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FAST FORWARD EVALUATION, 2002-03

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Abstract

The 2001-02 evaluation of Fast ForWord established that participants experienced short-term gains in language and reading skills, as measured by the Woodcock Diagnostic Reading Battery. EOG results also indicated that participants made significant gains in reading achievement. This evaluation examined the reading achievement of 2002-03 Fast ForWord participants relative to a comparison group, and investigated factors that predict success on reading EOG tests. Results for 2002-03 participants indicate that participants made significant gains on EOGs, but that their achievement growth pattern was not significantly different than that of matched non-participants. The short and long versions of the Teacher Observation Survey (TOS) predicted success equally well, and no demographic characteristics predicted success consistently. Thus, no simple means of selecting the most appropriate participants were identified.

SUMMARY

Fast ForWord is a computer-based program designed to improve students' auditory processing and language skills. Several findings emerged from the 2002-03 evaluation:

- As was the case in 2001-02, the program enrolled proportionally more male, special education, free or reduced-price lunch (FRL), and black students, relative to Wake County Public School System (WCPSS) overall.
- The majority of participants who enrolled in the program scored at Level III or IV on both End of Grade (EOG) pretests and posttests, with the largest absolute gains in the percentage of students at or above grade leveling between 2001-02 and 2002-03 occurring in Grade 7.
- Participants made significant gains in reading EOG scores at all grades except grade 6. However, participants' post EOG scores were not significantly different than those of matched students.
- The short and long versions of the Teacher Observational Survey (TOS) were associated with similar proportions of the variance in participants' reading EOG scores.
- No variable except EOG reading pretest was consistently significant as associated with participant reading posttest achievement.

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FAST FORWARD EVALUATION, 2002-03

OVERVIEW

The Fast ForWord program is designed to improve the auditory processing and language skills of students with language-learning impairments. The Scientific Learning Corporation developed this computer-based program. It is based on research on brain plasticity that indicates the brain never ceases to learn. The program is designed to improve auditory processing speed, working memory, serial order processing, phonological awareness, listening comprehension, syntax, and morphology. In addition to these direct benefits, WCPSS hoped that the building of these foundational skills could lead to increased reading achievement for those served.

In 2002-03, 10 schools (6 elementary and 4 middle schools) participated in the Fast ForWord program. A previous evaluation of this program in WCPSS (Lister et al, 2002) indicated that Fast ForWord participants experienced significant gains in foundational reading skills after 100 hours of instruction, as measured by specific subsets of the Woodcock Diagnostic Reading Battery. Further, participants scored significantly higher on reading EOG posttests from spring 2002 as compared to spring 2001. Gains shown were greater than those shown for WCPSS students overall. However, the Lister evaluation did not compare the results for Fast ForWord participants to the results for similar non-participants.

The current study was designed to examine the effects of participation on long-term learning, as measured by reading EOG scores, and provide more information about factors associated with participant success. The following discussion focuses on demographic and outcome data for participants, and includes a comparison of achievement results for participants and matched students.

FAST FORWARD PARTICIPANT CHARACTERISTICS

Overall, 616 students participated in Fast ForWord in 2002-03. The number of students enrolled ranged from 7 at grade 1 to 142 at grade 7. Seventh-grade students represented the largest percentage of the Fast ForWord participant population (23%), while 1st-grade students represented the smallest segment of this group (1%).

Figure 1
Distribution of 2002-03 Fast ForWord Participants, by Grade
(N=616)

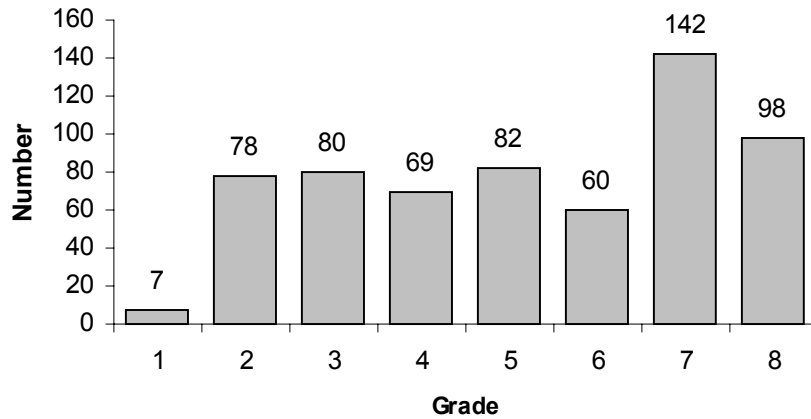


Figure 2 compares the demographic characteristics of Fast ForWord participants to the demographics of WCPSS students overall. As was the case in 2001-2002, the 2002-03 Fast ForWord program enrolled proportionally more special education, Black/African-American, and FRL students, compared to WCPSS overall. Compared to WCPSS overall, slightly more male and Hispanic students were also included. Attachment 1 includes a breakdown of Fast ForWord participant demographics by grade.

Figure 2
Demographics of 2003-03 Fast ForWord Participants (N=616),
Compared to WCPSS (N=104,725)

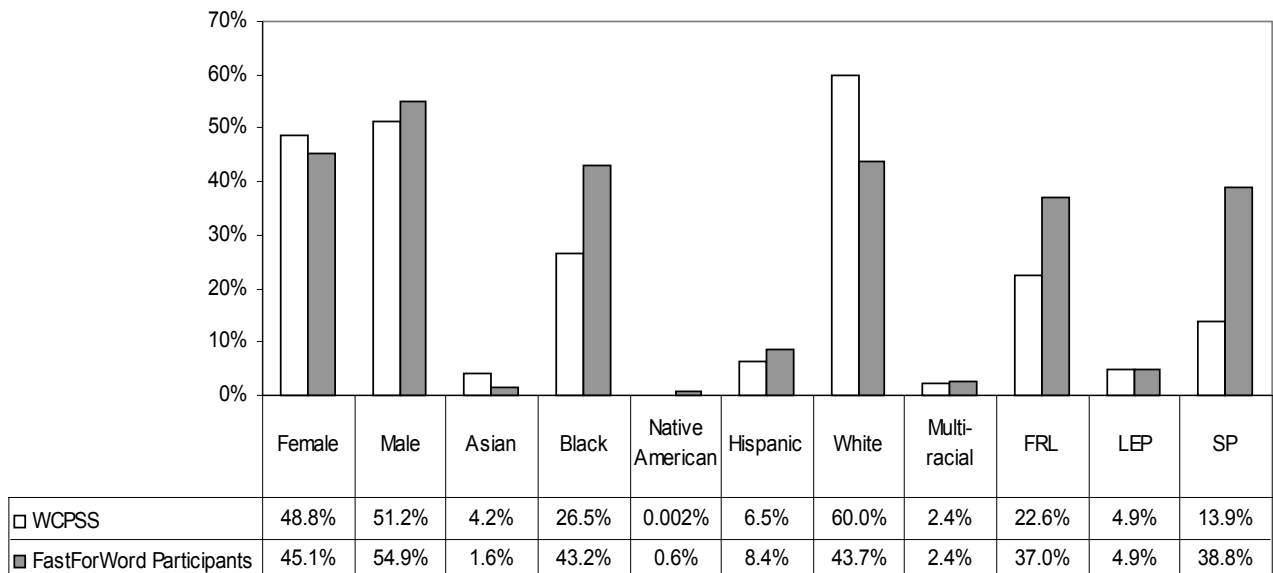


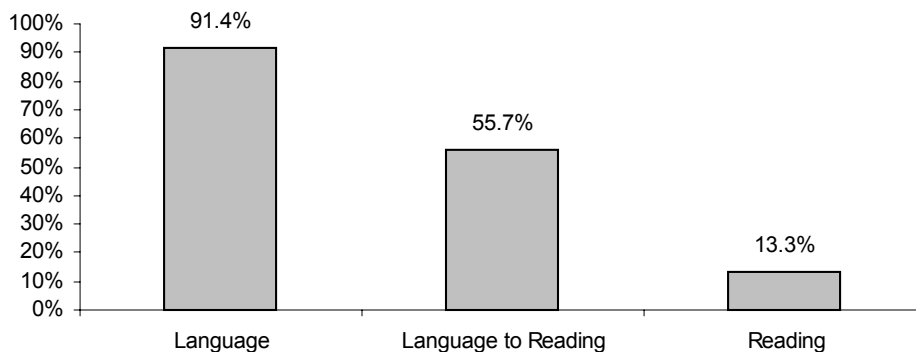
Figure 3 illustrates the by-grade breakdown of pre and post reading EOG levels of Fast ForWord participants, compared to the averages for WCPSS as a whole. Overall, EOG levels for Fast ForWord participants were lower than the average for other students, as might be expected from the fact that the program enrolls students who have difficulty with language processing. However, prior to enrolling in Fast ForWord, the majority of participants at grades 3, 4, 5 and 8 scored at Level III or IV on their reading EOG pretest. The most dramatic increase in the percentage of participants at or above grade level occurred in grade 7, where the percentage of students at or above grade level increased from 15.3% to 60.4%. At grades 6 and 8, the percentage of participants scoring at or above grade level declined, in absolute terms.

Figure 3
2002-03 Reading EOG Levels for Fast ForWord Participants and WCPSS

Reading EOG Level	Group	EOG	3	4	5	6	7	8
Level I or II	Participants	Pre	46.2%	31.9%	32.2%	61.0%	84.6%	11.5%
		Post	27.6%	24.6%	12.5%	65.5%	39.6%	32.1%
	WCPSS	Pre	24.7%	22.0%	22.7%	20.3%	26.0%	22.0%
		Post	11.1%	10.1%	6.5%	14.6%	12.2%	7.8%
Level III or IV	Participants	Pre	53.8%	68.1%	67.9%	39.0%	15.3%	88.5%
		Post	69.7%	75.4%	87.5%	34.5%	60.4%	67.9%
	WCPSS	Pre	75.3%	78.0%	77.3%	79.7%	74.0%	78.0%
		Post	88.9%	89.9%	93.5%	85.4%	87.8%	92.2%

The Fast ForWord program comprises three sequential levels of language and reading intervention: “Language,” “Language to Reading,” and “Reading.” As Figure 4 illustrates, most Fast ForWord participants enrolled in the “Language” segment of the program. The majority of participants (60%) enrolled in more than one level of the program in 2002-03. The 8.6% of participants who did not enroll in the Language component in 2002-03 may have completed this segment in 2001-2002.

Figure 4
2002-03 Fast ForWord Program Participation
(N=616)



2002-03 EVALUATION QUESTIONS

The evaluation of 2002-03 outcomes posed three major questions:

1. Compared to students with similar demographic characteristics and prior achievement in non-participating schools, did 2002-03 Fast ForWord participants perform significantly better on EOG reading and mathematics tests?
2. Which version (long or short) of the TOS provides a better predictor of success in the Fast ForWord program, as measured by EOG scores?
3. What specific demographic factor(s) have the strongest predictive association with success in the Fast ForWord program, as measured by EOG outcomes?

The first of these three questions was intended to establish whether participating in the Fast ForWord program made a measurable difference in participants' long-term achievement. The second and third questions were designed to uncover ways of selecting the most appropriate candidates for Fast ForWord participation in 2003-2004.

RESULTS OF 2002-03 FAST FORWARD EVALUATION

Question 1: Compared to students with similar demographic characteristics and prior achievement in non-participating schools, did 2002-03 Fast ForWord participants perform significantly better on EOG reading tests?

The previous evaluation of Fast ForWord in WCPSS (Lister et al, 2002) found that the 2001-02 Fast ForWord participants experienced significant short-term gains in foundational reading and language processing skills, as measured by the Woodcock Diagnostic Reading Battery, as well as significant gains in their reading EOG scale scores. However, scale scores on the EOG are developmental in nature, so growth is expected. While it was encouraging that gains for Fast ForWord students were greater than those seen in WCPSS overall, this study lacked a comparison group. It was therefore not possible to determine how the performance of Fast ForWord participants was different from the performance of other students with similar characteristics.

To address this issue, Fast ForWord participants in 2002-03 were matched with students from non-Fast ForWord sites. These matches were based on the following criteria: grade, race, Limited English Proficiency (LEP) status, specific Special Programs (SP) code, FRL status, and reading EOG pretest scores. Of the 616 program participants, 426 were matched with similar students.¹ The following discussion examines the results of by-grade comparisons of program participants and their matches.

¹ The number of students matched was based on the total number of participants minus participants who were missing either pre or posttest scores.

READING EOG SCORES

Figure 5 shows the difference between pre and post reading EOG scores for Fast ForWord participants, by grade. Analyses of variance (ANOVAs) revealed that at every grade except grade 6, Fast ForWord participants experienced statistically significant gains in their reading EOG scores. This pattern mirrors historical trends in EOG performance among WCPSS students. The most significant increase occurred for 7th-grade participants, and the largest increases, in absolute terms, occurred for 3rd- and 5th-grade participants. The pre-post differences for WCPSS students are also shown (based on ABC's data for students with scores both in spring 2002 and 2003) for context. While Fast ForWord students started and ended with scores below the WCPSS average, Fast ForWord student gains exceeded district averages at most grades (3, 5, 6, 7, 8). The most substantial differences were at grades 5, 7, and 8.

Figure 5
2002-03 Reading EOG Scores for Fast ForWord Participants, by Grade

Grade	Number	Mean pre	Mean post	Difference	F Ratio	Prob > F	WCPSS Diff.
3	71	233.87	243.20	9.32	51.14	<.0001	8.6
4	57	144.53	148.39	3.86	7.81	<.0061	4.3
5	74	147.38	156.07	8.69	87.45	<.0001	5.5*
6	39	148.62	149.80	1.18	0.54	<.4665	1.0
7	112	147.93	155.70	7.77	111.05	<.0001	3.4*
8	73	151.75	157.70	5.95	50.22	<.0001	2.7*

Results for Participants and Matched Students

While comparisons of gains of Fast ForWord students to all WCPSS students look positive, a truer test of program value is to compare progress to students with similar characteristics. Figure 6 illustrates the results of comparisons of EOG post-reading scores for Fast ForWord participants and matched students. Results of grade-level ANOVAs show no significant differences between the reading EOG post scores of Fast ForWord participants and students who were matched on grade, reading pretest, race, FRL, special education code, and LEP status. At grade 5, Fast ForWord participants scored higher than matched students. At the other grade levels, the average post score for comparison students in absolute terms was higher than for participants. Again, none of these differences was significant at the $\alpha=.05$ level of significance.

Figure 6
2002-03 Post Scores for Fast ForWord Participants
Compared to Matched Students

Grade	Group	Number	Mean Pre	Mean Post	Difference between FFW and Non-FFW (Post)	F Ratio	Prob > F
3	Non-FFW	71	233.87	245.94	-2.75	3.61	0.06
	FFW	71	233.87	243.20			
4	Non-FFW	57	144.53	150.90	-2.51	3.48	0.06
	FFW	57	144.53	148.39			
5	Non-FFW	74	147.38	155.76	0.31	0.14	0.71
	FFW	74	147.38	156.07			
6	Non-FFW	39	148.62	151.59	-1.80	1.07	0.30
	FFW	39	148.62	149.80			
7	Non-FFW	112	147.93	156.86	-1.16	1.83	0.18
	FFW	112	147.93	155.70			
8	Non-FFW	73	151.75	158.18	-0.48	0.24	0.62
	FFW	73	151.75	157.70			

These results provide some evidence that Fast ForWord may not be as effective in producing long-term gains in reading achievement as it is in improving students' foundation skills in auditory processing. However, it is too early to draw the conclusion for three primary reasons:

- 1) It may take some time for students' improved auditory skills to impact higher level reading comprehension skills, which is the focus of the EOG test.
- 2) The matching program analysis, while it matched on a number of characteristics, still had limitations. Matching individual students on the same special education code, for example, did not preclude inexact matches, e.g., students with learning disabilities in *math* may have been matched with participants who have learning disabilities in *language*, and it was not possible to control for this contingency. Further, this study did not control for the additional interventions matched students may have received. Additionally, this study did not account for school level issues, such as the percent of FRL at the schools represented.
- 3) Finally, an important limitation of these analyses pertained to the small size of the groups being compared; larger sample sizes may have made it easier to detect significance in these outcomes.

Question 2: Which version (long or short) of the Teacher Observational Survey (TOS) provides a better predictor of success in the Fast ForWord program, as measured by EOG scores?

In the 2002-03 school year, TOS forms were used as one factor in identifying appropriate participants. These forms include questions about students' reading and language processing skills, and allow teachers to describe the frequency with which students manifest difficulties with these skills. Two versions of this form exist, and one of the goals of this study was to determine

which of these forms provided a better predictor of long-term participant performance, as measured by reading EOG scores.

To answer this question, two different regression models were constructed using standard least squares regression techniques. In the first model, scores from the short TOS form were used to predict reading EOG post scores. In the second model, scores from the long TOS form were used to predict reading EOG post scores.²

As Figure 7 shows, the amount of variance in reading EOG post scores predicted by either form was very similar: the short TOS form was associated with 9.2% of the variation in EOG scores, while the long TOS form was associated with about 9.4% of the variation in EOG scores. Therefore, these forms perform about equally well in predicting participants' performance on end of year exams.

Figure 7
Long and Short Teacher Observational Surveys
as Predictors of Reading EOG Post Scores

Model	Number	RSquare Adj	Intercept	Parameter Estimate	F-Ratio	Prob > F
Short TOS	338	0.092	262.89	-0.49	35.29	<.0001
Long TOS	156	0.094	260.42	-0.28	16.79	<.0001

Question 3: What specific demographic factor(s) have the strongest predictive association with success in the Fast ForWord program, as measured by EOG outcomes?

The third research question, like the second, was intended to provide information to assist in the participant selection process. The factors that best predict long-term participant success may be of interest to staff involved in choosing the most appropriate participants.

To address the third research question, a number of factors were used to predict post reading EOG scores for Fast ForWord participants. These factors included race (White/Non-white), LEP status (LEP/nonLEP), special programs status (SP/non SP), gender, and FRL status.³ The number of Fast ForWord programs completed was included as an additional factor. These analyses were performed separately for each grade level. First, all variables were entered into the model using standard least squares regression to find the parameter estimates for the full model, and then forward stepwise regression was used to identify the most statistically significant variables. Next, the factors identified as significant at the $p=.15$ level of significance by the stepwise procedure were tested again using standard least squares regression. Factors that contributed significantly to the model (F-test yielded a value greater than 2) were kept, and their coefficients are illustrated in Figure 7. Attachment 2 provides the full regression results for each grade.

² Only students with available post reading EOG scores were included in these models.

³ Race was treated as a single categorical variable (white/Non-white) due to the small group size in several grades.

Overall, across-grade comparisons reveal that no variable except reading pretest score had a consistently significant predictive association with reading EOG post-score. At the same time, several variables, including FRL, Special Education, Non-white, gender (female) and LEP emerged as marginally significant predictors of achievement at different grade levels. Two of these factors, FRL status and special education, were marginally significant at four different grade levels.

As Figure 8 shows, the effect of these variables differed by grade; for example, 6th grade FRL participants scored higher on the reading EOG posttest than their Not FRL counterparts, but the opposite occurred in grades 4, 5, and 7. Similarly, 4th grade participants enrolled in special education outperformed their non-special education peers, but this variable had a negative effect in grades 6, 7, and 8.

Figure 8
Predictors of Reading EOG Scores, by Grade

Grade	Number	Coefficients for Variables in Restricted Model					
		Pretest	FRL	SP	Non-white	Female	LEP
3	73	0.49**					
4	57	0.76**	-1.30	1.25		1.53*	
5	74	0.47**	-1.22*				
6	41	0.69**	2.30	-2.26*	-4.05**		
7	112	0.51**	-0.95	-0.95			
8	73	0.87**		-1.19	-1.11		-3.54*

Note: Each variable in Figure 8 is significant at the $p < .15$ level of significance; shaded cells indicate that a variable did not meet this criterion for entry into the model.

*variable is significant at $p < .05$ level of significance.

**variable is significant at $p < .01$ level of significance.

Again, the small group size for each grade made it more difficult to determine the influence of various factors. For example, the effect of LEP status was difficult to gauge, given that only 4.9% of students in the entire Fast ForWord population were designated as LEP, and no 4th- or 5th-grade LEP students had available EOG scores. At the same time, these results suggest that none of the demographic characteristics included as factors in these analyses consistently predict success in the Fast ForWord program.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions that can be drawn at this point are presented in the summary at the beginning of the report. In terms of the more indirect goal of improved long-term impact on reading achievement, the tighter comparison of Fast ForWord to matched comparison students did not reveal a significant advantage for participation in Fast ForWord. However, before drawing final conclusions about the overall value of the Fast ForWord program for WCPSS, further research should be conducted. In particular, future evaluations could:

- Use a true control group to compare student progress. This would require either identifying a pool of students within Fast ForWord schools and randomly choosing half to serve, or identifying students in schools who are not participating that meet the eligibility criteria. This would provide the best test of program effectiveness.
- Create more precise matches for a matched group analysis if a control group is not feasible. Although the comparison group used in this evaluation was matched exactly on several characteristics, including reading pretest, some potentially important factors were not considered in constructing this group. Because the Fast ForWord program targets students with problems in language processing and/or reading, comparing them to students who may not have these problems may bias results. Participation in other programs should also be considered in the matching process as feasible.
- Track the performance of participants over multiple years. The reading achievement of 2001-02 and 2002-03 participants should be measured longitudinally, to determine if the benefits of Fast ForWord emerge more clearly as participants are required to master new materials and skills.

REFERENCES

Lister, H., & Painter, J. (2002). *Fast ForWord School Pilot: Benefits to Students and Analysis of Changes in Foundational Literacy Skills*. Raleigh, NC: Wake County Public School System, Dept. of Evaluation and Research, Report No. 02.19.

The Davis Center. *Fast ForWord Series*. <http://www.thedaviscenter.com/therapies/fast4word.htm>.

Attachment 1**Fast ForWord Participant Demographics, By Grade**

Grade	Number	Female	Male	Asian	Black	Native American	Hispanic	White	Multi-racial	FRL	LEP	SP
1	7	0.0%	100.0%	0.0%	28.9%	0.0%	0.0%	71.4%	0.0%	28.9%	0.0%	42.9%
2	78	46.2%	53.8%	3.8%	19.2%	0.0%	5.1%	66.7%	5.1%	23.1%	3.8%	21.8%
3	80	30.0%	70.0%	1.3%	35.0%	2.5%	11.3%	47.5%	2.5%	35.0%	6.3%	37.5%
4	69	50.7%	49.3%	1.4%	30.4%	0.0%	5.8%	55.2%	7.2%	28.9%	4.3%	40.6%
5	82	50.0%	50.0%	2.4%	42.7%	1.2%	4.9%	47.6%	1.2%	39.0%	1.2%	39.0%
6	60	51.7%	48.3%	1.7%	51.7%	1.7%	13.3%	28.3%	3.3%	43.3%	8.3%	66.7%
7	142	45.1%	54.9%	0.0%	55.6%	0.0%	11.3%	32.4%	0.7%	47.2%	4.9%	33.1%
8	98	48.0%	52.0%	2.0%	56.1%	0.0%	7.1%	34.7%	0.0%	35.7%	6.1%	42.9%

Attachment 2

Reading EOG Regression Results: Grade 3

Parameter Estimates for Full Model: Readpost (N=73) Regressed on Readpre, FRL, Sex, LEP, White/Non-white, SP/Non-SP, and Number of Programs

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	137.98223	24.83676	5.56	<.0001
ReadPre	0.4470715	0.107851	4.15	0.0001
Not FRL [0]	0.9266959	1.290781	0.72	0.4754
FRL [1]	-0.926696	1.290781	-0.72	0.4754
Female [0]	0.5040905	0.981053	0.51	0.6091
Male [1]	-0.504091	0.981053	-0.51	0.6091
Non-LEP [0]	-1.509018	2.130245	-0.71	0.4812
LEP [1]	1.5090178	2.130245	0.71	0.4812
White [0]	0.5668942	1.279846	0.44	0.6593
Non-white [1]	-0.566894	1.279846	-0.44	0.6593
Non-SP [0]	0.6873199	0.908007	0.76	0.4518
SP [1]	-0.68732	0.908007	-0.76	0.4518
Number of Programs	1.4023078	1.898784	0.74	0.4629

Attributes of Restricted Model (Readpost regressed on Readpre)

Summary of Fit

RSquare	0.245336
RSquare Adj	0.234707
Root Mean Square Error	6.718463
Mean of Response	243.137
Observations (or Sum Wgts)	73

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1041.8503	1041.85	23.0816
Error	71	3204.7798	45.14	Prob > F
C. Total	72	4246.6301		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	129.01715	23.76656	5.43	<.0001
ReadPre	0.4883778	0.101654	4.80	<.0001

Reading EOG Regression Results: Grade 4

Parameter Estimates for Full Model: Readpost (N=57)

Regressed on Readpre, FRL, Sex, White/Non-white, SP/Non-SP, and Number of Programs

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	35.727805	14.18069	2.52	0.0150
ReadPre	0.7747836	0.098925	7.83	<.0001
Not FRL [0]	1.6173677	0.893757	1.81	0.0764
FRL [1]	-1.617368	0.893757	-1.81	0.0764
Female [0]	1.4260878	0.715413	1.99	0.0517
Male [1]	-1.426088	0.715413	-1.99	0.0517
White [0]	-0.731254	0.84127	-0.87	0.3889
Non-white [1]	0.7312541	0.84127	0.87	0.3889
Non-SP [0]	-1.475083	0.756864	-1.95	0.0569
SP [1]	1.4750829	0.756864	1.95	0.0569
Number of Programs	0.0414124	1.654368	0.03	0.9801

Note: there were no LEP participants in Grade 4 with available EOG scores.

Attributes of Restricted Model

(Readpost regressed on Readpre, Sex, and FRL, and SP/Non-SP)

Summary of Fit

RSquare	0.58094
RSquare Adj	0.548705
Root Mean Square Error	5.074653
Mean of Response	148.386
Observations (or Sum Wgts)	57

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	1856.3996	464.100	18.0218
Error	52	1339.1092	25.752	Prob > F
C. Total	56	3195.5088		<.0001

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	38.094932	13.74703	2.77	0.0077
ReadPre	0.7586472	0.095269	7.96	<.0001
Female	1.533605	0.693606	2.21	0.0315
Male	-1.533605	0.693606	-2.21	0.0315
Not FRL	1.3045888	0.80642	1.62	0.1118
FRL	-1.304589	0.80642	-1.62	0.1118
Non-SP	-1.25074	0.701691	-1.78	0.0805
SP	1.2507405	0.701691	1.78	0.0805

Reading EOG Regression Results: Grade 5

Parameter Estimates for Full Model: Readpost (N=74) Regressed on Readpre, FRL, Sex, LEP, White/Non-white, SP/Non-SP, and Number of Programs

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	86.712924	11.95808	7.25	<.0001
ReadPre	0.4869276	0.080874	6.02	<.0001
Not FRL [0]	0.789362	0.593832	1.33	0.1883
FRL [1]	-0.789362	0.593832	-1.33	0.1883
Female [0]	0.514923	0.491284	1.05	0.2984
Male [1]	-0.514923	0.491284	-1.05	0.2984
White [0]	0.4654654	0.590398	0.79	0.4332
Non-white [1]	-0.465465	0.590398	-0.79	0.4332
Non-SP [0]	0.2564292	0.509012	0.50	0.6161
SP [1]	-0.256429	0.509012	-0.50	0.6161
Number of Programs	-1.549189	1.01094	-1.53	0.1301

Note: There were no LEP participants in grade 5 with available EOG scores.

Attributes of Restricted Model (Readpost regressed on Readpre and FRL/Not FRL)

Summary of Fit

RSquare	0.435939
RSquare Adj	0.42005
Root Mean Square Error	3.944698
Mean of Response	156.0676
Observations (or Sum Wgts)	74

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	853.8565	426.928	27.4364
Error	71	1104.8057	15.561	Prob > F
C. Total	73	1958.6622		<.0001

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	86.228566	11.63976	7.41	<.0001
ReadPre	0.4723074	0.079093	5.97	<.0001
Not FRL	1.2215051	0.487025	2.51	0.0144
FRL	-1.221505	0.487025	-2.51	0.0144

Reading EOG Regression Results: Grade 6

Parameter Estimates for Full Model: Readpost (N=41) Regressed on Readpre, FRL, Sex, LEP, White/Non-white, SP/Non-SP, and Number of Programs

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	51.182494	20.37803	2.51	0.0171
ReadPre	0.6609187	0.137492	4.81	<.0001
Not FRL [0]	-2.460032	1.24105	-1.98	0.0558
FRL [1]	2.4600317	1.24105	1.98	0.0558
Female [0]	-0.927306	0.95232	-0.97	0.3373
Male [1]	0.9273064	0.95232	0.97	0.3373
Non-LEP [0]	4.2708489	1.380882	3.09	0.0040
LEP [1]	-4.270849	1.380882	-3.09	0.0040
White [0]	2.8009719	1.16664	2.40	0.0222
Non-white [1]	-2.800972	1.16664	-2.40	0.0222
Non-SP [0]	3.491017	2.34857	1.49	0.1467
SP [1]	-3.491017	2.34857	-1.49	0.1467
Number of Programs	-0.154802	1.069731	-0.14	0.8858

Attributes of Restricted Model (Readpost regressed on Readpre, FRL/Not FRL, White/Non-white and SP/Non-SP)

Summary of Fit

RSquare	0.532451
RSquare Adj	0.480502
Root Mean Square Error	5.467538
Mean of Response	149.6098
Observations (or Sum Wgts)	41

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	1225.5733	306.393	10.2493
Error	36	1076.1828	29.894	Prob > F
C. Total	40	2301.7561		<.0001

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	48.706874	18.87769	2.58	0.0141
ReadPre	0.6951038	0.128199	5.42	<.0001
Not FRL	-2.297815	1.202276	-1.91	0.0640
FRL	2.2978152	1.202276	1.91	0.0640
White	4.0544772	1.359241	2.98	0.0051
Non-white	-4.054477	1.359241	-2.98	0.0051
Non-SP	2.2561035	1.087296	2.07	0.0452
SP	-2.256103	1.087296	-2.07	0.0452

Reading EOG Regression Results: Grade 7

Parameter Estimates for Full Model: Readpost (N=116) Regressed on Readpre, FRL, Sex, LEP, White/Non-white, SP/Non-SP, and Number of Programs

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	82.017826	17.49363	4.69	<.0001
ReadPre	0.5013847	0.116892	4.29	<.0001
Not FRL [0]	0.74388	0.611514	1.22	0.2265
FRL [1]	-0.74388	0.611514	-1.22	0.2265
Female [0]	-0.324972	0.573552	-0.57	0.5722
Male [1]	0.3249716	0.573552	0.57	0.5722
Non-LEP [0]	-0.215577	2.057755	-0.10	0.9168
LEP [1]	0.2155766	2.057755	0.10	0.9168
White [0]	0.3351117	0.678637	0.49	0.6224
Non-white [1]	-0.335112	0.678637	-0.49	0.6224
Non-SP [0]	1.0677296	0.607792	1.76	0.0818
SP [1]	-1.06773	0.607792	-1.76	0.0818
Number of Programs	-0.29967	0.720082	-0.42	0.6781

Attributes of Restricted Model (Readpost regressed on Readpre, FRL/Not FRL, and SP/Non-SP)

Summary of Fit

RSquare	0.187604
RSquare Adj	0.165844
Root Mean Square Error	5.585104
Mean of Response	155.8017
Observations (or Sum Wgts)	116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	806.7804	268.927	8.6213
Error	112	3493.6593	31.193	Prob > F
C. Total	115	4300.4397		<.0001

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	80.329433	17.00582	4.72	<.0001
ReadPre	0.5073127	0.114562	4.43	<.0001
Non-SP	0.9785024	0.588293	1.66	0.0991
SP	-0.978502	0.588293	-1.66	0.0991
Not FRL	0.9486392	0.523783	1.81	0.0728
FRL	-0.948639	0.523783	-1.81	0.0728

Reading EOG Regression Results: Grade 8

Parameter Estimates for Full Model: Readpost (N=74) Regressed on Readpre, FRL, Sex, LEP, White/Non-white, SP/Non-SP, and Number of Programs

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	29.540075	23.67301	1.25	0.2165
ReadPre	0.840066	0.152443	5.51	<.0001
Not FRL [0]	0.2080403	0.627287	0.33	0.7412
FRL [1]	-0.20804	0.627287	-0.33	0.7412
Female [0]	0.1413391	0.610134	0.23	0.8175
Male [1]	-0.141339	0.610134	-0.23	0.8175
Non-LEP [0]	3.2431042	1.561626	2.08	0.0417
LEP [1]	-3.243104	1.561626	-2.08	0.0417
White [0]	1.0016983	0.651274	1.54	0.1288
Non-white [1]	-1.001698	0.651274	-1.54	0.1288
Non-SP [0]	1.0701717	0.621491	1.72	0.0898
SP [1]	-1.070172	0.621491	-1.72	0.0898
Number of Programs	-1.134174	0.836061	-1.36	0.1795

Attributes of Restricted Model (Readpost regressed on Readpre, LEP, White/Non-white, and SP/Non-SP)

Summary of Fit

RSquare	0.383786
RSquare Adj	0.348063
Root Mean Square Error	4.855007
Mean of Response	157.8108
Observations (or Sum Wgts)	74

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	1012.9458	253.236	10.7435
Error	69	1626.4056	23.571	Prob > F
C. Total	73	2639.3514		<.0001

Expanded Estimates

Nominal factors expanded to all levels

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	22.743462	22.65453	1.00	0.3189
ReadPre	0.8689809	0.147244	5.90	<.0001
Non-LEP	3.5423174	1.475225	2.40	0.0190
LEP	-3.542317	1.475225	-2.40	0.0190
White	1.1050825	0.606477	1.82	0.0728
Non-white	-1.105083	0.606477	-1.82	0.0728
Non-SP	1.18551	0.602493	1.97	0.0531
SP	-1.18551	0.602493	-1.97	0.0531