Eye on Evaluation

WAKE COUNTY PUBLIC SCHOOL SYSTEM

EVALUATION AND RESEARCH DEPARTMENT

FAST FORWORD EVALUATION: 2003-04

Authors: Amy A. Germuth (Contractor),
Nancy Baenen (WCPSS Contact)

ABSTRACT

In 2003-04, 1,912 students in 16 elementary and 6 middle schools in the Wake County Public School System (WCPSS) participated in Fast ForWord program. Evaluation findings indicate that elementary and middle school participants made short-term gains averaging 22-55 months (approximately 2-4 years) of gain in terms of foundational listening and reading skills after nine weeks of intervention. When compared to students who had not received Fast ForWord instruction in 2003-04, both groups appeared to make similar gains on the Reading EOG over one year, although 7th and 8th graders served via Fast ForWord made greater gains on the math EOG. Over two years, students who received Fast ForWord in 2002-03 again performed similarly to their at-risk peers who had not received services in Reading EOG scores and gains. These findings suggest that Fast ForWord appears to impact foundational reading skills, but is not sufficient on its own to influence higher level reading skills and comprehension as measured by EOGs.

BACKGROUND

In 2003-04, 22 schools (16 elementary and 6 middle schools) in the Wake County Public School System (WCPSS) participated in the Fast ForWord program. Fast ForWord is an Internet and CD-ROM based cognitive training program for children experiencing language and reading difficulties. Using a set of "at-risk" characteristics as a guide, a core team of teachers and administrators at each school identified students who might benefit from intervention via Fast ForWord. Students selected for Fast ForWord instruction tended to exhibit poor listening skills in conjunction with other "at-risk" factors.

The 2003-04 school year represents the third year WCPSS has used Fast ForWord to help both regular and special education students exhibiting language and reading problems. During its initial implementation,

Fast ForWord was used solely with Special Education students in WCPSS during the time period winter 1999 through spring 2001. An evaluation of the effects of Fast ForWord completed in its pilot year (2001-2002), including both groups of students, found that students receiving Fast ForWord instruction did indeed show significant gains in foundational reading skills as measured by standard score gains on specific Woodcock Diagnostic Reading Battery clusters and subtests, with no differences due to gender, race, grade, or special education status. Results from 2002-03 suggested that participants scored significantly higher on End of Grade (EOG) tests, but that their performance was not significantly different than that of matched non-participants. Lister (2002) and Overbay & Baenen (2003) studied results from prior years on Fast ForWord.

To assess the impact of Fast ForWord on students' achievement, analyses of EOG test score gains in the areas of reading and math were made for all Fast ForWord participants. In addition, a sub-sample of 269 of the 1,912 students served during the 2003-04 school year were randomly chosen across all participating schools to take part in further evaluation activities. A pool of 675 comparison students were selected from 22 schools (16 elementary and 6 middle) that had:

1) expressed interest in hosting a Fast ForWord program in their schools during the 2003-04 school year but were unable to participate due to financial or space limitations.

2) agreed to participate in Fast ForWord evaluation activities when invited;

3) had similar demographic characteristics (i.e., school type (middle/elementary), size of student population, and percent receiving free or reduced-price lunch) as participating schools; and

4) identified potential Fast ForWord students in the same manner as students were chosen at participating schools (i.e., using similar core teams and identifying students with similar at-risk characteristics as schools participating in Fast ForWord had).

FINDINGS

Findings from the various evaluation activities implemented include:

- Twenty-two schools (16 elementary and 6 middle) provided a total of 1,912 students (1,460 elementary school and 452 middle school students) with Fast ForWord instruction throughout the 2003-04 school year. Students participated in one or two 9-week sessions, with an average of 87 students served per session.

- When compared to WCPSS student population for the same grades, students receiving Fast ForWord tended to be similarly distributed in terms of gender, but were more predominately Black (45%) or Hispanic. Additionally, students served via Fast ForWord were twice as likely to 1) have received Limited English Proficient (LEP) services, 2) be identified as needing special education services, 3) have received free or reduced-price lunch, and 4) have been retained. These students tend to have greater needs than the general WCPSS population, so this demographic profile of students served is appropriate.

- For both elementary and middle school students selected to participate in Fast ForWord, reading comprehension difficulty was most often cited as the primary reason for referral into the Fast ForWord program. Auditory discrimination difficulty was also mentioned frequently as a primary referral at the elementary level.

- In terms of short-term gains in standard scores on the Word Attack, Sound Blending, and Listening Comprehension subtests of the Woodcock Johnson Diagnostic Reading Battery (WDRB), Fast ForWord participants at the elementary school level made significant gains on skills in all areas directly assessed, regardless of whether students completed Level 1 or Level 2. In comparison, middle school students who completed Level 1 made significant gains on the Listening Comprehension subtests whereas those completing Level 2 made significant gains on both the Sound Blending and Listening Comprehension subtests.

- Additionally, age equivalency gains on the Woodcock Johnson Diagnostic Reading Battery for students, after nine-weeks of intervention, ranged between 22 and 55 months (approximately 2-4 years), depending upon school-level and Fast ForWord level completed. *Again, such gains suggest that Fast ForWord has a short-term impact on skills directly assessed.*

- In terms of reading EOG gains after one and two years, students who received Fast ForWord instruction made similar gains to their at-risk peers who had not received services. Very little difference was found in terms of actual point gains between the groups when the performance of Fast ForWord students in terms of reading EOG scores were compared to scores of a comparison group of students who had not received Fast ForWord instruction. The regular WCPSS instructional program appeared to have had about the same impact on EOG scores whether students participated in Fast ForWord or not. The same is true in terms of math EOG scores when looking at 3rd – 6th grade students. Seventh and 8th graders receiving Fast ForWord instruction did make greater gains on the math EOG after one year than the comparison groups of students. This suggests that Fast ForWord instruction had little impact on gains for a test such as the reading EOG, which emphasizes reading comprehension and higher order skills. This is not to say that Fast ForWord had no impact (short-term impacts were evident), but that EOG tests (reading, in particular) were not sensitive to Fast ForWord impacts. Additionally, whether stronger achievement gains show up for Fast ForWord participants on a nationally norm-referenced achievement test that focused more on foundational reading skills and basic recall is unknown. However, the focus of the North Carolina testing system and related WCPSS goals go beyond foundational skills.

FAST FORWORD EVALUATION
2003-04

INTRODUCTION

Much research and evaluation has been conducted on Fast ForWord to assess its impact on students' brain plasticity and learning gains. (For more information please see http://www.scilearn.com/results/science/main=home/rd). Although most of the school-level evaluations indicate that Fast ForWord (FF) positively impacted students' reading abilities as measured by standardized tests, most relied on pre-post designs with small samples and no comparison groups. Without a comparison group that is known to closely match the group of students receiving a treatment, it is very difficult to judge whether an intervention leads to greater gains than normal instruction in a setting. Studies that used comparison groups provided little detail on student selection; most did not appear to randomly select or to closely match their samples. A study by Miller et. al. (Scientific Learning Corporation, 2004), is an exception; they found at-risk elementary students showed greater increases in receptive language, phonological awareness, and single word reading than comparison students.   To inform local educators and extend data about the impact of FF on language and reading comprehension, WCPSS conducted an evaluation of Fast ForWord using a quasi-experimental approach.

In 2003-04, 22 schools (16 elementary and 6 middle schools) participated in the Fast ForWord program. Fast ForWord is an Internet and CD-ROM based training program for children experiencing language and reading difficulties based upon the theory of neuroplasticity or brain plasticity. Through an intensive series of adaptive interactive exercises using acoustically processed speech and speech sounds, users learn to distinguish the various components of speech and develop enhanced phonological awareness.

Using a set of "at-risk" characteristics as a guide, a core team consisting of a school administrator, Fast ForWord coordinator, Fast ForWord coach, speech-language pathologist, and other teachers where appropriate (i.e., Accelerated Learning Program (ALP) teacher, Instructional Resource Teacher (IRT), Special Education chair, School Support Team (SST) chair, English as a Second Language (ESL) teacher, or other teachers from the school leadership team) identified students who might benefit from intervention via Fast ForWord. Students selected for Fast ForWord instruction tended to exhibit poor listening skills in conjunction with other "at-risk" factors including: 1) having been referred to or qualifying for Student Support Team or Special Education Services, 2) having an Individual Education Plan (IEP) for language or reading decoding, 3) having been identified as having Attention Deficit Disorder (ADD) or Attention Deficit Hyperactive Disorder (ADHD) or exhibiting significant difficulty listening in the classroom in the absence of ADD/ADHD, 4) having received ALP services, 5) having received ESL services for more than 2 years, 6) having a reading End of Grade (EOG) test score of Level I or II, and/or 7) having been retained. A total of 1,912 students participated in Fast ForWord during the 2003-04 school year, training on individualized computer exercises over a 9-week period for 100 minutes each day in a computer lab monitored by a Fast ForWord-trained instructor.

The current study was designed to 1) examine the effects of participation in Fast ForWord on short-term and long-term learning, as measured by scores on three subtests of the Woodcock Diagnostic Reading Battery (WDRB) and 2003-04 reading and math EOG tests, and 2) provide more information about factors associated with participants' success. The following discussion focuses on demographic and outcome data for participants, and includes a comparison of achievement results for participants and comparison students.

OVERVIEW OF THE STUDY

Broadly summarized, the current study was designed to examine the effects of participation in Fast ForWord on short-term gains in sound blending, listening comprehension, and reading ability, as measured by specific subtests of the Woodcock Diagnostic Reading Battery (WDRB) and long-term learning, as measured by reading EOG scores. More specifically this study answers the following questions for the 2003-04 academic year:

1. How many students in grades 2-8 were served through the Fast ForWord program?
    a) What were the Teacher Observation Rating Scale (TOS) and demographic characteristics of these students?
    b) In 2003-04, how many students completed Fast ForWord Level 1? Level 2? Level 3?

2. Did Fast ForWord participants make significant short-term gains in sound blending, listening comprehension, and reading ability, as measured by specific subtests of the Woodcock Diagnostic Reading Battery (WDRB)?

3. Did Fast ForWord students show significantly higher gains on EOG reading and math tests than a comparison group (of students who fit the Fast ForWord profile but were enrolled in schools interested in the program who did not participate)?

4. To assist in targeting the most appropriate population, is it possible to predict short and/or long-term learning, as measured by WDRB and/or EOG scores, using specific TOS or demographic factors?

5. Compared to other students with similar demographic characteristics and prior achievement, did Fast ForWord participants from 2002-03 perform significantly better on EOG reading and mathematics tests in 2003-04?

6. How cost-effective was the Fast ForWord program in 2003-04?

SAMPLE

During the 2003-04 school year, 22 schools (16 elementary and 6 middle schools) in WCPSS participated in the Fast ForWord program by providing Fast ForWord instruction to their students. As seen in the next table, almost all schools participating in Fast ForWord provided instruction each quarter.

Figure 1. Overview of Schools Providing Fast ForWord Instruction for 2003-04

School ID	School Name	School Type	Session 1	Session 2	Session 3	Session 4
334	Brassfield Elementary	Elementary	X	X	X	X
362	Carver Elementary	Elementary	X	X	X	X
364	Cary Elementary	Elementary	X	X	X	---
380	Conn Global Magnet	Elementary	X	X	X	X
440	Green Year Round	Elementary	X	X	X	X
447	Holly Springs Elementary	Elementary	X	X	X	X
470	Lead Mine Elementary	Elementary	X	X	X	X
520	Northwoods Elementary	Elementary	X	X	X	X
523	Olive Chapel Elementary	Elementary	---	X	X	X
542	Reedy Creek Elementary	Elementary	X	X	X	X
550	Salem Elementary	Elementary	X	X	X	X
584	Wake Forest Elementary	Elementary	X	X	X	X
593	Wakefield Elementary	Elementary	X	X	X	X
606	West Lake Elementary	Elementary	X	X	X	X
618	Wildwood Forest Elementary	Elementary	---	---	X	X
624	Willow Springs Elementary	Elementary	X	X	X	X
356	Carnage Middle	Middle	X	X	X	X
360	Carroll Middle	Middle	X	X	X	X
399	Durant Road Middle	Middle	X	X	X	X
408	East Millbrook Middle	Middle	X	X	X	X
608	West Millbrook Middle	Middle	X	X	X	X
636	Zebulon Middle	Middle	---	X	X	---
TOTAL			**19**	**21**	**22**	**20**

Schools participating in the Fast ForWord program were selected based upon their desire to implement the program in their schools, capacity in terms of their computer availability and staffing of the lab, need for such a program, and their agreement to participate in evaluation activities related to Fast ForWord. Thus it is important to note that schools were not randomly selected to receive Fast ForWord instruction, nor were students in these schools randomly selected. As stated previously, students who participated in Fast ForWord were selected by a core team of school-level personnel who identified students who exhibited poor listening skills in conjunction with other "at-risk" factors.

A total of 1,912 students (1,460 elementary school and 452 middle school students) completed 9 weeks of Fast ForWord instruction throughout the 2003-04 school year at the 22 participating schools. Schools served an average of 87 students via four separate sessions provided throughout the year. As shown in Figure 2, of the students receiving Fast ForWord instruction:

- they were almost equally divided between male and female;
- they were most commonly Black or White (15% were Hispanic);
- close to 10% were currently receiving ESL services;
- approximately 37% were receiving Special Education services (non-Academically Gifted);

- fifty-three percent received free or reduced-price lunch;
- ten percent had been retained at some point in their academic career;
- most (approximately 75%) completed Level 1 of Fast ForWord (Language) although close to 25% completed both Level 1 and Level 2: Language to Reading. Four students completed Level 3: Reading;
- over 35% were at or above grade level in terms of their 2003 reading EOG scores; and
- just over 30% received at least one type of accommodation when taking their EOGs.

Compared to students systemwide in these same grades, students receiving Fast ForWord tended to be similarly distributed in terms of gender, but more predominately Black (45% versus 28% systemwide) or Hispanic (15% versus 7% systemwide). Additionally, students served via Fast ForWord were twice as likely to:

1) have received LEP services than the systemwide population for these grades (10% versus 5% systemwide),
2) be identified as needing special education services (37% versus 17% systemwide),
3) have received free or reduced-price lunch (52% versus 27% systemwide), and
4) have been retained (10% versus 5% systemwide).

Figure 2. Demographic Information for Fast ForWord Students, Fast ForWord Students Participating in Evaluation Activities, and Comparison (Non-Fast ForWord) Students

Demographics	Fast ForWord Participants n=1912	Fast ForWord Participants Randomly Selected for Evaluation Purposes n=269	Comparison (Non-Fast ForWord) Students n=675
Gender			
Male	1080 (56.5%)	147 (54.7%)	442 (65.5%)
Female	832 (43.5%)	122 (45.4%)	233 (34.5%)
Ethnicity			
Black	861 (45.0%)	120 (44.6%)	288 (42.7%)
White	657 (34.4%)	106 (39.4%)	270 (40.0%)
Hispanic/Latino	291 (15.2%)	30 (11.2%)	77 (11.4%)
Multi-Racial	64 (3.3%)	11 (4.1%)	26 (3.9%)
Asian	34 (1.8%)	2 (0.7%)	13 (1.9%)
American Indian	5 (0.3%)	---	1 (0.1%)
Grade			
K	39 (2.0%)	3 (1.1%)	---
1	108 (5.6%)	6 (2.2%)	---
2	261 (13.6%)	22 (8.2%)	---
3	388 (20.3%)	69 (25.7%)	179 (26.5%)
4	368 (19.2%)	43 (16.0%)	133 (19.7%)
5	296 (15.5%)	47 (17.5%)	150 (22.2%)
6	128 (6.7%)	20 (7.4%)	56 (8.3%)
7	176 (9.2%)	29 (10.8%)	78 (11.6%)
8	147 (7.7%)	30 (11.2%)	79 (11.7%)

Figure 2 Cont. Demographic Information for Fast ForWord Students, Fast ForWord Students Participating in Evaluation Activities, and Comparison (Non-Fast ForWord) Students

Demographics	Fast ForWord Participants n=1912	Fast ForWord Participants Randomly Selected for Evaluation Purposes n=269	Comparison (Non-Fast ForWord) Students n=675
LEP Status			
Receiving ESL Services	184 (9.6%)	16 (6.0%)	47 (7.0%)
Exited from ESL Program	54 (2.8%)	7 (2.6%)	18 (2.7%)
Not receiving services	1606 (84.0%)	246 (91.4%)	592 (87.7%)
Special Ed Status			
Receiving Special Ed non-AG services	715 (37.4%)	93 (34.6%)	332 (49.2%)
Receiving AG services	11 (0.5%)	---	19 (2.8%)
Not receiving Special Ed services	1186 (62.0%)	176 (65.4%)	324 (48.0%)
Free and Reduced Price Lunch Status			
Free	863 (45.1%)	110 (40.9%)	260 (38.5%)
Reduced	145 (7.6%)	13 (4.8%)	51 (7.6%)
Not eligible/Did not apply	904 (47.3%)	146 (54.3%)	364 (53.9%)
Retention Status			
Retained previously	203 (10.6%)	30 (11.2%)	47 (7.0%)
Never retained	1709 (89.4%)	239 (88.8%)	628 (93.0%)
School Type			
Elementary	1460 (76.4%)	190 (70.6%)	462 (68.4%)
Middle	452 (23.6%)	79 (29.4%)	213 (31.6%)
Highest Level Completed			
Level 1: Language	1432 (74.9%)	187(69.5%)	
Level 2: Language To Reading	473 (24.7%)	82 (30.5%)	*Not Applicable*
Level 3: Reading	4 (0.2%)	---	
Level Unknown	3 (0.2%)	---	
Most Recent Reading EOG Level			
Level 1	131 (6.9%)	18 (6.7%)	57(8.4%)
Level 2	490 (25.6%)	87 (32.3%)	164 (24.3%)
Level 3	571 (29.9%)	89 (33.1%)	265 (39.3%)
Level 4	113 (5.9%)	17 (6.3%)	109 (16.1%)
Level Missing or NA	607 (31.7%)	58 (21.6%)	80 (11.9%)
No. of Modifications Received			
0	1311 (68.6%)	187 (69.5%)	339 (50.2%)
1	51 (2.7%)	8 (3.0%)	29 (4.2%)
2	72 (3.8%)	13 (4.8%)	50 (7.4%)
3	130 (6.8%)	12 (4.5%)	125 (18.5%)
4	203 (10.6%)	30 (11.2%)	99 (14.7%)
5	143 (7.5%)	19 (7.1%)	31 (4.6%)
6	2 (0.1%)	---	2 (0.3%)

A sub-sample of 10-20 students receiving Fast ForWord instruction were randomly chosen at each school to participate in evaluation activities, for a total sample of 269 students. Again, as shown in Figure 2, these students appear quite similar to all students who participated in Fast ForWord activities during the 2003-04 school year although over 30% had completed Level 2: Language to Reading.

To answer additional evaluation questions a total of 675 students from 22 schools (16 elementary and 6 middle), an average of 31 students per school, were identified via a core team at their school as students who would have been provided Fast ForWord instruction had the program been implemented at that school. Importantly, the pool of comparison students were selected from schools that had:

    1) expressed interest in hosting a Fast ForWord program in their schools during the 2003-04 school year but were not able to participate due to financial or space limitations,
    2) agreed to participate in Fast ForWord evaluation activities when invited,
    3) had similar demographic characteristics (i.e., school type (middle/elementary), size of student population, and percent receiving free or reduced-price lunch) as participating schools; and
    4) identified potential Fast ForWord students in the same manner as students were chosen at participating schools (i.e., using similar core teams and identifying students with similar at-risk characteristics as schools participating in Fast ForWord had).

Schools invited to participate in evaluation activities were first identified by whether or not they had expressed an interest in providing Fast ForWord services to their students, and were then stratified by level (elementary or middle), size (total number of students served), and percent of students receiving free or reduced-price lunch. As shown in Figure 2, the comparison group appears very similar to those in the Fast ForWord sample, with the exception that they were slightly more likely to be male, receiving special education, and receiving accommodations for testing. Differences were not considered large enough to be of concern in the analyses.

METHODOLOGY & RESULTS

Teacher Observation Scale Characteristics for Fast ForWord Students

As stated previously, part of the evaluation activities related to understanding the impact of Fast ForWord on students' reading and language skills made use of a randomly selected group of 269 students who had participated in Fast ForWord during the 2003-04 school year. For each student in this group, the teacher who best knew the student was asked to complete a Teacher Observation Scale (Appendix A) before the student began receiving Fast ForWord instruction and again within two to four weeks of completing Fast ForWord for the group that was immediately tested and seven to eight weeks after completing Fast ForWord for the delayed testing group.

As can be seen in Figure 3, over half of the students served had all of the characteristics listed as possible reasons students might benefit from Fast ForWord. Elementary students tended to have higher percentages for most characteristics than middle school students, with the exception of "following oral directions" and "remembering what was said" (true for three fourths of both groups). Of the elementary students randomly selected for evaluation activities, 90% or more had difficulty discriminating sounds in words, pronouncing unknown words, and understanding what they read. Additionally, over 80% displayed problems in terms of their phonemic awareness, had trouble comprehending age-appropriate words and verbal concepts, and were

lacking in their ability to sequence sounds, words, events, etc. Middle school students chosen as part of this sample were most likely to have trouble understanding what they read, following oral directions, and remembering what was said. For both elementary and middle school students, reading comprehension difficulty was most often cited as the primary reason for referral into the Fast ForWord program. Reading decoding difficulty was also mentioned frequently as a primary referral at the elementary level.

Figure 3. Overview of TOS Characteristics for Fast ForWord Students Randomly Selected to Participate in Evaluation Activities

	Elementary (n=190)	Middle (n=79)
Student has difficulty….		
Discriminating sounds in words	171 (90%)	52 (66%)
In phonemic awareness	163 (86%)	45 (57%)
Following oral directions	146 (77%)	60 (76%)
Comprehending words/verbal concepts for age/grade level	160 (84%)	57 (72%)
Verbally expressing thoughts	131 (69%)	49 (62%)
Remembering what is said	144 (76%)	59 (75%)
Sequencing sounds, words, events, or sequences	160 (84%)	54 (68%)
Pronouncing unknown words	176 (93%)	56 (71%)
Understanding what they read	180 (95%)	67 (85%)
Primary reason for referral:*		
Reading decoding difficulty	59 (31%)	7 (9%)
Reading comprehension difficulty	87 (46%)	39 (49%)
Spelling difficulty	7 (4%)	1 (1%)
Auditory discrimination difficulty	8 (4%)	2 (3%)
Difficulty listening/following directions	16 (8%)	9 (11%)
Limited English Proficient	2 (1%)	4 (5%)
Other	14 (7%)	9 (11%)
Missing /No response	11 (6%)	8 (10%)

* Some elementary school teachers gave more than one response and thus total response may be greater than the number of students actually included.

Short-term Gains Among Fast ForWord Participants

One key question this study sought to answer was whether Fast ForWord participants made significant short-term gains in sound blending, listening comprehension, and reading ability, as measured by specific subtests of the Woodcock Diagnostic Reading Battery. Thus the sub-sample of Fast ForWord students chosen for evaluation activities were tested using the Woodcock Diagnostic Reading Battery in the following areas: Word Attack, Sound Blending, and Listening Comprehension. Tests were administered to students both before they received Fast ForWord instruction and again within 2-8 weeks of their completion of the Fast ForWord program. The variability in time between completing Fast ForWord instruction and post-testing allowed time between testing to be assessed to determine if time was a factor in students' post-test results. No correlation between time lag and test scores was found, suggesting gains were more than immediate but also did not increase over time. Thus, students' scores were grouped based upon school classification (elementary or middle) and Fast ForWord level completed (Language or Language to Reading).

Standard Score Gains. A paired samples t-test was conducted to assess whether standard score gains made by students between pre- and post-tests were statistically significant (i.e., due to reasons beyond chance). As shown in Figure 4a, elementary students who completed Level 1 of Fast ForWord training made gains of 7, 11, and 9 standard score points respectively on the Word Attack, Sound Blending, and Listening Comprehension subtests. The average standard score gains for these students were statistically significant for all subtests. Elementary students who completed Level 2 of Fast ForWord made gains of 6, 10, and 11 standard score points respectively on the Word Attack, Sound Blending, and Listening Comprehension subtests; again these gains were statistically significant for all subtests. Middle school students who completed Level 1 made gains on the Word Attack, Sound Blending, and Listening Comprehension subtests of 5, 7, and 8 standard score points, respectively. T-tests indicated that these gains were statistically significant in the area of Listening Comprehension only. Middle school students who completed Level 2 made gains on the Word Attack, Sound Blending, and Listening Comprehension subtests of 4, 9, and 7 standard score points, respectively, with gains considered statistically significant in the areas of Sound Blending and Listening Comprehension.

Effect sizes for all gains (calculated by dividing the mean gain by the pooled standard deviation, producing a value that represents a percent of one standard deviation) were also calculated. These values provide a measure of the impact of the intervention and allow for more accurate comparisons of gains across subtests. According to Cohen[1] effect sizes of .2 are considered small, .5 are considered medium, and any effect size of .8 or greater is considered large. Figure 4a shows that effect sizes of gains made by elementary students ranged from .55 - .96 standard deviations and .45 - .78 standard deviations for students completing Level 1 and Level 2, respectively. These indicate moderate to strong gains. Among middle school students, effect sizes were much smaller: effect sizes of gains made by those who completed Level 1 of Fast ForWord ranged between .22 and .37 standard deviations and from .20 - .47 standard deviations for students who completed Level 2 of Fast ForWord, indicating small to moderate gains. Despite the fact that some gains among middle school students were not significant (i.e., gains on Word Attack for Level 1 and 2 students and gains on Sound Blending for Level 1 students), middle school students' gains on the Listening Comprehension subtest were significant for all students, regardless of level completed. Overall, Fast ForWord appears to have the greatest short-term impact on foundational reading skills at the elementary level, with middle school students showing benefit primarily in the area of listening comprehension.

As a comparison point, in the 2001-2002 pilot study, students' mean standard score gain on the Word Attack subtest was 4.64 points, representing an effect size of .27. Note that for the 2001-2002 study students' scores were not disaggregated by school-level, so this represents scores for both elementary and middle students. Although as part of the pilot study students were tested in the areas of Sound Blending and Listening Comprehension, test scores (and subsequently gains and effect sizes) were not reported individually but combined with other tests and reported as cluster scores[2].

---

[1] More information about effect sizes and their magnitudes can be found online at the following site: http://web.uccs.edu/lbecker/Psy590/es.htm
[2] Findings are from the report by Lister and Painter titled "Fast ForWord School Pilot: Benefits to Students and Analysis of Change in Foundational Literacy Skills, 2001-2002".

**Figure 4a. Overview of WDRB Standard Score Gains by
Grade Range and Fast ForWord Level Completed**

Student Grade Range	Elementary School Students						Middle School Students					
Fast ForWord Level Completed	Language (n=147)			Language To Reading (n=43)			Language (n=40)			Language To Reading (n=39)		
Subtest	Mean	SD	Effect Size	Mean	SD	Effect Size	Mean	SD	Effect Size	Mean	SD	Effect Size
Word Attack	7.86*	12.30	.55	6.09*	12.44	.45	5.03	21.68	.22	4.13	22.10	.20
Sound Blending	11.88*	12.65	.96	10.79*	11.74	.78	7.05	24.03	.34	9.51*	14.60	.61
Listening Comprehension	9.18*	11.70	.55	11.74*	12.45	.78	8.29*	14.77	.37	7.05*	14.95	.47

* Indicates 2-tailed paired samples t-test was statistically significant at alpha = .05 level

Age Equivalent Gains. As shown in Figure 4b, a paired samples t-test was conducted to assess whether age equivalent gains (measured in months) made by students between pre- and post-tests were also statistically significant. The average time between pre- and post- testing was 11 weeks. As can be seen:

- Elementary students who completed Level 1 of Fast ForWord training made average gains of *25, 41, and 22 months* respectively on the Word Attack, Sound Blending, and Listening Comprehension subtests, after 9 weeks of intervention. The average age equivalent gains for these students were statistically significant for all subtests. Elementary students who completed Level 2 of Fast ForWord made average gains of *41, 50, and 26 months* respectively on the Word Attack, Sound Blending, and Listening Comprehension subtests; again these gains were statistically significant for all subtests.

- Middle school students who completed Level 1 made average gains on the Word Attack, Sound Blending, and Listening Comprehension subtests of *24, 43, and 24* months, respectively. T-tests indicated that these gains were statistically significant in the areas of Sound Blending and Listening Comprehension only. Middle school students who completed Level 2 made average gains on the Word Attack, Sound Blending, and Listening Comprehension subtests of *55, 40, and 22 months*, respectively, with gains considered statistically significant in all areas.

Thus, on the average, students showed gains of close to two years or more from an intervention of nine weeks. Effect sizes for all gains were again calculated. Figure 4b shows that effect sizes of gains made by *elementary* students ranged from .47 - .88 standard deviations and .59 - .82 standard deviations for students completing Level 1 and Level 2, respectively. These indicate *moderate to strong gains*. Among *middle* school students, effect sizes of monthly gains were somewhat smaller: effect sizes of gains made by those who completed Level 1 of Fast ForWord ranged between .22 and .86 standard deviations and from .39 - .70 standard deviations for students who completed Level 2 of Fast ForWord, indicating *small to moderate* gains. Taken

together, age equivalent gains and effect sizes again suggest that *Fast ForWord does have a short-term impact on skills directly assessed*.

Figure 4b. Overview of WDRB Age Equivalent Gains (in months) by Grade Range and Fast ForWord Level Completed

Student Grade Range	Elementary School Students						Middle School Students					
Fast ForWord Level Completed	Language (n=147)			Language To Reading (n=43)			Language (n=40)			Language To Reading (n=39)		
Subtest	Mean	SD	Effect Size	Mean	SD	Effect Size	Mean	SD	Effect Size	Mean	SD	Effect Size
Word Attack	25.46*	54.30	0.47	40.58*	81.79	0.59	24.40	79.39	0.22	55.21*	109.96	0.54
Sound Blending	40.67*	55.28	0.88	50.00*	63.29	0.82	43.16*	45.71	0.86	40.92*	52.10	0.70
Listening Comprehension	22.33*	29.78	0.61	26.64*	26.15	0.82	24.10*	61.28	0.39	22.10*	52.72	0.39

* Indicates 2-tailed paired samples t-test was statistically significant at alpha = .05 level

Researchers were interested in whether teacher perceptions of students' areas of difficulty changed when assessed using the TOS before and then after having completed Fast ForWord instruction. Results are shown in Figure 5. Interestingly, the percent of elementary students identified as having difficulty in a certain area decreased by greater than 10% in 8 of 9 instances, compared to only one area for middle school students. However, the reliability and validity of the TOS as a predictive instrument has not been assessed. The scale also does not assess degree of difficulty, so it is also not sensitive to improvements that may still leave students with some difficulty in an area.[3] Thus, not too much should be made of this finding.

Figure 5. Comparison of Pre-Post TOS Scores

Student has difficulty….	Elementary (n=190)		Middle (n=79)	
	Pre	*Post*	*Pre*	*Post*
Discriminating sounds in words	171 (90%)	146 (77%)*	52 (66%)	53 (67%)
In phonemic awareness	163 (86%)	145 (76%)*	45 (57%)	50 (63%)
Following oral directions	146 (77%)	117 (62%)*	60 (76%)	52 (66%)*
Comprehending words/verbal concepts for age/grade level	160 (84%)	130 (68%)*	57 (72%)	57 (72%)
Verbally expressing thoughts	131 (69%)	103 (54%)*	49 (62%)	49 (62%)
Remembering what is said	144 (76%)	123 (65%)*	59 (75%)	56 (71%)
Sequencing sounds, words, events, or sequences	160 (84%)	124 (65%)*	54 (68%)	53 (67%)
Pronouncing unknown words	176 (93%)	161 (85%)	56 (71%)	59 (75%)
Understanding what they read	180 (95%)	153 (81%)*	67 (85%)	61 (77%)

* Indicates percent identified decreased by 10% or greater.

---

[3] The TOS does include a question on the frequency with which a difficulty is evident ("sometimes, often, or always") but these terms are not defined, and respondents often did not complete this information or answered "always." It was therefore not helpful for analysis.

Comparison of EOG Gains Between Fast ForWord and Comparison Students

A second key question of this study was: Did Fast ForWord students show significantly higher gains on EOG reading and math tests than a comparison group (of students who fit the Fast ForWord profile but were enrolled in schools interested in the program who did not participate)?

To determine whether students' who received Fast ForWord scored higher or made greater gains on either the reading or math EOG, an independent samples t-test was also conducted to determine if differences were statistically significant from 0 at the alpha =.03 level. Differences in gains are more critical than performance differences for this key study question. Figure 6 shows that there was very little difference in terms of performance among students (disaggregated by grade) on either the reading or math EOG test except among 3rd graders. Interestingly, third graders who received Fast ForWord services showed lower mean posttest performance scores in both reading and math on EOG. The differences in performance average 2 and 3 points. (For context, average gains in WCPSS for third grade were 8.4 points in reading and 14.7 in math.)

In terms of gains between 2003 and 2004 on the reading EOG test, 5th grade students who received Fast ForWord services did make statistically significantly greater gains whereas among 3rd graders, non-Fast ForWord students' gains were statistically significantly greater. For all other grades, differences in gains on the reading EOG between the two groups were not significant. In terms of math gains, 7th and 8th graders who received Fast ForWord did perform significantly better than their at-risk peers who had not received services, with average differences in gains equal to 3-4 points. Their math gains were also considerably higher than that of the system overall (which averaged 3.5 points at grade 7 and 3.3 at grade 8). It is possible that improved basic reading skills attained through Fast ForWord did impact these students' math scores. (The reading level demands of math questions are more basic than those in reading). [4]

An additional analysis indicated that gains made between spring 2003 and spring 2004 were statistically significant for all groups on both tests except among 3rd graders (both those who completed Fast ForWord and those chosen for comparison purposes) in terms of reading. This finding is similar to the finding last year that students who complete Fast ForWord make statistically significant gains, but do not perform differently from matched students[5]. The fact that overall at-risk students who received Fast ForWord instruction appeared to perform similarly and make similar gains as at-risk students who had not received instruction suggests that Fast ForWord does not have an impact in the areas directly assessed via the EOG tests. This is not to say that Fast ForWord has no impact (it was shown above that it does), but that the EOG tests may not be sensitive to the skills Fast ForWord does impact.

---

[4] Similar analyses were also conducted using the full Fast ForWord sample (see Appendix B). Results were similar, although no statistically significant differences were found in gains between the two groups.

[5] For more information see "Fast ForWord Evaluation, 2002-03" by Amy Overbay and Nancy Baenen.

Figure 6. Comparison of EOG Performance and Gains Between Fast ForWord Participants and Comparison Sample by Grade: Spring 2003 and 2004

		Reading EOG			Math EOG		
		n	Mean	SD	n	Mean	SD
Performance Score							
Grade 3	FF	71	241.93*	7.71	72	249.07*	6.04
	Non-FF	172	244.94*	8.37	172	251.20*	5.46
Grade 4	FF	47	246.70	6.66	47	254.26	6.19
	Non-FF	128	248.33	6.99	128	255.38	6.10
Grade 5	FF	49	252.96	6.04	49	259.08	7.54
	Non-FF	143	253.71	7.81	143	259.46	7.52
Grade 6	FF	23	249.61	7.25	23	256.26	6.68
	Non-FF	54	250.89	9.86	54	258.24	10.54
Grade 7	FF	28	253.21	9.56	28	261.75	7.65
	Non-FF	75	255.56	11.82	75	262.28	13.02
Grade 8	FF	25	254.96	6.89	25	262.84	6.37
	Non-FF	75	257.55	11.44	74	264.49	11.69
Gain Score							
Grade 3	FF	69	8.97*	7.19	70	16.14	5.37
	Non-FF	163	11.10*	7.73	163	16.42	5.52
Grade 4	FF	44	6.14	4.64	44	6.14	3.47
	Non-FF	113	5.66	6.49	113	4.82	4.11
Grade 5	FF	46	8.13*	5.98	46	4.83	3.94
	Non-FF	126	5.24*	5.83	126	3.90	5.01
Grade 6	FF	20	1.35	6.68	21	2.86	5.58
	Non-FF	50	0.90	5.84	50	2.36	4.70
Grade 7	FF	27	3.59	6.92	27	5.67*	4.54
	Non-FF	72	2.74	6.65	72	1.96*	6.37
Grade 8	FF	20	3.80	6.96	20	6.20*	6.84
	Non-FF	66	3.44	6.67	66	3.23*	5.10

*Indicates independent samples t-test was statistically significant at alpha = .03 level

Lastly, researchers investigated whether there were differences in terms of EOG gains depending upon time elapsed since students received intervention via Fast ForWord. Thus EOG gains among Fast ForWord students grouped by which quarter they received Fast ForWord were compared and were found to be similar across groups (i.e., not statistically significantly different). Thus, EOG results for the overall group were not influenced by mixing together students served at different times of the year.

Predicting Short- and/or Long-term Learning Gains

Fast ForWord program staff also wanted to know whether the students most likely to benefit from Fast ForWord instruction were being targeted for this intervention. Thus one question researchers investigated was: Is it possible to predict short and/or long-term learning, as measured by the Woodcock Johnson Diagnostic Reading Battery (WDRB) and/or EOG scores, using specific Teacher Observation Rating Scales (TOS) or demographic factors?

Multiple regression equations with WDRB and EOG gains scores as outcomes and individual demographic factors and TOS factors as independent or predictor variables were tested in order to determine whether such factors could be used to predict gains. However, no single factor (WDRB, EOG, TOS or demographics) emerged as a statistically significant factor when regression results were tested.

Next, the number of areas in which teachers indicated a student exhibited difficulty, as noted on their PreTOS form, were summed to produce a score presumably indicative of students' magnitude of difficulty in the broad area of language/reading. As shown in Figure 7, scores could range from one to nine. On average students were noted as having difficulty in approximately seven areas identified in the TOS. Thus, students were seen as having difficulty in many areas listed.

Figure 7. PreTOS Overall Score

Score	n (%)
1	---
2	1 (0.01%)
3	10 (3.7%)
4	11 (4.1%)
5	16 (5.9%)
6	20 (7.4%)
7	32 (11.9%)
8	38 (14.1%)
9	118 (43.9%)
Missing	23 (8.6%)

When included as the sole predictor of WDRB and EOG gains (by subtest) in regression equations, the overall TOS score (again postulated to be an indication of the magnitude of a student's difficulty in language/reading) was a statistically significant predictor of standard score gains for the Listening Comprehension subtest of the WDRB for both elementary and middle school students (but not for Word Attack or Sound Blending).

Figure 8. Regression Results for Predicting Gains

	n	Mean Square	F	Sig.
Elementary School Students				
Listening Comprehension – Standard Score Gain	180	790.79	6.013	0.015*
Middle School Students				
Listening Comprehension – Standard Score Gain	61	1607.27	9.871	0.003*

* Indicates F value was statistically significant at alpha = .05 level

Researchers also checked whether students' 2003 EOG level may predict WDRB and EOG gains by comparing differences in student standard score gains (by grade) in terms of the three WDRB subtests against students' 2003 reading EOG level. Among the 18 calculations reviewed, differences were statistically significant in only two cases. Not surprisingly, when reading EOG gains were considered, 3-5th graders prior reading EOG level did make a difference in EOG gains. Those who initially scored in Level I-II showed larger gains than those scoring in Level III-IV initially.

Long-term Gains Among Fast ForWord Participants

Researchers also attempted to assess the long-term impact of Fast ForWord on past participants. Thus they sought to answer whether compared to other students with similar demographic characteristics and prior achievement, did Fast ForWord participants from 2002-2003 perform significantly better on EOG Reading tests in 2003-2004?

A total of 655 students, 334 whom had received Fast ForWord instruction in 2002-2003 and 321 who had never received Fast ForWord services but were similar in terms of demographics and prior achievement to the other group were included in these analyses. Comparison of Reading EOG scale scores and gains, as shown in the figure below, indicate that both groups are performing similarly. Additional analyses (independent samples t-test) indicated that there were no significant differences in pre and post (i.e., 2002 and 2004) scores between the two groups or in terms of gains between 2002 and 2004. Furthermore, scores and gains for both groups were similarly and normally distributed. Thus the evidence does not suggest Fast ForWord is helping WCPSS meet the goal of improving student achievement as measured by state assessments. However, it does appear to impact some basic reading skills that may not be emphasized in state instruments.

Figure 9. Mean EOG Scale Scores and Gains Between Students Receiving Fast ForWord Services and Students Who Did Not Receive Services

		n	2002 EOG Reading Score		2004 EOG Reading Score		02-04 Reading Gain	
			Mean	SD	Mean	SD	Mean	SD
Grade 3	FF	66	233.91	7.93	247.80	7.55	13.89	7.60
	Non-FF	63	233.71	7.89	248.71	8.71	15.00	7.15
Grade 4	FF	53	144.59	7.42	156.02	5.77	11.43	6.60
	Non-FF	53	144.26	7.13	156.47	4.73	12.21	6.08
Grade 5	FF	67	147.27	6.30	156.27	5.90	9.00	4.77
	Non-FF	71	147.37	6.21	155.73	5.08	8.37	4.53
Grade 6	FF	36	148.92	6.93	155.22	5.59	6.31	4.97
	Non-FF	29	149.45	7.27	157.52	8.39	8.07	5.08
Grade 7	FF	107	148.05	4.75	158.88	4.91	10.83	5.00
	Non-FF	102	147.81	4.77	159.96	4.67	12.15	4.92

Cost Effectiveness of Fast ForWord

The scope of this study did not allow researchers to conduct a full cost-benefit analysis of the Fast ForWord program. However, to assess how cost-effective the Fast ForWord program is, an attempt was made to collect information on direct costs associated with implementation of Fast ForWord through the district level coordinator. For the 2003-04 school year, WCPSS negotiated with the Fast ForWord vendor the direct cost of serving one student with two programs (e.g., Level 1, Level 2, etc.) to be $83. This equates to an average direct cost of $7,221 per school, based on the fact that on average 87 students were served per school, and a total cost of $158,696 (based on the fact that a total of 1,912 students were served this year). Additional costs to implement Fast ForWord (but not calculated in the figure above due to variability of needs across sites) include salaries for full-time teacher or teacher assistants who implement Fast ForWord on-site, facility set-up costs (wiring for computer labs if not available), operation

and/or purchase costs where necessary of at least eleven computers (10 student stations and 1 data management station), headphones and Y cords for each student station, and daily student materials. Other costs include district level costs associated with a district level coordinator.

CONCLUSIONS

Students receiving Fast ForWord during the 2003-04 school year tended to be referred due to reading comprehension and auditory discrimination difficulties. Fast ForWord students randomly chosen to participate in evaluation activities did make significant gains in standard scores on the Word Attack, Sound Blending, and Listening Comprehension subtests of the Woodcock Johnson Diagnostic Reading Battery. This suggests that Fast ForWord does have at least a short-term impact on improving foundational reading skills for those experiencing reading and/or listening difficulties. Importantly, gains were greater among elementary students than middle school students and seemed unrelated to Fast ForWord level completed. When a sample of Fast ForWord students' reading and math EOG scores were compared to scores of a comparison group of students who had not received Fast ForWord instruction, there was very little difference in terms of actual point gains between the groups. In terms of long-term gains, students who received Fast ForWord instruction again made similar gains and performed similarly on the reading EOG test when compared to their at-risk peers who had not received services. The fact that in both instances students who received Fast ForWord instruction appeared to perform similarly to at-risk students who had not received instruction suggests that Fast ForWord has little impact (short-term or long-term) on students' EOG performance. This however, does not indicate that Fast ForWord has no effect – it may not or it may be that EOG tests do not directly assess the reading and math skills Fast ForWord does impact.

Findings from this evaluation seem to match findings from both the 2001-2002 pilot year study and 2002-03 study. The pilot year study found that students showed significant gains in foundational reading skills as measured by various WDRB subtests and clusters. Additionally, although students participating in Fast ForWord had lower EOG scores when compared to the school system mean for their grade, students who did receive Fast ForWord services made statistically significant gains (Lister, 2002). The 2002-03 evaluation focused on EOG scores and revealed that whereas Fast ForWord students' gains on EOGs were statistically significant, post EOG scores were not significantly different from matched students (Overbay and Baenen, 2003). Together these evaluations suggest that Fast ForWord has short-term impacts that can be directly assessed but may have no long-term impact on EOG tests as skills learned are not sufficient to yield increases in achievement on tests that focus on reading comprehension and higher order thinking skills.

RECOMMENDATIONS

Based upon findings from the 2003-04 evaluation of the Fast ForWord program in WCPSS, including achievement, cost, and time program participants are required to be out of their regular class, district administrators may want to consider refining the ways students are identified for the Fast ForWord program and the level of use of the program. As with other interventions, Fast ForWord should not be viewed as a way to help *all* students exhibiting learning difficulties. In

the study conducted by Miller et. al. (Scientific Learning Corporation, 2004), they found FF elementary students improved their language comprehension and phonological processing skills to a greater extent than a comparison group. While they suggested this should enable students to better initiate reading, they also noted "learning to read itself still involves intensive training after a language training such as Fast ForWord has been completed." WCPSS needs to take great care in selecting students for services. Revisiting the goals WCPSS has for Fast ForWord would be a valuable first step, and refined goals could drive refinement decisions. For example:

- If the goal is to help students with listening and auditory discrimination issues understand classroom instruction more quickly and respond more fully and appropriately, then students with these issues should be the focus of service, and those who have *only* reading comprehension issues should be excluded (a common primary referral reason).
- If the goal is to increase the percentage of students scoring *on grade level* in reading on the EOG, then those students who score at or above grade level (or at least those who score more than two points above the cut scores) *before* service should not be served through Fast ForWord.
- If the goal is to optimize student achievement on the EOG *regardless* of initial test scores, then Fast ForWord should focus on those whose achievement can be improved by better language processing, and we must recognize it as a first intervention which will often need appropriate follow-up.

In terms of student identification, the guidelines have been very broad and schools have been given a great deal of latitude in deciding which students to serve. Tightening up the criteria could make the process easier, more efficient, and more effective. It could result in better identification of students most likely to benefit from this program. One place to start is the nature of the program. FF is designed to improve aural reception of speech. The TOS does allow school administrators to identify a large pool of students who may possibly gain from Fast ForWord participation, but is does not narrow the field adequately. Refining TOS questions to better address degree and frequency of difficulty in each area might help show improvement more fully, but other information also needs to be considered. Checking students directly for auditory issues before service could definitely help. Middle school results suggest that students with listening skill issues might be the most likely to show large improvements. Examining common characteristics of students who showed large gains on the Woodcock Johnson Diagnostic Reading Battery and EOG, as well as those who did not appear to benefit, could help fine tune criteria as well. (These discussions should be based on teacher judgments and other data available at schools beyond test results.) Results do suggest grades 5, 7, and 8 may be good years to emphasize for service. In an effort to catch students early, grade 2 might also be considered (grade 3 results do not look positive, which could relate to the heavy testing load at that grade).

In terms of level of use, while students participating in Fast ForWord do show gains in targeted foundation skills, translation of these gains into measurable and meaningful growth on such critical tests as the End-of-Grade test may require either more time in the Fast ForWord program or intervention of a different nature. Benefits of Fast ForWord must be balanced against classroom instruction missed. Results suggest most elementary students need only one level, while most middle school students may need two. Criteria may need to be refined regarding who

might need two levels. Follow-up after Fast ForWord to build on skills learned, focused on reading comprehension and higher level skills, is also critical. This might be provided in the classroom, through the Accelerated Learning Program outside of school hours, or as an elective. Central literacy staff should provide some guidance to schools on appropriate follow-up.

Some changes have already been adopted for the current school year. For the 2004-05 school year schools may elect to provide Fast ForWord instruction 5 days per week in 100-minute, 75-minute, or 50-minutes blocks (or a combination thereof). The 100 and 75-minute protocols require 9 weeks of instruction whereas the 50-minute protocol is an 18-week program. Additionally, all students who go through the program are being pre and post tested using the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3) Recalling Sentences subtest and the Phonological Awareness computerized assessment from the software program *Fast ForWord Basics*. Lastly, the companion software program *Fast ForWord Basics* is being used at all Fast ForWord elementary school sites. Fast ForWord Basics targets age 4-7 year olds and develops foundational literacy skills that should be mastered by age 7. Basics is being used in 3 ways: First, all students are required to be tested using a computerized test from this program. Secondly, Basics is being used as an intervention tool for those students who are struggling with certain aspects of the Fast ForWord Language (Level I) program. Thirdly, Basics is being used an intervention/supplement for students in the Kindergarten and First grade classrooms whom are struggling with Phonemic Awareness, Following Directions or Letter Knowledge.

In addition to these changes, given the findings and recommendations of this report, any further research of WCPSS's Fast ForWord program should be driven by the refined goal statement about the program.

REFERENCES

Lister, Henry A. & Painter, J. (2002). *Fast ForWord School Pilot: Benefits to Students and Analysis of Changes in Foundational Literacy Skills, 2001-2002* (Henry A. Lister & Assoc). Chapel Hill, NC

Scientific Learning Corporation. (2004). *Improved Language Skills by Children with Low Reading Performance Who Used Fast ForWord Language.* (Scientific Learning Corporation Product Report 3(1)1:13). http://www.scilearn.com/results/science/main=home/rd

Overbay, A. & Baenen, N. (2002). *Fast ForWord Evaluation, 2002-03* (Evaluation and Research, Report No. 03.24). Raleigh, NC: Wake County Public School System. http://www.wcpss.net/evaluation-research/reports/2003/0324fastforward2003.pdf

Appendix A

Language Takes Us Everywhere™

Teacher Observation Rating Scale (TOS)

Student Name_____   NC Wise #_____

School_____   Grade____   Teacher_____
                                                                  (who completed the form)

Does this student have difficulty:	Yes	No	If yes, please rate frequency of difficulty by circling.
1. discriminating sounds in words? *(e.g. during spelling or writing)*	❑	❑	Sometimes------Often ------Always
2. in phonemic awareness? *(i.e. manipulating sounds in words)*	❑	❑	Sometimes------Often ------Always
3. following oral directions?	❑	❑	Sometimes------Often ------Always
4. comprehending words/verbal concepts for age/grade level?	❑	❑	Sometimes------Often ------Always
5. verbally expressing thoughts?	❑	❑	Sometimes------Often ------Always
6. remembering what is said?	❑	❑	Sometimes------Often ------Always
7. sequencing sounds, words, events or sentences?	❑	❑	Sometimes------Often ------Always
8. Pronouncing unknown words? *(i.e. decoding, word attack skills)*	❑	❑	Sometimes------Often ------Always
9. Understanding what they read?	❑	❑	Sometimes------Often ------Always

PRIMARY Reason for Referral: Please check only **ONE** item below:

❑ Reading Decoding Difficulty
❑ Reading Comprehension Difficulty
❑ Spelling Difficulty
❑ Auditory Discrimination Difficulty (e.g. hearing vowel differences)
❑ Difficulty Listening/Follow Directions
❑ LEP/ESL
❑ Other_____

Appendix B

Comparison of EOG Performance and Gains Between
All Fast ForWord Participants and Comparison Sample by Grade

		Reading EOG			Math EOG		
		n	Mean	SD	n	Mean	SD
Performance Score							
Grade 3	FF	360	231.97	7.78	360	233.68	6.83
	Non-FF	163	234.25*	8.33	163	235.00	6.42
Grade 4	FF	330	241.54	7.62	330	249.81	5.55
	Non-FF	113	243.39	7.87	113	251.17*	5.30
Grade 5	FF	250	246.11	7.32	250	254.46	6.39
	Non-FF	126	249.11*	7.55	126	256.48*	6.26
Grade 6	FF	100	249.50	6.14	100	254.24	6.97
	Non-FF	50	250.38	8.78	50	256.20	10.54
Grade 7	FF	147	249.68	6.55	147	257.55	6.40
	Non-FF	72	252.96*	11.20	72	260.72	11.75
Grade 8	FF	112	250.92	6.88	112	257.55	6.98
	Non-FF	66	255.33*	11.93	66	262.15*	12.40
Gain Score							
Grade 3	FF	360	9.99	7.09	360	16.36	4.97
	Non-FF	163	11.10	7.73	163	16.42	5.52
Grade 4	FF	330	4.96	6.46	330	5.27	4.31
	Non-FF	113	5.66	6.49	113	4.82	4.11
Grade 5	FF	250	6.35	6.00	250	3.87	4.70
	Non-FF	126	5.24	5.83	126	3.90	5.01
Grade 6	FF	100	1.49	5.95	100	3.23	5.24
	Non-FF	50	0.90	5.84	50	2.36	4.70
Grade 7	FF	147	4.17	6.02	147	3.05	5.52
	Non-FF	72	2.74	6.65	72	1.96	6.37
Grade 8	FF	112	4.19	6.29	112	4.56	5.35
	Non-FF	66	3.44	6.67	66	3.23	5.10

*Indicates independent samples t-test was statistically significant at alpha = .03 level