivation. The exercises use sounds and discrimination tasks to develop the student's syntactic and semantic skills. Immediate corrective feedback is given before continuing an exercise. At the end of a set of correct responses, students are rewarded with brief but highly motivating features such as lights and animations, amusing sounds, and fetching musical phrases. Because the developers say that the brain is being remapped, the schedule for using the product is frequent and intense. Students participate in computer-based individualized sessions 5 days a week, 100 minutes per day, for 4-8 weeks with the guidance of a *Fast ForWord* trained clinician or educator. The flexibility of the product permits the student to complete the daily exercises in one session or in sessions that are divided throughout the school day. Sessions may also be scheduled before and after school, as well as on the weekends and during the summer.

Progress Tracker, a data analysis and performance review component to the *Fast ForWord* product, is beneficial to teachers, other professionals, and parents. Each day, data from the student's exercises is uploaded to the Scientific Learning database via the internet and a detailed summary of the student's progress is generated. This daily review of the student's performance allows teachers to further individualize instruction by reinforcing strengths and concentrating on areas of weakness.

Specific products included in Scientific Learning's *Fast ForWord* intervention include: *Reading Edge*, an assessment tool; *Fast ForWord Basics,* a preparation for students 4-7 to enter into the next product; *Fast ForWord Language,* a product that helps to develop early reading-related language skills; *Fast ForWord Language to Reading*, a product that helps to link spoken language to written language; *Fast ForWord Reading*, a product to build reading strategies including, decoding, spelling, and comprehension; *Fast ForWord Middle and High School*; *Fast ForWord Bookshelf*; and the *Fast ForWord Quickstart* products, similar to the other Fast ForWord products, but not requiring internet connectivity.

Is Fast ForWord aligned with Reading First?

Although the products in the *Fast ForWord* family have been created to address the five components of scientifically based reading instruction that are emphasized in Reading First, at this time Scientific Learning has only submitted research relevant to the *Fast Forward Language* product. *Fast ForWord Language* trains students in phonological awareness, language processing speed, sequencing, vocabulary, and language comprehension. A unique aspect of the *Fast ForWord Language* product is its focus on the subskills of language development. Research demonstrates that students without phonemic awareness will encounter difficulties when learning to read. In order to have phonemic awareness however, students must be able to accurately process the incoming sounds of language. The exercises in the *Fast ForWord Language* product are designed to break down the components of phonemic awareness by altering the way the brain processes the rapidly successive features of speech sounds. In addition to work on the rate of auditory processing, the student works systematically with phoneme identification and discrimination, sound matching and auditory word recognition.

The focus of the *Fast ForWord Language* product is on oral language skills rather than phonics instruction. Accompanying products, however, build on the oral language skills in *Fast ForWord Language*, and also provide instruction and practice in letter-sound correspondences to identify words. The *Fast ForWord Language to Reading* and *Fast ForWord Reading* products contain explicit and systematic phonics instruction.

Vocabulary and comprehension development are closely entwined in *Fast Forward Language* as well as the accompanying *Fast ForWord* products. The various exercises are designed to build understanding of individual words as well as sentences and story comprehension. In one *Fast ForWord Language* exercise, students must differentiate between 2 words that only vary in their initial or final consonant sound. Another exercise requires the student to carry out directions by listening to sentences that increase in length and complexity. In order to successfully complete the exercise, students need to understand such concepts as *instead, except, underneath, beside, between, on, behind, or, before.* Language comprehension is also addressed in an exercise that orally presents a sentence and 2-4 pictures that might possibly represent that sentence. The student's task is to choose the one correct picture.

Professional development for *Fast ForWord* products varies from site to site depending on which services have been contracted with Scientific Learning. Typical trainings occur over a two day period and include: implementation procedures for the programs and research support; how to summarize data for communication with parents and administrators; and how to interpret data in order to understand student progress and to inform future instruction. Scientific Learning offers a toll-free customer phone support line 6 days a week. *Cross Train* is a tutorial for parents and teachers to complete training online.

Research Support for Fast ForWord

The first two published evaluations of *Fast ForWord Language* examined its effects on auditory processing and language comprehension skills. They reported significant improvements in both of these areas resulting from work with the exercises (Merzenich, Jenkins, Johnston, Schreiner, Miller, & Tallal, 1996; Tallal, Miller, Bedi, Byma, Wang, Nagarajan, Schreiner, Jenkins, & Merzenich, 1996). However, the focus of this review is on research evidence for the effectiveness of *Fast ForWord Language* in improving phonemic awareness, phonemic decoding ability, reading fluency, vocabulary, or reading comprehension, as these are the reading skills and subskills that must be directly affected if the programs are to be effective in preventing reading difficulties. Although it is widely known that general language comprehension ability is strongly correlated with reading comprehension, if *Fast Forward Language* improves language comprehension solely by helping students to process the sounds of oral language more accurately, the effects may not generalize to reading comprehension.

The Scientific Learning Corporation reports a number of studies on its website and to its customers in which the *Fast ForWord Language* product has been implemented with various populations of students. The majority of these studies are pre- and post-test studies, and provide a minimum amount of information by which to judge their validity and interpretation. In a pre-/posttest study in which no control group is used, it is impossible to know whether the gains seen are attributable to the intervention (i.e., to *Fast ForWord Language* in this case), or whether they might have been seen even without the intervention. For example, they may be attributable to other factors in the child's school or out-of-school experience occurring over the same time period as the *Fast ForWord* training.

The field studies without comparison groups report consistent improvements in measures of phonemic awareness, phonemic decoding, and reading comprehension, and many of these gains are in standard score units. That is, they show that exposure to the program helped children improve their reading skills relative to average children. This is a substantial accomplishment since many remedial efforts in the schools do not produce similar gains (Torgesen, et al., 2001), but as was mentioned earlier, in the absence of sufficient information about the students, the conditions of their instruction, and appropriate comparison groups, the results are very difficult to interpret.

In 1997, Scientific Learning conducted a pilot study involving nine school districts in California, Texas, Illinois, Indiana, and Nebraska (Miller, et al., 1999). The study specifically targeted "at-risk" children in language arts (as identified by their classroom teachers); no students receiving special education services were included in this study. Over 400 students were randomly assigned to a *Fast ForWord* experimental group or to a comparison group. The *Test of Auditory Comprehension of Language*

and two subtests from the *Phonological Awareness Test* (isolation and deletion) were used to evaluate the effectiveness of the program. Each child in the experimental group trained for 1 hour 40 minutes/day, 5 days/week, and participated an average of 39 days. Before participation, language comprehension performance for both groups of students was at approximately the 12th percentile. At the end of the treatment period, the control group's performance was at the 21st percentile, while the training group's performance was at the 49th percentile. The number of children performing at or above the median in age-corrected language comprehension improved for the trained group from 11.3% to 39.3% as compared to 11.9% to 14.8% for the control group. The above changes were found to be statistically significant, and greater for the *Fast ForWord* group than the control group. Both groups improved in performance on the measures of phonological awareness from pre to post test, with the *FastForWord* group showing more improvement on the phoneme isolation task but not on the task measuring phoneme deletion. Although the report of this study mentions that the children were also administered the Letter-Word Identification subtest of the Woodcock Johnson Psycho-Educational Battery-Revised, results from this test are not included in the results section.

At the time this report was written, we also had available to us three reports produced by Scientific Learning and based on data collected by school districts in which the *Fast Forward Language* product was evaluated. One of the reports from Seminole County, Florida, provides data from two elementary schools in which the *Fast Forward Language* product was implemented. Neither a control nor an appropriate comparison group was used in either of the schools. One of the schools used the *Success for All* curriculum and reported that 71% of the students made a year or more gain in reading level during the period in which *Fast Forward Language* was implemented. The major problem interpreting these results, of course, is that *Success for All* itself, as a school change model, provides effective instruction in reading (Borman, Hughes, Overman, & Brown, 2002), so it is difficult to determine whether these student gains were produced by exposure to the *Fast Forward Language* Product, or whether they resulted from the *Success for All* curriculum. Another analysis involving data from the *Success for All* school and another elementary school showed that 38% of students at the SFA school and 29% of students at the other school improved at least one level on the reading portion of the Florida Comprehensive Achievement Test. In contrast, 24% of students in the Seminole School District improved one level in performance on the FCAT. The problem in interpreting this comparison is that the district average included many children who were already performing at high levels on the FCAT (and for whom improvement would thus be very difficult), while the schools that employed the *Fast Forward Language* product had higher proportions of students performing at lower levels on the FCAT.

Another report (#111) provides data from an implementation of Fast Forward during the 2001-2002 school year in the Cobb County School District in Marietta, Georgia. The introduction to the report states the following conclusion, "On average, students who used Fast ForWord products made significant improvements, and improved more than students who did not use Fast ForWord Products. These results indicate that the students were beneficially impacted by the use of Fast ForWord products, and that they have developed a foundation for higher academic achievement"(p.1). The report provides four measures of reading outcome, but for only one of the measures (instructional reading level) was a contrast group provided. The reports that did not use a contrast group show that students using the Fast ForWord products did, in fact, make reliable gains on a Basic Literacy Test, on a

measure using running records, and on their lexile scores from the Scholastic Reading Inventory. For the comparison involving a contrast group, the *Fast ForWord* group made slightly larger gains, but they were not statistically reliable. Thus, this study also does not provide clearly interpretable evidence that the *Fast ForWord Language* product significantly influences reading growth beyond that obtainable from more conventional approaches to reading instruction.

The third study reported by Scientific Learning, was based on data collected by the Cherry Hill School District in New Jersey. In this trial, children from kindergarten through 5th grade were selected by speech and language pathologists because they were "struggling with phonemic awareness." Of the 73 students identified, 51 were randomly assigned to receive intervention with *Fast ForWord Language* and 22 took part in the regular classroom curriculum. Measures were four subtests from the *Clinical Evaluation of Language Fundamentals-Third Edition* (CELF-3). The subtests used were *Concepts and Directions, Recalling Sentences, Word Classes*, and *Formulated Sentences*. An analysis conducted by the Reading First Assessment committee and reported on the website of the Institute for Development of Educational Achievement (http://idea.uoregon.edu/assessment/index.html) identified all of these subtests as appropriate measures of oral language vocabulary. Data analysis of pre and post tests showed that students who received intervention with the *Fast ForWord Language* product made significant gains in all four subtests, while children in the control group improved significantly only on Concepts and Directions. When all four subtests were used to calculate a Total Language score, analysis showed that the group receiving experience with *Fast ForWord Language* made significantly greater gains than children in the control group. These results provide strong support for the idea that intervention with the *Fast ForWord Language* product can produce significant improvements in oral language vocabulary, beyond gains attributable to normal classroom experience. One interesting topic for future research would be to determine whether these gains in vocabulary performance are limited to the particular test formats used on the CELF-3 (which have some similarities to practice exercises in *Fast ForWord Language*), or whether they represent generalized improvements in word knowledge that might be manifest on other measures of vocabulary such as the Peabody Picture Vocabulary Test or the vocabulary subtest of the Wechsler Intelligence Scale for Children-III.

A study conducted at Massachusetts General Hospital by Hook, Jones & Macaruso (2001) compared outcomes from a group of 11 children with difficulties in phonemic awareness and word identification using *Fast ForWord Language* with a matched group of 9 students using the Orton Gillingham training method. It should be noted here that Hook and Jones, in addition to their affiliation with MGH, are software product designers for Lexia Learning Corporation and have designed commercial reading intervention software based on the Orton-Gillingham method. The Orton Gillingham method is a way of providing explicit and systematic instruction in reading. The children were approximately 9.5 years of age (on average) when the interventions began. This study also contained a longitudinal comparison of two groups of children receiving Orton Gillingham instruction, with one of the groups having previously been treated with the *Fast ForWord Language* product. The researchers were interested in the possible facilitative effects of *Fast ForWord* training on the development of the children's reading and spelling skills when it was provided before a period of systematic instruction in basic reading skills. The *Fast ForWord* intervention was provided five days a week for about 100 minutes per day. Treatment continued for the *Fast ForWord* students until they reached the criterion for success established by the

creators of *Fast ForWord*, or until they reached a performance plateau. The treatment period varied from 22 to 42 days in this group. The Orton Gillingham program was provided using 1:1 instruction for one hour a day, five days a week, for five weeks. The study did not report whether the groups received different total amounts of instruction, but it is seems likely that they did. The Orton Gillingham students received about 25 hours of instruction, while the students receiving *Fast ForWord* received from 37 to 73 hours of instructon.

Results indicated that the Orton Gillingham and *Fast ForWord* children made similar, and statistically reliable, gains in phonemic awareness. However, children in the Orton Gillingham group showed significant gains in Word Attack, while the *Fast ForWord* children did not. In fact, the standard scores for both the measures of Word Identification and Word Attack *decreased* from pretest to post test in the *Fast ForWord* group. When compared in the two-year longitudinal study, the group who had received the *Fast ForWord* treatment did not differ significantly from the longitudinal control group in any tested area over the two years. However, both groups made significant progress in phonemic awareness and reading. This latter analysis of gains that were made subsequent to exposure to the *Fast ForWord* product should be considered inconclusive, as the sample size in this study is really not sufficient to detect meaningful differences between the groups with reasonable power. Over the two year longitudinal period, the group that had previously been exposed to the *Fast ForWord* product improved 9.3 standard score points in Word Identification, 8.1 points in Word Attack, and 9.5 points in Passage comprehension. Comparable figures for the longitudinal control group were 4.8, 8.9, and 8.

Another set of independent studies examined the effects of programs (not specifically *Fast ForWord*) that operate similarly to *Fast Forword* on several measures of phonemic awareness and reading (Habib, et al., 2002). In the first study reported in this article, ten- to twelve-year-old children with a diagnosis of pure phonological dyslexia were involved in the training exercises using altered speech. Six students formed the treatment group, and six the control group. The treatment group received exercises with speech that was modified in duration and amplitude for 45 min/day for 5 weeks; the control group received similar speech exercises for the same period of time except that the speech sounds in the training exercises were not modified in either duration or amplitude. Performance on phonological abilities for all 12 children was measured after the 5-week intervention. Results indicated that the group treated with altered speech showed significantly greater improvement on a phonemic awareness task similar to the one used in training as well as a measure of non-word spelling, but did not show greater improvement than the control group on a number of other phonemic awareness and reading tasks. Since a control group using similar exercises without modified speech was employed in this study, the differences that did occur between the groups can be attributed directly to the effects of exercises using modified speech.

The second study from these investigators applied the programs using modified speech in a more ecologically valid, clinical setting to 27 children. After training in daily 15-minute sessions over a six-week period, the group showed significant growth on a global (combined scores from several different tasks) index of phonemic awareness. However, no control group was used in this second study, making it difficult to attribute these effects specifically to experience with the program using modified speech.

A final study examining the effects of *Fast Forward Language* as a reading intervention for children with reading difficulties was reported by a mix of investigators, some of whom are directly affiliated with Scientific Learning (Temple, et al., 2003). This study reported substantial improvements in reading skills for 8-12 year old dyslexic children treated with the *Fast ForWord Language* product. The study also examined changes in brain functioning following the intervention by using measurements from functional magnetic resonance imaging (fMRI). Training with Fast Forword was provided for 100 minutes per day, five days a week, for about 28 days, which amounts to about 47 hours of training. The study did not employ a control group of dyslexic students, but rather used a group of normal readers to control for changes in brain function that might result from repeated testing with fMRI technology. Improvements in reading at posttest, as measured by the Woodcock-Johnson Reading Mastery Test-Revised (1987), were substantial. The children improved from a standard score of 78.2 to 86 on Word Identification, from 85.5 to 93.7 on Word Attack, and from 83.3 to 88.9 on Passage Comprehension. These effects are strikingly different from those reported in the earlier study by Hook, et al., (2001), and they compare favorably with improvements noted from roughly similar amounts of intervention provided by more traditional direct instruction (Torgesen, et al., in press). FMRI measurements in the dyslexic children also indicated some normalization of brain activation patterns during performance of phonological tasks following the training period. The major difficulty in interpreting these results as evidence for improvement in reading is that the study did not employ a contrast group of dyslexic students. It seems unlikely that improvements of the magnitude obtained in this study could have resulted solely from regression to the mean. However, if the students were selected because of low scores on the reading measures prior to training, it is statistically likely that they would obtain higher scores when tested again eight weeks later, even in the absence of a treatment effect. At this point, it is unclear why similar amounts of intervention with the *Fast ForWord* product should produce such strikingly different outcomes for older children with reading difficulties as is noted in the studies by Temple, et al. (2003) and the study by Hook, et al., (2001).

In summary, we conclude that there is at least a beginning level of evidence to support the use of the *Fast ForWord Language* product as an intervention for children experiencing difficulties learning to read. The effects of training with *Fast ForWord Language* are most consistently found for the area of language comprehension, next strongest for effects in the area of phonemic awareness, and mixed or indeterminate (no control groups) for reading outcomes such as phonemic decoding, word recognition or reading comprehension. What is not clear from the research at this point is whether the *FastForWord Language* product has unique instructional advantages when compared to conventional methods of direct instruction in phonemic awareness or reading. We have been particularly careful in interpreting the research results for the *Fast Forword Language* product because it does not provide direct instruction in reading skills. It claims to achieve its effects by remediating more basic, or underlying auditory processes. Thus, it seems particularly important that clear evidence of a sustained impact on reading skills be demonstrated in subsequent research.

Strengths & Weaknesses

Strengths of *Fast ForWord*:

- Intensive skill work is embedded in game-like training exercises that are engaging and motivating.
- Difficulty levels progress and adapt gradually such that the student gives correct answers approximately 80% of the time.
- Corrective feedback is always given before the next task is begun. When responses are correct, the student is rewarded by sounds, lights, progress indicators, animations and points.
- Student progress information generated by the internet database is useful for teachers, parents and administrators.
- Improvements have been noted in Oral Language Skills (phonemic awareness, vocabulary, comprehension) in traditionally under-performing subgroups of poor readers including students with limited English proficiency, language impaired students, students with learning disabilities, and students with pervasive developmental disabilities.

Weaknesses of *Fast ForWord*:

- The activities in *Fast ForWord Language* do not directly teach print reading skills. They are based on the idea that improvements in basic language processing skills will generalize to improvements in reading accuracy and comprehension. Until this assumption is verified in research, this remains a potential weakness.

Which Florida counties have schools that implement Fast ForWord?

Dade County	305-995-1428
Escambia County	386-437-7577
Osceola County	407-870-4008
Seminole County	407-320-0000
Taylor County	850-838-2500

For More Information

www.scientificlearning.com

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