



Center for Research in Educational Policy

The University of Memphis
325 Browning Hall
Memphis, Tennessee 38152
Toll Free: 1-866-670-6147

Supplemental Educational Services

in the State of Tennessee:

2007 – 2008

Student Achievement Results





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Prepared by
SAS[®] EVAAS[®]

for the
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Policy

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Supplemental Educational Services in Tennessee: 2007-2008 Student Achievement Analyses

Purpose and General Methodology

The purpose of the evaluation plan for Supplemental Educational Services (SES) in the state of Tennessee was to assess the effectiveness of SES providers while accounting for the actual classroom learning effect. To accomplish this, the current (2008) Tennessee Comprehensive Assessment Program (TCAP) scale score in Math and Reading/Language Arts (R/LA) (measured in state NCE units) was analyzed as a function of a student's predicted score (based on two years of previous test scores), the student's grade level, the service provider, and the teacher. In this way, influences of these variables that might obscure the effects of the treatment (i.e., SES tutoring) were controlled statistically. An overall tutoring effect was also determined by comparing the TCAP scores of all tutored students (regardless of provider) vs. non-tutored (control) students using the analytical models described below. Because analysis models used relied on predicted scores (i.e., scores adjusted for prior achievement), only data from grades 4-8 could be modeled; that is, grades earlier than grade 4 have no predictor scores available. The model also restricted the analysis to students (a) having teacher linkages where there is a primary teacher of record with a "claim percentage" (i.e., responsibility) for at least 50% of the student's allocated instruction in the tested subjects (b) having predicted scores (some students may not have sufficient prior scores to provide a predicted score), and (c) receiving tutoring from a provider with at least 10 students analyzed in grades 4-8. The requirement of a minimum of 10 students total (i.e., across all school districts) was to ensure that a sufficient number of students were in the analysis so as to provide a reliable estimate for a provider. Although there were data from relatively small student samples in grades 9-12, only students in grades 4-8 were included in the present analyses.

According to the CREP SES Report Guidelines (8-01-08), parameters were used for selecting SES students to be included in the analysis and SES providers to be included in the student achievement evaluation. The parameters for students excluded all students who had completed less than 50% of their contracted hours or completed more than 100% of their contracted hours, were special education (SPED) or limited English proficient (LEP). The rationale for these parameters is that low tutoring dosage has little chance of showing effects and is most often due to low attendance and other attrition beyond the control of the provider. SPED and LEP students have unique needs and characteristics that preclude valid matching to non-SES students. This report does not examine whether students served by SES providers demonstrated statistically significant academic gains in Reading and Mathematics from 2006-2007 to 2007-2008, as the data from 2006-2007 were not comparable to the 2007-2008 data due to the more

rigorous enforcement of selection parameters in 2007-2008. This type of year-to-year comparison analysis will be conducted in the future.

In the 2007-2008 school year, data for 3638 students receiving tutoring in Math, R/LA, or both subjects were obtained. Due to the nature of the analyses, many of these students were not able to be included in the assessment. The exclusion criteria described in the preceding paragraph eliminated a large number of students from the analyses. In addition, to be eligible for the assessment analyses, a student needed to be in grades 4-8, have a TCAP score in the subject tutored, have a teacher linkage, and have at least three prior TCAP scores in the previous two years. The exclusion process went as follows. First, 62 students were removed due to a missing provider, multiple providers, duplicate records, or invalid tutoring subject (subject was not Math or R/LA). Next, students were removed based on Special Ed status (405 students), LEP status (781 students), tutoring <50% of contract (1166 students), or tutoring >100% of contract (706 students). Note that these exclusions were done simultaneously as a student may be flagged for exclusion due to meeting any one of the exclusion criteria. Then, students who were not found in the Tennessee TCAP database were removed because they must have valid TCAP scores. After all of these exclusions, a total of 547 students were eligible to be used in the analysis. Applying the inclusion criteria of having a TCAP score in the appropriate subject, an existing teacher linkage, and at least three prior scores left 248 students for the math analysis and 335 students for the reading analysis.

During the 2007-2008 school year, five local educational agencies (LEAs) in Tennessee were required to offer Supplemental Educational Services. Within these districts, 54 Title I schools were designated SES-eligible, based on the fact that they were in their second year of school improvement (i.e., have not made adequate yearly progress or “AYP” for three or more years), in corrective action, or in restructuring status. For the 2007-2008 evaluation, LEAs offering SES in Tennessee provided the records of the students in their districts who received SES. Due to the exclusion criteria for student data to be included in the analyses, several providers were also eliminated from the achievement analyses because the students they serviced were not able to be included.

In the 2007-08 school year, two school districts in Tennessee offered SES with sufficient numbers of students (after applying the exclusion parameters) to be included in this study: Davidson County and Memphis. For each district, schools that had tutored students in 2007-2008 were identified. The test data (2006-2008) for the students attending these schools were then extracted from the database. Students are tested each year in four subjects: Math, Reading/Language Arts, Science, and Social Studies. Therefore, most students had either 4 or 8 historical scores for use as predictors for the current analyses of Math and R/LA achievement. The tutoring information was then merged with the student data and each student was matched with the 2008 teacher of record. Teacher matches were kept for the primary teacher;

that is, when the teacher claimed responsibility for at least 50% of the student’s instruction in the tested subjects.

For analyses purposes, a predicted score was calculated for each student. The predicted score takes into account the prior achievement of the student using the previous two years of test data in four subjects: Math, R/LA, Science, and Social Studies). These predicted scores re derived from SAS EVAAS methodology¹. The prediction parameters were developed using all students at the schools in each district that had tutored students. The predicted score is, therefore, what the student would be expected to score on the 2008 Math or R/LA tests assuming that the student had the “average schooling experience” within the subset of district schools having tutored students.

A model using a matched-pair approach was also fitted. Each block (pair) used in the model consisted of a tutored student and a non-tutored student. The matched counterpart for each tutored student was the non-tutored student having the closest predicted scores (within a 10-unit maximum difference) in the same classroom (i.e., taught by the same teacher). Note that it was not possible to find a match for each tutored student. This limitation is due to a missing teacher, clustering of tutored students with no non-tutored classmates, or simply not finding a suitable match (i.e., a >10-unit difference in predicted scores).

Statistical Models

Two types of models were fitted to these data. In all models, only students with predicted scores and teacher linkages from the set of providers with at least 10 tutored students were used. Each model was fitted separately with individual providers and with a tutoring indicator. The models with a tutoring indicator were used to assess the overall difference between a tutored student and non-tutored student. This effect represents an average effect of the providers.

1. Model 1: Fixed effects were predicted score, grade, and provider or tutoring indicator. Teacher nested within grade was used in the model as a random effect. This model accounted for the teacher effect so that the provider or tutoring effect was estimated free of the teacher effect.
Score = predicted_score + grade + provider/tutored + teacher(grade)
2. Model 2: Fixed effects were grade and provider or tutoring indicator. Block, nested within grade, was used as a random effect. Each block consists of a pair of students, one receiving tutoring and one not receiving tutoring, matched within the classroom (teacher) by the nearest classmate using the predicted score. This model estimates the provider or tutoring effect free of the teacher effect.
Score = grade + provider/tutored + block(grade).

¹ Sanders, William L., S. Paul Wright, June C. Rivers (2006). Measurement of Academic Growth of Individual Students toward Variable and Meaningful Academic Standards. In *Longitudinal and Value Added Modeling of Student Performance*, edited by Robert W. Lissitz. Maple Grove: JAM Press. 385-399.

Results

Descriptive Results: Overall and Data Analysis Samples

For the purpose of this study, a total of 248 students who received tutoring in Math and 335 who received tutoring in R/LA in Tennessee were included in the analyses. Due to the requirement of students having prior achievement scores, the analyses sample was restricted to grades 4 through 8. Descriptive results showing the frequencies of students served by different providers and having the required data for the statistical analyses of provider effectiveness are summarized in Tables 1-3. Specifically, Table 1 presents a summary of the number of students receiving tutoring in 2008 for Math and Reading/Language for grades 4-8 by district (Davidson County and Memphis). As can be seen, the number of different providers that tutored students in Math, R/LA, or both subjects was 11 in Davidson County and 13 in Memphis.

Table 2 presents a summary of the data that were used in the analyses. To be included in the analyses, a provider needed to have tutored at least 10 students across all districts with a primary teacher linkage and a predicted score. Attrition from the Table 1 frequencies was due to the elimination of students who lacked either a predicted score or an available primary teacher linkage.

Table 3 presents a summary of the matched pairs used in Model 2, broken out by provider within district. The match rate was based on the proportion of tutored students who were successfully matched with a non-tutored student within the classroom. The match rates were fairly high, ranging from 67% to 100%, with an average of about 92% in Math and 84% in R/LA.

Inferential Comparisons between SES and Control Students

Interpretation of tabular data: Tables 4 and 5 present the summary of the statistical analyses for the two models for Math and R/LA. The models tend to agree on the assessments. The top portion of the tables indicates, for each model, the significance of: (a) the contribution of the predictor variables to the State NCE scores, (b) differences in State NCE scores between the grade levels examined, and (c) differences in NCE scores between participating providers. Although obtaining a highly significant predictor effect is both desirable and expected, there was no particular interest in, or rationale for, finding differences between grade levels or providers. Such differences may occur in given years due to true effects (e.g., tutoring is more effective in certain grades or by certain providers) or to extraneous variables involving, for example, student sampling, district characteristics, or testing factors. Also, there was no interest in the present study in directly comparing individual providers. The bottom portion of the tables, labeled “Variance Component Estimates,” presents estimates of the teacher variance within grades.

More important to present interests, the Comparisons section provides the statistical comparison of each provider with the control group (the non-tutored students in the district). The column labeled “Est.” contains the estimate of the provider effect: the average difference in scores between the students

tutored by the provider and the non-tutored students. A positive effect means that the students tutored by the provider scored higher on average than non-tutored students. A negative effect means that the students tutored by the provider scored lower on average than non-tutored students. The column labeled “SE” contains the standard error of the estimate. The column labeled “*p*-value” contains the statistical level of significance for the comparison. A *p*-value less than 0.05 indicates that the provider effect is significantly different from the control group. The column labeled “Eff. Size” contains the estimate of the effect size, defined to be the effect estimate divided by the square root of the residual error. In more applied language, an effect size represents the magnitude of an experimental (or treatment) program’s impact in standard deviation units. An effect size of 0.50, for example, would indicate an average advantage of one-half standard deviation for program students compared to control students. In education, effect sizes approximating +.20 or higher are considered moderately strong to strong in impact and educationally meaningful. Given the fairly limited number of tutoring hours in SES (e.g., only 20-60 per year for the typical student), prior studies have found more modest effect sizes in the .06 to .10 range (e.g., Ross, Paek, & McKay, 2008; Zimmer et al., 2007).

Individual provider mathematics and R/LA outcomes: For Math, the *p*-value for the provider effect was significant (Model 1: $p=0.010$; Model 2: $p=0.014$), meaning that there were differences among providers. More critically, the individual comparisons of providers with the control group found several significant differences. To increase the reliability of findings regarding provider effectiveness, we judged a provider to be significantly different from the control only when the comparison was significant for *both* models. For Math, there were three providers that were significantly worse than the control group: A to Z In-Home Tutoring, LLC (Model 1: $p=0.049$; Model 2: $p=0.026$), Kastle Instruction Recovery, LLC (Model 1: $p=0.043$; Model 2: $p=0.022$) and Success Educational Services (Model 1: $p=0.025$; Model 2: $p=0.011$). There were no providers that were significantly better than the control group.

The results for R/LA found no differences. For R/LA, the *p*-value for the provider effect was not significant (Model 1: $p=0.645$; Model 2: $p=0.366$), indicating relatively stable effects across providers. The individual comparisons of providers with the control group found no significant differences for both models. In other words, no providers were significantly better or worse than the control students in both models.

Overall tutoring effects: Tables 6 and 7 present the summaries of the Model 1 and Model 2 statistical analyses in Math and R/LA for all providers combined. The overall test of the tutoring effect was significant for Math (Model 1: $p=0.004$; Model 2: $p<0.001$) but not significant for R/LA (Model 1: $p=0.735$; Model 2: $p=0.501$).² For Math, the overall effect of tutoring was estimated to be -1.81 NCE

² These effects are summarized in two places in Tables 6 and 7: (a) in the “tutored” row under Effect, and (b) in “tutored vs. non-tutored section” of Comparisons.

units. The effect sizes for Math were significant, and moderate in size (-0.20 and -0.34, respectively) in the two models, indicating an overall negative impact of SES tutoring on achievement. The effect sizes for R/LA were not large in either model, indicating little overall impact of SES tutoring on achievement in R/LA.

Dosage effects: Tables 8 and 9 present the summaries of the Model 1 and Model 2 statistical analyses for Math and R/LA for all providers combined and a *dosage* effect based on a comparison of three conditions: control (no tutoring), low dose (attendance of 50%-75% of contracted hours), and high dose (attendance of more than 75% of contracted hours). The overall test for a dose*tutoring effect for Math was significant for both models (Model 1: $p=0.012$; Model 2: $p=0.001$). The low dose effect was estimated to be -2.49 NCE units and was significantly less than the control ($p=.027$). The high dose effect was estimated to be -1.54 NCE units and was also significantly less than the control ($p=0.035$). These results, while not easily explainable, reflect a pattern in which the greater the dosage of tutoring for a group, the lower the achievement relative to control students. The overall test for the tutoring dosage effect for R/LA was not significant for either model (Model 1: $p=0.554$; Model 2: $p=0.572$). Thus, there was no dosage effect for R/LA.

Tables 10 and 11 present the summaries of the Model 1 and Model 2 statistical analyses for Math and R/LA for each provider, using the same three-group dosage design described above for all providers combined. Using the conservative criterion that an effect must be significant for both analysis models, we found that, for Math, only one provider dose group was significantly different from the control group. Specifically, the A to Z In-Home Tutoring, LLC high dose group was found to be significantly worse than the control group (Model 1: $p=0.026$; Model 2: $p=0.048$). Given the large number of comparisons that were made, it is probably best to ignore this single significant comparison. For R/LA, there were no significant differences found.

Conclusions

Sufficient data for the Teacher Nested (Model 1) and Matched Pairs (Model 2) analyses were available for 9 providers in Math and 10 in R/LA.

- For Math, the overall effect of tutoring (averaging across all providers) was estimated to be negative. The estimate was -1.81 NCE units, which was significantly less than the non-tutored students ($p=0.004$). Effect sizes for both models were moderate in strength (-0.20 and -0.34).
- For R/LA, the overall effect of tutoring was -0.18, which was no different from the non-tutored ($p=0.735$).
- For Math, three providers had significantly negative effects relative to the control students in both models. These providers were A to Z In-Home Tutoring, LLC, Kastle Instruction Recovery, LLC, and Success Educational Services.
- For R/LA, no provider appeared to be significantly different (better or worse) than the control students in both models.
- The overall dosage analysis for Math showed that both the low dose group and the high dose groups performed significantly worse than the control group. The low dose group effect was estimated to be -2.49 NCE units, while the high dose group effect was estimated to be -1.54 NCE units. For R/LA, neither the low dose group nor the high dose group was different from the control group.
- Overall, the achievement analyses mostly showed small, nonsignificant effects of tutoring services offered by individual providers. Math results, however, tended to show a more negative than positive pattern. The amount of tutoring received (low vs. high dosage) had little impact on the results.

Appendix A

Table 1: Summary of Students Receiving Tutoring in Tennessee in 2007-2008

Davidson County			N					Total
			Grade					
Provider #	Year	Subject	4	5	6	7	8	N
A to Z In-Home Tutoring, LLC	2008	Math		4	3	5	3	15
		Reading/Language		5	4	4	3	16
AlphaBEST	2008	Math	4					4
		Reading/Language	4					4
ATS Project Success	2008	Math			2			2
		Reading/Language			2			2
Bright Sky Learning	2008	Math	1	18	20	8	8	55
		Reading/Language	1	18	20	8	8	55
Cool Kids Learn, Inc.	2008	Math	4	9	7	1	1	22
		Reading/Language	4	9	7	1	1	22
Education Station	2008	Math				4	1	5
		Reading/Language	3	1	3	1	1	9
Huntington Learning Center	2008	Math		1				1
		Reading/Language		2	1	5		8
Kastle Instruction Recovery, LLC	2008	Math	3	8	6	3	6	26
		Reading/Language	3	8	6	3	6	26
Knowledge Points of Middle Tennessee	2008	Math		10	10	16	7	43
		Reading/Language	1	46	28	25	24	124
The Learning Zone	2008	Math		2	4		2	8
		Reading/Language		2	4	1	2	9
Success Educational Services	2008	Math		1	1	1		3
		Reading/Language		1	1	1		3

Table 1, continued

Memphis			N					Total
			Grade					
Provider #	Year	Subject	4	5	6	7	8	N
A to Z In-Home Tutoring, LLC	2008	Math	2		4	6	3	15
		Reading/Language	3	2	5	12	3	25
AlphaBEST	2008	Math	6	16				22
		Reading/Language	6	16				22
Applied Scholastics	2008	Reading/Language			1			1
Bright Sky Learning	2008	Math			1	4	2	7
		Reading/Language			1	4	2	7
Club Z! In-Home Tutoring	2008	Math			1	5	2	8
		Reading/Language		2		5	1	8
Education Station	2008	Math			5	5		10
		Reading/Language	1			5		6
Educational Enterprises	2008	Math				4	2	6
		Reading/Language				5	2	7
Learning 4 Today "I Can Do This"	2008	Math	1			1		2
		Reading/Language	1			1		2
Project Achieve: Intervention Assistance for Students	2008	Reading/Language			3	9	1	13
The Street Academy	2008	Math	19	19	3	2		43
		Reading/Language	19	19	3	2		43
Success Educational Services	2008	Math		1	9	5	11	26
		Reading/Language		2	8	5	5	20
Total Learning Center	2008	Reading/Language	2	1		1		4
X-CEL Operating Foundation	2008	Math	1		3	3	1	8
		Reading/Language	1		3	3	1	8

Table 2: Summary of Students Receiving Tutoring with Predicted Scores and Teacher Linkages

				N					Total
				Grade					
District	Provider #	Year	Subject	4	5	6	7	8	N
Davidson County	A to Z In-Home Tutoring	2008	Math		4	3	4	3	14
			Reading		4	4	2	2	12
	AlphaBEST	2008	Math	4					4
			Reading	4					4
	Bright Sky Learning	2008	Math	1	15	17	3	2	38
			Reading	1	16	17	7	5	46
	Cool Kids Learn, Inc.	2008	Math	4	7	6	1	1	19
			Reading	4	8	6	1	1	20
	Education Station	2008	Math				3	1	4
			Reading	3	1	3	1	1	9
	Kastle Instruction Recovery, LLC	2008	Math	3	5	6	2	5	21
			Reading	3	7	6	2	5	23
	Knowledge Points of Middle Tennessee	2008	Math		8	8	11	5	32
			Reading		31	24	17	20	92
Success Educational Services	2008	Math		1	1	1		3	
		Reading		1	1	1		3	
Memphis	A to Z In-Home Tutoring	2008	Math	2		4	4	3	13
			Reading	3	2	5	8	3	21
	AlphaBEST	2008	Math	5	15				20
			Reading	5	15				20
	Bright Sky Learning	2008	Math			1	4	2	7
			Reading			1	4	2	7
	Education Station	2008	Math			4	4		8
			Reading				5		5
	Project Achieve: Intervention Assistance for Students	2008	Reading			3	8	1	12
	The Street Academy	2008	Math	19	19	2	2		42
			Reading	19	19	2	2		42
	Success Educational Services	2008	Math		1	8	4	10	23
			Reading		2	8	4	5	19

Table 3: Summary of Students Used in the Matched-Pairs Analysis

District	Provider #	Year	Subject	N Total	N Matched	Pct Matched	
All Districts		2008	Math	248	228	91.9	
			Reading	335	282	84.2	
Davidson County	A to Z In-Home Tutoring	2008	Math	14	14	100.0	
			Reading	12	12	100.0	
	AlphaBEST	2008	Math	4	4	100.0	
			Reading	4	4	100.0	
	Bright Sky Learning	2008	Math	38	38	100.0	
			Reading	46	43	93.5	
	Cool Kids Learn, Inc.	2008	Math	19	16	84.2	
			Reading	20	18	90.0	
	Education Station	2008	Math	4	4	100.0	
			Reading	9	6	66.7	
	Kastle Instruction Recovery, LLC	2008	Math	21	21	100.0	
			Reading	23	22	95.7	
	Knowledge Points of Middle Tennessee	2008	Math	32	29	90.6	
			Reading	92	67	72.8	
	Success Educational Services	2008	Math	3	3	100.0	
			Reading	3	3	100.0	
	Memphis	A to Z In-Home Tutoring	2008	Math	13	12	92.3
				Reading	21	19	90.5
AlphaBEST		2008	Math	20	18	90.0	
			Reading	20	15	75.0	
Bright Sky Learning		2008	Math	7	6	85.7	
			Reading	7	7	100.0	
Education Station		2008	Math	8	8	100.0	
			Reading	5	5	100.0	
Project Achieve: Intervention Assistance for Students		2008	Reading	12	11	91.7	
The Street Academy		2008	Math	42	33	78.6	
			Reading	42	32	76.2	
Success Educational Services		2008	Math	23	22	95.7	
	Reading		19	18	94.7		

Table 4: Analyses for 2007-2008 Math Grades 4-8 – Comparing Each Provider with the Control

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-Value	p-value	Num DF	Den DF	F-value	p-value
Predicted Score	1	9824	18668.0	0.000				
Grade	4	253	1.11	0.353	4	223	1.20	0.312
SES Provider Code	9	9824	2.40	0.010	9	219	2.38	0.014

Comparisons	Est.	SE	p-value	Eff. Size	Est.	SE	p-value	Eff. Size
A to Z In-Home Tutoring, LLC vs. Control	-3.53	1.79	0.049	-0.38	-5.19	2.32	0.026	-0.57
AlphaBEST vs. Control	-1.50	2.09	0.473	-0.16	-4.42	2.47	0.075	-0.48
Bright Sky Learning vs. Control	-3.24	1.41	0.022	-0.35	-1.43	1.80	0.427	-0.16
Cool Kids Learn, Inc. vs. Control	-0.75	2.16	0.730	-0.08	-2.51	2.88	0.384	-0.28
Education Station vs. Control	0.45	2.68	0.868	0.05	-3.40	3.41	0.320	-0.37
Kastle Instruction Recovery, LLC vs. Control	-4.12	2.04	0.043	-0.45	-5.87	2.55	0.022	-0.64
Knowledge Points of Middle Tennessee vs. Control	2.72	1.70	0.111	0.30	0.34	2.20	0.877	0.04
The Street Academy vs. Control	-1.00	1.59	0.530	-0.11	-2.51	2.04	0.221	-0.27
Success Educational Services vs. Control	-4.10	1.83	0.025	-0.45	-6.13	2.40	0.011	-0.67

Variance Component Estimates	Estimate	Estimate
Grade 4	30.96	52.57
Grade 5	23.50	118.10
Grade 6	18.24	145.52
Grade 7	8.69	134.61
Grade 8	12.50	256.42
Residual	83.98	83.21

Table 5: Analyses for 2007-2008 Reading Grades 4-8 – Comparing Each Provider with the Control

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Predicted Score	1	9979	16478.0	0.000				
Grade	4	347	0.70	0.594	4	277	7.03	0.000
SES Provider Code	10	9979	0.78	0.645	10	272	1.09	0.366

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
A to Z In-Home Tutoring, LLC vs. Control	-0.21	1.56	0.894	-0.02	0.55	1.86	0.766	0.07
AlphaBEST vs. Control	-0.65	1.93	0.734	-0.07	0.82	2.38	0.732	0.10
Bright Sky Learning vs. Control	-1.96	1.24	0.115	-0.22	-2.25	1.48	0.131	-0.28
Cool Kids Learn, Inc. vs. Control	1.50	2.01	0.456	0.17	0.50	2.43	0.838	0.06
Education Station vs. Control	0.43	2.41	0.857	0.05	-1.83	3.08	0.554	-0.23
Kastle Instruction Recovery, LLC vs. Control	0.74	1.86	0.691	0.08	0.66	2.21	0.765	0.08
Knowledge Points of Middle Tennessee vs. Control	0.84	0.98	0.391	0.10	1.74	1.29	0.181	0.22
Project Achieve: Intervention Assistance for Students vs. Control	1.68	2.61	0.520	0.19	-0.28	3.09	0.929	-0.03
The Street Academy vs. Control	0.00	1.46	0.999	0.00	-1.95	1.85	0.293	-0.24
Success Educational Services vs. Control	-3.41	1.91	0.074	-0.39	-4.95	2.26	0.030	-0.62

Variance Component Estimates	Estimate	Estimate
Grade 4	2.56	63.80
Grade 5	6.11	131.78
Grade 6	6.64	106.89
Grade 7	5.85	86.02
Grade 8	4.39	139.35
Residual	77.49	64.62

Table 6: Analyses for 2007-2008 Math Grades 4-8 – Comparing Tutored and Non-tutored Students

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Tutored	1	9832	8.34	0.004	1	227	13.71	0.000
Predicted Score	1	9832	18658.9	0.000				
Grade	4	253	1.13	0.341	4	223	1.24	0.295

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
Tutored vs. NonTutored	-1.81	0.63	0.004	-0.20	-3.18	0.86	0.000	-0.35

Variance Component Estimates	Estimate	Estimate
Grade 4	31.39	50.99
Grade 5	23.42	119.07
Grade 6	18.25	141.35
Grade 7	8.68	128.64
Grade 8	12.38	246.92
Residual	84.03	84.15

Table 7: Analyses for 2007-2008 Reading Grades 4-8 – Comparing Tutored and Non-tutored Students

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-Value
Tutored	1	9988	0.11	0.735	1	281	0.45	0.501
Predicted Score	1	9988	16481.5	0.000				
Grade	4	347	0.69	0.599	4	277	6.83	0.000

Comparisons	Est.	SE	p-value	Eff. Size	Est.	SE	p-value	Eff. Size
Tutored vs. NonTutored	-0.18	0.52	0.735	-0.02	-0.46	0.68	0.501	-0.06

Variance Component Estimates	Estimate	Estimate
Grade 4	2.63	61.48
Grade 5	6.10	131.81
Grade 6	6.60	108.89
Grade 7	5.89	82.10
Grade 8	4.45	141.87
Residual	77.48	65.10

Table 8: Analyses for 2007-2008 Math Grades 4-8 – Assessing Overall Dose Effect

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Predicted Score	1	9831	18658.5	0.000				
Grade	4	253	1.14	0.339	4	223	1.24	0.295
Tutored*dose	2	9831	4.43	0.012	2	226	6.84	0.001

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
Tutored High vs. Nontutored	-1.54	0.73	0.035	-0.17	-3.14	0.99	0.002	-0.34
Tutored Low vs. Nontutored	-2.49	1.13	0.027	-0.27	-3.29	1.48	0.027	-0.36

Variance Component Estimates	Estimate	Estimate
Grade 4	31.46	51.00
Grade 5	23.43	119.13
Grade 6	18.26	141.37
Grade 7	8.68	128.74
Grade 8	12.38	246.54
Residual	84.03	84.44

Table 9: Analyses for 2007-2008 Reading Grades 4-8 – Assessing Overall Dose Effect

Response Variable=Scale Score (in state NCE units)								
Model 1					Model 2			
Fixed Effects and Random Teacher within Grade					Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Predicted Score	1	9987	16478.3	0.000				
Grade	4	347	0.68	0.603	4	277	6.78	0.000
Tutored*dose	2	9987	0.59	0.554	2	280	0.56	0.572

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
Tutored High vs Nontutored	0.12	0.59	0.841	0.01	-0.16	0.77	0.838	-0.02
Tutored Low vs Nontutored	-1.04	0.98	0.290	-0.12	-1.29	1.22	0.294	-0.16

Variance Component Estimates	Estimate	Estimate
Grade 4	2.71	61.19
Grade 5	6.12	132.13
Grade 6	6.62	107.69
Grade 7	5.90	82.37
Grade 8	4.44	141.09
Residual	77.47	65.27

Table 10: Analyses for 2007-2008 Math Grades 4-8 – Assessing Dose Effect by Provider

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Provider*dose	18	9815	1.69	0.034	18	210	1.38	0.144
Predicted Score	1	9815	18665.7	0.000				
Grade	4	253	1.10	0.356	4	223	1.13	0.342

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
A to Z In-Home Tutoring, LLC High vs. Control	-4.52	2.03	0.026	-0.49	-5.29	2.66	0.048	-0.58
A to Z In-Home Tutoring, LLC Low vs. Control	-0.06	3.81	0.986	-0.01	-4.93	4.84	0.309	-0.54
AlphaBEST High vs. Control	-0.62	2.45	0.799	-0.07	-4.80	3.07	0.120	-0.52
AlphaBEST Low vs. Control	-3.34	3.45	0.334	-0.36	-3.71	4.10	0.366	-0.40
Bright Sky Learning High vs. Control	-3.39	1.46	0.021	-0.37	-1.32	1.87	0.481	-0.14
Bright Sky Learning Low vs. Control	-0.80	5.36	0.882	-0.09	-3.16	6.83	0.644	-0.34
Cool Kids Learn, Inc. High vs. Control	-2.88	2.60	0.268	-0.31	-3.66	3.49	0.296	-0.40
Cool Kids Learn, Inc. Low vs. Control	4.04	3.85	0.295	0.44	0.07	5.15	0.990	0.01
Education Station High vs. Control	-1.59	3.28	0.628	-0.17	-7.04	4.19	0.094	-0.77
Education Station Low vs. Control	4.48	4.62	0.331	0.49	3.92	5.94	0.510	0.43
Kastle Instruction Recovery, LLC High vs. Control	-2.37	2.70	0.380	-0.26	-5.60	3.36	0.097	-0.61
Kastel Instruction Recovery, LLC Low vs. Control	-6.45	3.11	0.038	-0.70	-6.19	3.98	0.121	-0.67

Table 10, continued

Comparisons	Est.	SE	p-value	Eff. size	Est.	SE	p-value	Eff. size
Knowledge Points of Middle Tennessee High vs. Control	3.34	1.78	0.061	0.36	0.89	2.34	0.706	0.10
Knowledge Points of Middle Tennessee Low vs. Control	-3.06	5.35	0.568	-0.33	-4.26	6.76	0.529	-0.46
The Street Academy High vs. Control	-0.03	2.05	0.988	-0.00	-3.68	2.67	0.169	-0.40
The Street Academy Low vs. Control	-2.21	2.28	0.332	-0.24	-0.98	3.07	0.750	-0.11
Success Educational Services High vs. Control	-2.38	2.67	0.373	-0.26	-5.96	3.64	0.103	-0.65
Success Educational Services Low vs. Control	-5.60	2.49	0.024	-0.61	-6.22	3.19	0.053	-0.68

Variance Component Estimates	Estimate	Estimate
Grade 4	30.75	52.77
Grade 5	23.55	118.06
Grade 6	18.34	144.18
Grade 7	8.66	138.72
Grade 8	12.49	259.01
Residual	83.98	84.55

Table 11: Analyses for 2007-2008 Reading Grades 4-8 – Assessing Dose Effect by Provider

	Response Variable=Scale Score (in state NCE units)							
	Model 1				Model 2			
	Fixed Effects and Random Teacher within Grade				Random Block (pairs matched by predicted score within teacher)			
Effect	Num DF	Den DF	F-value	p-value	Num DF	Den DF	F-value	p-value
Provider*dose	20	9969	0.80	0.712	20	262	0.79	0.721
Predicted Score	1	9969	16466.5	0.000				
Grade	4	347	0.69	0.600	4	277	6.97	0.000

Comparisons	Est.	SE	p-value	Eff. Size	Est.	SE	p-value	Eff. size
A to Z In-Home Tutoring, LLC High vs. Control	-1.10	1.75	0.530	-0.13	-0.29	2.12	0.890	-0.04
A to Z In-Home Tutoring, LLC Low vs. Control	3.08	3.37	0.361	0.35	3.53	3.94	0.371	0.44
AlphaBEST High vs. Control	-0.38	2.29	0.870	-0.04	1.78	2.88	0.537	0.22
AlphaBEST Low vs. Control	-1.19	3.24	0.714	-0.14	-1.40	4.26	0.743	-0.17
Bright Sky Learning High vs. Control	-1.98	1.29	0.126	-0.22	-2.57	1.56	0.099	-0.32
Bright Sky Learning Low vs. Control	-1.81	4.46	0.685	-0.21	1.54	5.22	0.768	0.19
Cool Kids Learn, Inc. High vs. Control	0.76	2.40	0.752	0.09	-0.19	2.87	0.947	-0.02
Cool Kids Learn, Inc. Low vs. Control	3.23	3.68	0.379	0.37	2.20	4.60	0.634	0.27
Education Station High vs. Control	2.95	3.65	0.419	0.34	-3.43	5.11	0.503	-0.42
Education Station Low vs. Control	-1.46	3.18	0.646	-0.17	-0.84	3.90	0.829	-0.10
Kastle Instruction Recovery, LLC High vs. Control	2.40	2.47	0.331	0.27	2.65	2.97	0.373	0.33
Kastle Instruction Recovery, LLC Low vs. Control	-1.45	2.82	0.608	-0.16	-1.83	3.34	0.584	-0.23

Table 11, continued

Comparisons	Est.	SE	p-value	Eff. Size	Est.	SE	p-value	Eff. size
Knowledge Points of Middle Tennessee High vs. Control	1.22	1.03	0.235	0.14	2.17	1.37	0.116	0.27
Knowledge Points of Middle Tennessee Low vs. Control	-2.54	2.99	0.394	-0.29	-1.72	3.92	0.661	-0.21
Project Achieve: Intervention Assistance for Students High vs. Control	0.73	4.52	0.871	0.08	0.50	5.91	0.933	0.06
Project Achieve: Intervention Assistance for Students Low vs. Control	2.13	3.16	0.501	0.24	-0.67	3.65	0.855	-0.08
The Street Academy High vs. Control	2.14	1.91	0.262	0.24	-1.42	2.52	0.574	-0.18
The Street Academy Low vs. Control	-2.66	2.12	0.210	-0.30	-2.53	2.68	0.346	-0.31
Success Educational Services High vs. Control	-2.81	2.23	0.207	-0.32	-3.56	2.70	0.188	-0.44
Success Educational Services Low vs. Control	-5.03	3.65	0.168	-0.57	-8.37	4.21	0.048	-1.03

Variance Component Estimates	Estimate	Estimate
Grade 4	2.55	65.07
Grade 5	6.08	131.72
Grade 6	6.65	102.68
Grade 7	5.87	87.66
Grade 8	4.40	139.08
Residual	77.51	65.79

Appendix B

Math - A to Z In-Home Tutoring

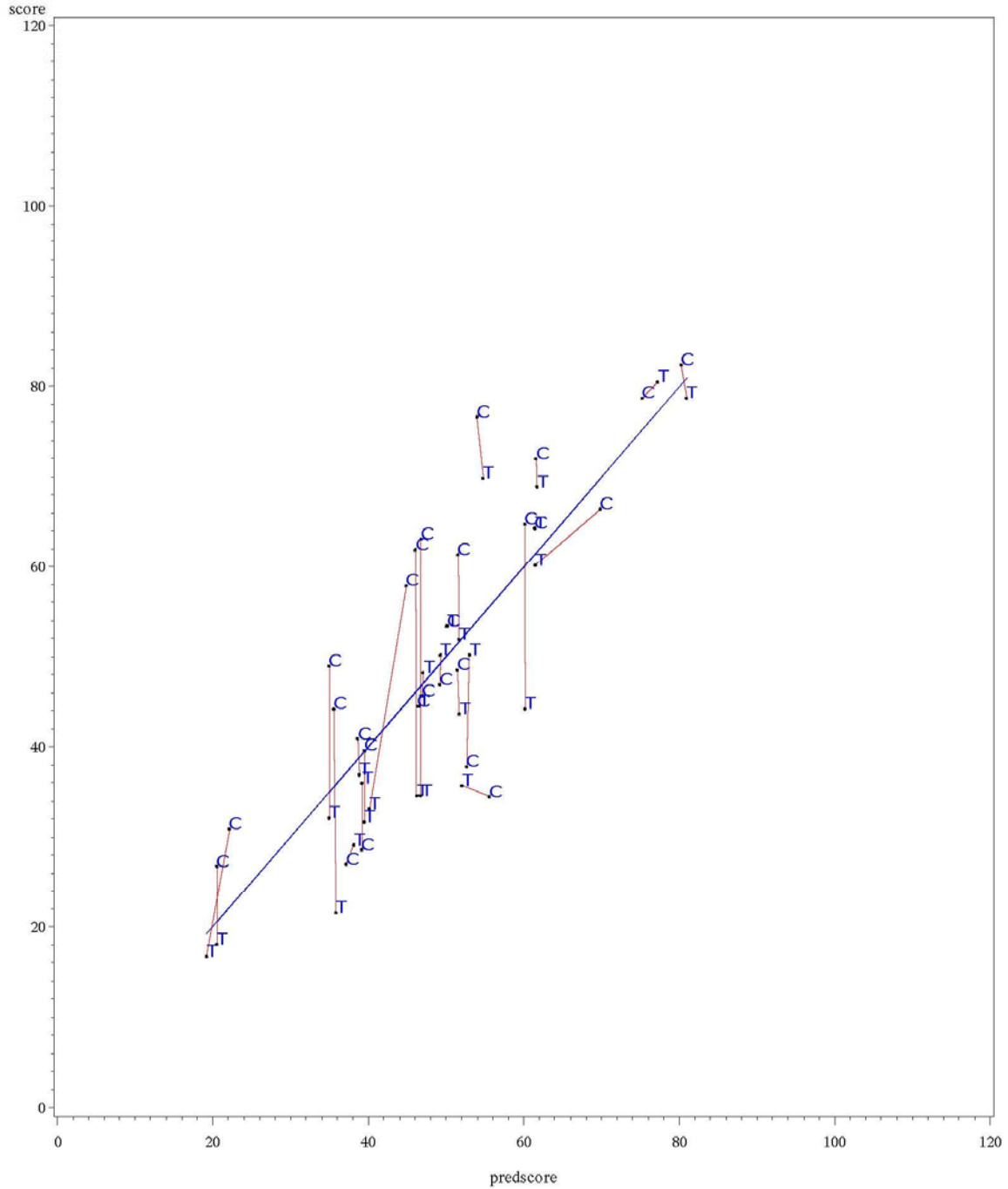


Figure 1: Graph from Model 2 for Math for A to Z In-Home Tutoring

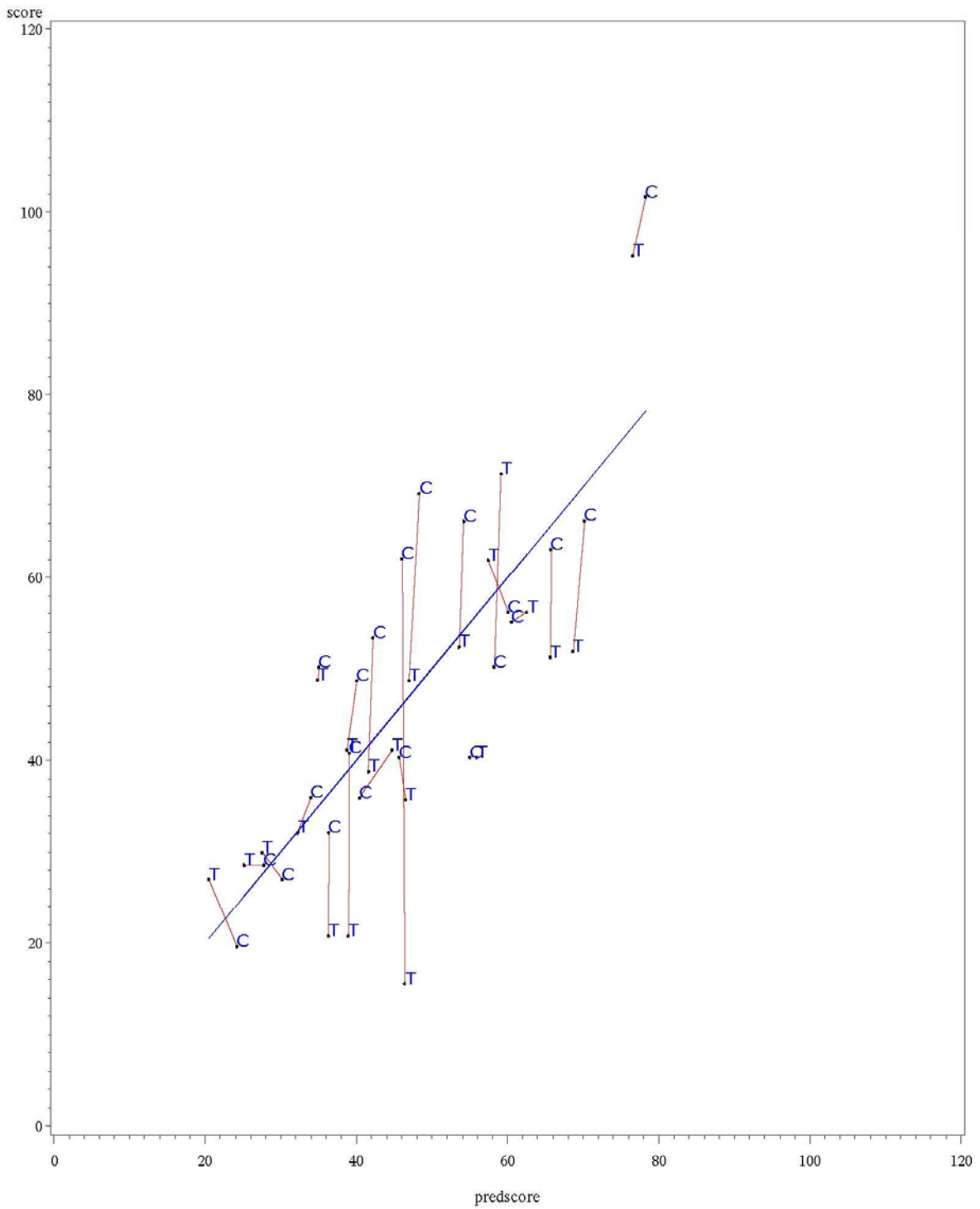


Figure 2: Graph from Model 2 for Math for Kastle Instruction Recovery, LLC

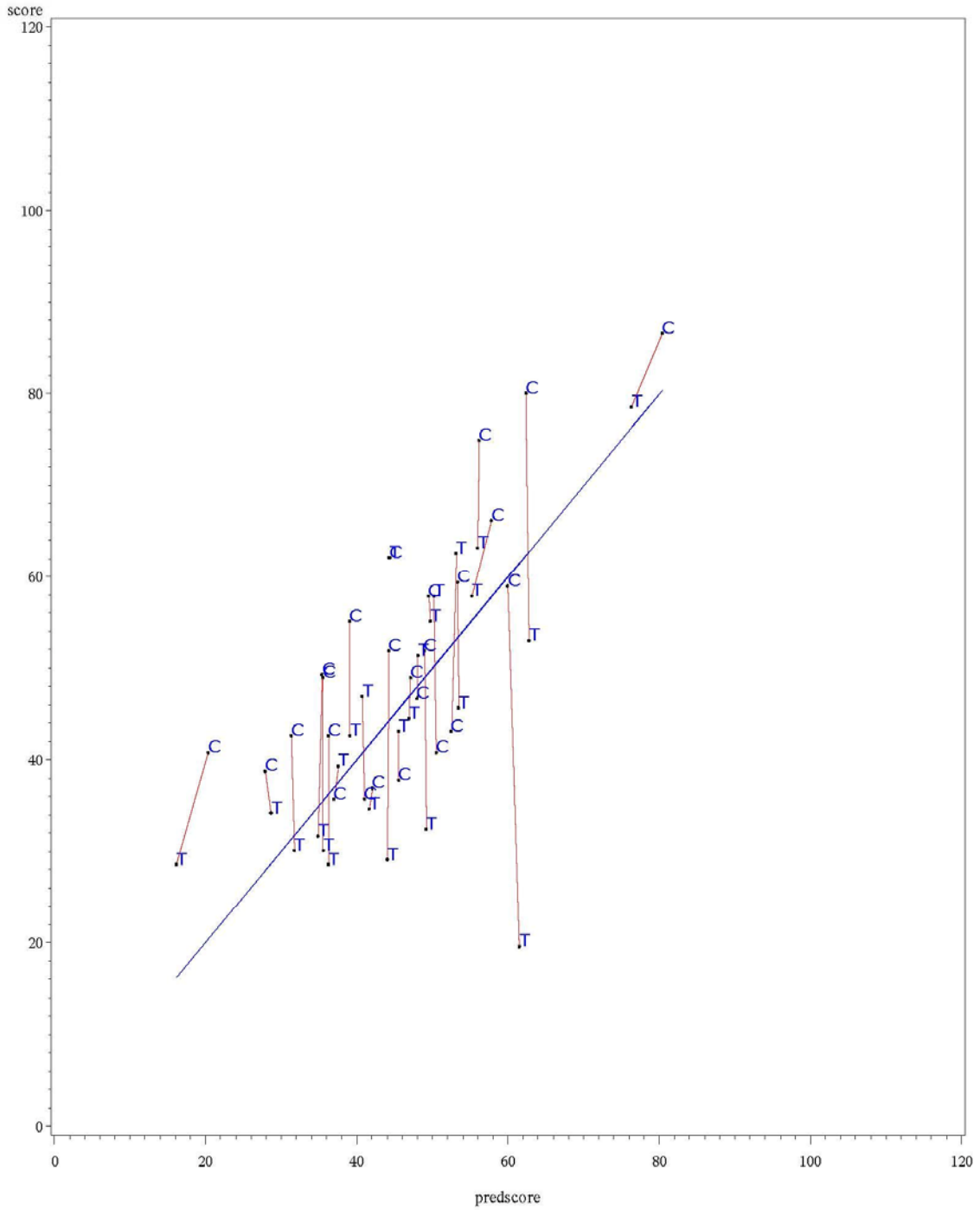


Figure 3: Graph from Model 2 for Math for Success Educational Services

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