Educational Policy Brief: SAS® Response to the "WCPSS E & R Comparison of SAS© EVAAS© Results and WCPSS Effectiveness Index Results," *Research Watch*, E&R Report No. 09.11, March 2009

The purpose of this report is to twofold:

1) In the short term, it is to address questions raised by WCPSS Evaluation & Research Department regarding the EVAAS analyses of WCPSS student achievement scores.

2) The broader, more important purpose is to illustrate for policy makers why it is so critical to get the analyses right, to structure them in a way that safeguards student opportunity and communicates reliable information to policy makers. In the end, the choice of statistical models is of utmost importance in that conclusions drawn from the ensuing analyses will be affected by the variables included in the model. The models used by WCPSS Evaluation & Research Department include various adjustments for socio-economic factors which are masking important differences in effectiveness among WCPSS schools to the detriment of the academic opportunity for many students. To the extent that a message of lesser expectations for some populations of students is reinforced in the minds of educators, unintended consequences for children can occur that limit their life choices after their K-12 experience.

In brief, the EVAAS school-level results indicate the effectiveness of individual NC schools, as measured by how well the schools move students academically when compared to the state average academic progress rates. The EVAAS school results for WCPSS demonstrate that the higher the percentage of poor students enrolled at a school, the poorer the school's performance in assisting the children to make academic progress. Although the relationship between schooling effectiveness and SES factors within WCPSS is measurable, *the magnitude of this relationship is much less in the remainder of the state.*

Because the much stronger negative relationship exists within WCPSS, the negative relationship was compelling evidence that something was happening systematically in WCPSS regarding student opportunities in access to courses and progress in courses, particularly in math, that does not occur as regularly in other NC districts. This condition is measurably related to the percentage of poor students at the WCPSS schools beginning at the end of the fifth grade year and continuing through high school.

Because the WCPSS E & R analyses include two adjustments for students' socio-economic status, these key systematic differences are hidden in the results of the E & R analyses. The WCPSS E & R analyses 'expects' students who are poor to score lower at the end of the year than more affluent students, even when individual students from a lower ses group start the school year at the very same achievement as more advantaged students. It 'forgives' the school serving the poorer students because of the demographic makeup of the school, thereby removing

any opportunity that the students' results will signal educators that something is amiss. Thus, it is most difficult to identify and correct the situations that contribute to the student inequity.

The authors of this report in no way would suggest that the processes and practices that create the inequity are intentional on the part of WCPSS educators, but given the data available, it is most unlikely for them to recognize the conditions that exist in certain schools. However, it is believed that WCPPS leadership would implement plans to rectify the inequities of opportunity which presently exists for too many WCPPS students when more reliable information is utilized.

Because student level free/reduced priced meal status is not available to the authors in preparing this response, student ethnicity has been substituted since minority students are also disproportionately poorer on average than their white peers. It is the only student level variable available to the authors to enable a vehicle to illustrate the magnitude of the inequity that has been found to exist. Within a broader context, policy makers should note that WCPSS black and Hispanic students are less often represented in 8th grade Algebra, the subject identified by many, including the authors of this report, as one of the gatekeepers for college success in technical majors. Again, this inequity is not readily detectable from the data provided to WCPSS policy makers and educators by the WCPSS E & R Department. Policy makers should be alerted to these important differences, not have them hidden.

Summary: The math student achievement in WCPSS has remained flat when compared to that of the state in the three most recent years. As students move across grades, they tend to lose ground academically so that fewer students are projected to be proficient in the middle grades than in the earlier ones. In 2008, **slightly more than *half* the students completing 7th grade math with a high likelihood of reaching proficiency in 8th grade Algebra actually enrolled in Algebra in their 8th grade year.** This deficit appears to fall disproportionately on black and Hispanic students: 20 percent fewer black and Hispanic students who were academically prepared for Algebra in 8th grade were enrolled than their comparably prepared white counterparts. There is no way from the data available to ascertain whether poorer whites were enrolled less frequently then more affluent white students. As illustrated in the report, other North Carolina LEAs are doing a better job of enrolling academically prepared students in 8th grade Algebra and examples are cited.

Disclosure: The EVAAS analyses provided in 2008 were available to all NC LEAs, funded in part by the NC General Assembly and in kind by SAS Institute Inc. The authors of this report are employed by SAS.

EVAAS® Analyses for Wake County Public Schools

By William L. Sanders, June C. Rivers, Steven Enck, Jill Leandro and John White[1]

Introduction

The Wake County Public Schools System (WCPSS) E & R Department released a report on March 9, 2009, that attempts to make comparisons of the WCPSS Effectiveness Index to the SAS® EVAAS school level value-added analysis results from the North Carolina DPI application. The report attempts to clarify an earlier description of EVAAS methodology provided by WCPSS E & R to principals, senior staff, school board members and the general public so that recipients might have more insight as to *how* and *why* the EVAAS analyses are actually structured or modeled and why differences between EVAAS and WCPSS E & R models exist in the results. However, the 3/9/09 report does not accurately present that information. The current document will discuss those issues, with particular emphasis on why the E & R model often masks important differences in schooling effectiveness. To illustrate the need for a more robust and reliable model than the E & R model, this document will show how WCPSS schools are performing relative to other North Carolina schools with students of comparable percentages of free/reduced priced eligible students.

Analysis Difference

The EVAAS value-added results compare the academic progress of a school's students in a given grade/subject to that of other North Carolina schools. The analyses utilize longitudinally merged student test scores from six years of EOG/EOC administrations and one year of SAT administration. No school or student level demographic variables are included in the EVAAS analyses.

The latter point is a very important distinction between the EVAAS process and the model that WCPSS E & R uses. WCPSS E & R makes ***two*** adjustments for free/reduced priced meal (FRPL) eligibility: one at the student level and one at the school level. Consider the following: Assume that two students have exactly the same previous academic history. One of these students comes from a disadvantaged socio-economic (SES) background while the other comes from a more affluent circumstance. Should there be the same academic expectation for these two students? If the answer is ***yes***, then it would be inappropriate to adjust for socio-economic variables in the model. *De facto* there will be, often unwittingly, a different expectation set for those students since one student will be a member of a group that scores lower than the student from a higher SES group. This is the primary reason that EVAAS analyses make no adjustment for SES variables at either the individual student or group level(s).

Another major distinction between the EVAAS process and the WCPSS E & R process is that the EVAAS estimates of schooling influence will be more reliable. In the EVAAS process, the

[1] See page 17 for the authors' biographical information.

analyses are multivariate, longitudinal in that all prior scores in all subjects are analyzed simultaneously. Reliability increases when measurement error is dampened, and the inclusion of all available scores dampens the measurement error in any single score. In the EVAAS value-added analyses, each student must have three prior scores to be included. *(It has been shown that three prior scores are necessary to eliminate non-trivial bias in the school estimates due to the errors of measurement in the previous test scores. This is a problem that the WCPSS E & R approach ignores.)*

In the EVAAS process, once students pass the three-prior-scores filter, all scores for the students from the last six years are included in the analyses. Thus, one student might have five scores, whereas another might have seven and another might have the minimal three.[2] The EVAAS school effects are shrinkage estimates because shrinkage protects educational entities (in this case, schools) from misclassification due to aberrant scores. This is especially necessary to protect schools with small numbers of students. The end result of using each student's prior scores is greater reliability in the estimate of schooling effectiveness as compared with the E & R Effectiveness Indices.

Because of the double adjustment for demographic variables, the E & R analyses are hiding an inequitable situation for students in schools serving more FRPL students. When these conditions continue over time, the end result is less than optimal achievement for the students affected.

WCPSS school effects hidden by the E & R statistical model

NC DPI provided school level demographic data for all North Carolina schools to the SAS EVAAS team. These variables are provided to DPI by LEAs, and the assumption in this report is that they are accurate. These data allow the relationship between the EVAAS school estimates and the demographic data to be evaluated for both WCPSS and the other North Carolina schools. The relationship with percent free/reduced price lunch (%FRPL) has been chosen for this report to be consistent with the earlier one released by WCPSS E&R.

The plots herein show the relationship of grade/subject school effects to the percentage of students reported at the school that belong to the FRPL demographic group. School effects appear on the vertical axis (state average is 0.0 by definition), and %FRPL students within a school appear on the horizontal axis. Red dots represent the Wake County schools while black dots represent the other schools in North Carolina.

To aid in interpretation, a red best-fit line is drawn to represent the relationship of the Wake County EVAAS school-level effects to the schools' %FRPL, and a black best-fit line is drawn to represent the relationship of the other North Carolina schools' %FRPL. When the line slopes downward, left to right, it suggests that as the percentage of FRPL students increases, the value-added result, as measure of schooling effectiveness, decreases. Also observe the variation in

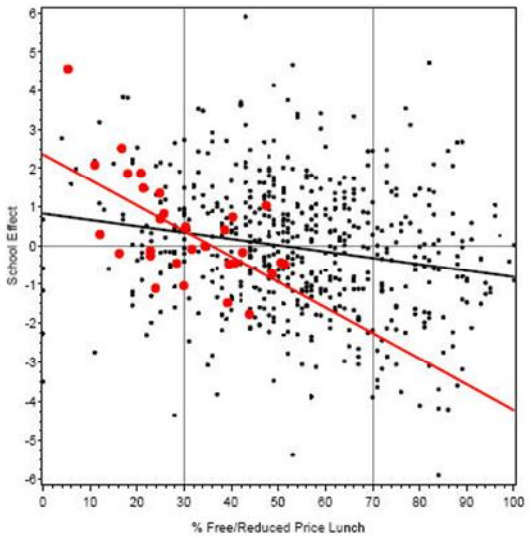
[2] No student, however, has imputed scores substituted for missing scores in the EVAAS analyses. Students are clustered according to the specific scores they have available for the analyses and the school value-added effects are estimated across all clusters simultaneously.

schooling effectiveness for schools across the state that occurs, regardless of the percentage of students within a demographic category.

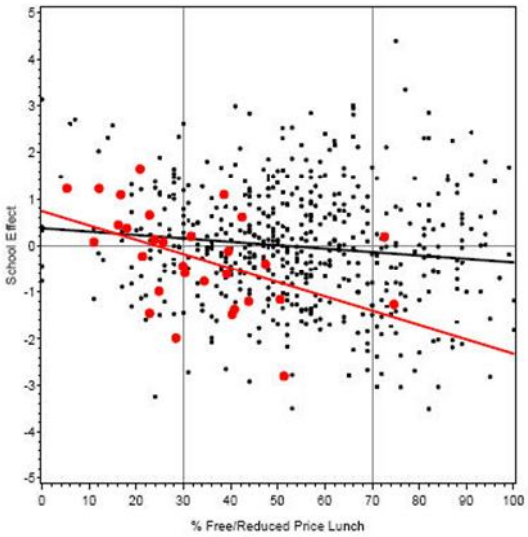
In Figure 1 below, consider the 6th grade Math graph (top left). Clearly, WCPSS schools (plotted in red) have a smaller range in %FRPL students than the range for the entire state of North Carolina. The black line denotes the relationship in EVAAS school effects and %FRPL for non-WCPSS schools, while the red line denotes the comparable relationship for WCPSS schools. In WCPSS as the %FRPL increases, there is a greater decline in 6th grade Math schooling effectiveness than for the rest of North Carolina schools. This relative inequity may be of concern to Wake County policy makers and school administrators.

Figure 1. EVAAS math school value-added estimates plotted against schools' self-reported percentages of free/reduced meal eligibility

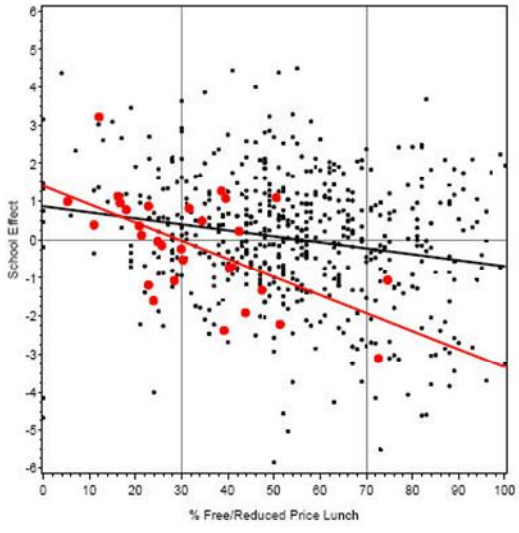
Grade 6 Math



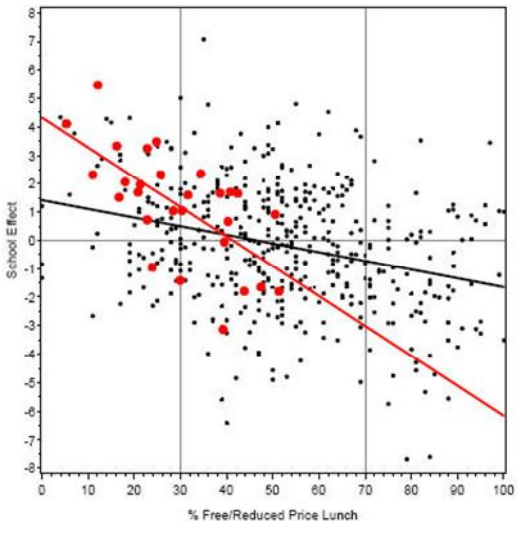
Grade 7 Math



Grade 8 Math



Grade 8 Algebra I



Note: In the graphs above, the red dots represent Wake County Schools and the black dots represent other schools in the state

It is important to note that in some of the grade/subject graphs, Wake County does have more schools with positive value-added effects than with negative ones. However, the relative inequity described above would not be seen using results from the WCPSS E & R models because that model would mask the inequity through its adjustment for SES factors. Policy makers should be alerted to these important differences, not have them hidden. As can be observed, comparable patterns are present in 7th grade (top right), 8th grade (lower left) and Algebra I for middle schools (lower right).

With many statistical approaches to estimating schooling influences through simple regression modeling, the measurement error in the predictor variables (prior scores) is too often ignored, creating a bias that *appears* to be an indication that student demographic variable adjustments are necessary to evaluate fairly the educational influences on student progress. Thus, many analysts fall into the trap of attempting to offset the bias created by the measurement error in the predictor variables by various *adjustments* of student and school demographic variables. A body of knowledge now exists that shows with a sufficient number of test scores, no adjustment is necessary at the student level.[3] Additionally, many analysts make a compelling statistical argument that no adjustment is necessary at the group (school) level.

To further illustrate why the relationship between schooling effectiveness and %FRPL should be viewed in a broader context, consider the following. Table 1 from the WCPSS E & R report shows differences for selected subjects in correlations between %FRPL and the Effectiveness Indices (within district, adjusted twice for FRPL eligibility) when compared to the EVAAS value-added analyses (statewide, with no adjustment for %FRPL eligibility). The correlations reported in the E & R table are arguably misleading when viewed within the context of the entire state. Table 1 below shows grades/subjects where the differences in EVAAS analyses between the WCPSS slopes and those for the other schools of North Carolina are significant at the 0.05 level. *The educational inference from this table is that, although highly correlated with the EVAAS value-added estimates, the E & R Effectiveness Indices may be providing policy makers with insufficient information on which to base their decisions.* A revised assessment of these grades/subjects offers the leadership of Wake County Schools an excellent opportunity to improve student outcomes.

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[3] Ballou, D., Sanders, W. L., and Wright P. (2004). Controlling for Student Background in Value-Added Assessment of Teachers. *Journal of Educational and Behavioral Statistics*, vol. 29, No. 1, pp. 37-66.

Lockwood, J. R., and McCaffrey, D. F. (2007). Controlling for Individual Heterogeneity in Longitudinal Models, with Applications to Student Achievement. *Electronic Journal of Statistics*, Vol. 1, pp. 223-252.

Table 1. Grades/Subjects Tests of Significance (at the 0.05 level) comparing Wake County schools' and Non-Wake County schools' correlations between %FRPL and EVAAS value-added estimates[4]

	Wake County			Non-Wake County			Pvalue
Subject	**N**	**Correlation**	**Pvalue**	**N**	**Correlation**	**Pvalue**	**(Difference)**
End of Course Algebra I	52	-0.674	0.0000	857	-0.207	0.0000	0.0000
End of Course Algebra I (High Schools)	24	-0.744	0.0000	418	-0.075	0.1238	0.0001
End of Course Algebra I (Middle Schools)	28	-0.658	0.0001	439	-0.293	0.0000	0.0180
End of Course Algebra II	25	-0.421	0.0360	415	0.010	0.8453	0.0360
End of Course Geometry	32	-0.405	0.0214	486	-0.056	0.2210	0.0502
End of Course Biology	22	-0.657	0.0009	432	-0.029	0.5472	0.0012
End of Course Civics and Economics	21	-0.551	0.0097	428	-0.109	0.0238	0.0341
End of Grade Math - Grade 6	30	-0.621	0.0003	558	-0.197	0.0000	0.0075
End of Grade Math - Grade 7	30	-0.473	0.0083	531	-0.119	0.0061	0.0457
End of Grade Math - Grade 8	30	-0.577	0.0008	547	-0.196	0.0000	0.0197
End of Grade Science - Grade 8	30	-0.790	0.0000	544	-0.424	0.0000	0.0017

Table 2 below shows grades/subjects where the difference in the WCPSS slopes and those of other North Carolina schools is marginally significant (0.10 level). No measurable differences are present in the remaining grades/subjects.

Table 2. Grades/Subjects Tests of Significance (at the 0.10 level) comparing Wake County schools' and Non-Wake County schools' correlations between %FRPL and EVAAS value-added estimates

	Wake County			Non-Wake County			Pvalue
Subject	**N**	**Correlation**	**Pvalue**	**N**	**Correlation**	**Pvalue**	**(Difference)**
End of Course Physical Science	22	-0.444	0.0386	398	-0.073	0.1480	0.0854
End of Grade Reading - Grade 5	96	-0.397	0.0001	1151	-0.224	0.0000	0.0750
End of Grade Science - Grade 5	95	-0.466	0.0000	1151	-0.299	0.0000	0.0700

If the results from the E & R Effectiveness Indices and the EVAAS value-added estimates are highly correlated, why does it matter what modeling approach is used? If the purpose of the analyses is to provide the most reliable information to educators, the results from a simplistic, SES-adjusted analysis can often be misleading regarding the progress students at a school actually make. Of equal importance, in our view, is the knowledge that *adjustment for demographic variables* sends an indirect message to educators that they should *expect less* of comparably prepared students when one belongs to a demographic group that, on average, scores lower than the students in the general population. Could the inclusion of demographic adjustments subtly support the common misperception that students from certain demographic

[4] See SAS Institute Inc. 2006, *Base SAS® 9.1.3 Procedures Guide*, Second Edition, Volume 4, Cary, NC: SAS Institute Inc., Pages 44-47 (Example 1.4) for significance testing methodology.

groups have less potential of success than students from other groups? Given the availability of results that are not adjusted, the question that policy makers should consider is how are students likely to be served better: with educators using results in school improvement that cover up inequity or educators using results that provide the most reliable information possible, given the totality of the testing data? A review of the 2008 EVAAS reporting for WCPSS could provide some answers to the questions posed.

The EVAAS web reporting for WCPSS includes a comparison of the district schooling influence on student academic progress to that of the average North Carolina district. As indicated by the following Figures (2-4), on average WCPSS is measurably more effective than the average district in the state. In the figures, grades/subjects shaded with green indicate better than average performance, yellow indicates state average performance and red indicates performance below other North Carolina districts.

Figure 2. End of Grade Math EVAAS District Value-Added Report

Test	Grade	Year	N	Mean Student Score	Mean Score %-ile	Mean Pred Score	Pred. Score %-ile	District Effect	Effect Std Err	District vs State Avg
Math	3	2007	9496	347.0	60	346.7	59	0.3	0.2	NDD
	4	2006	7440	352.5	64	351.6	60	0.9	0.1	Above
		2007	8335	352.9	62	352.1	59	0.8	0.1	Above
		2008	8947	353.8	61	353.5	59	0.4	0.1	Above
		3-Yr-Avg	24722	353.1	62	352.4	60	**0.7**	0.1	Above
	5	2006	7240	357.1	63	356.5	61	0.6	0.1	Above
		2007	7764	357.6	62	357.0	59	0.7	0.1	Above
		2008	8629	358.2	61	357.7	59	0.5	0.1	Above
		3-Yr-Avg	23633	357.7	62	357.1	60	**0.6**	0.1	Above
	6	2006	7436	359.2	66	358.4	63	0.8	0.1	Above
		2007	7891	358.8	62	358.3	60	0.5	0.1	Above
		2008	8326	359.5	62	359.1	60	0.4	0.1	Above
		3-Yr-Avg	23653	359.2	63	358.6	61	**0.6**	0.1	Above
	7	2006	7375	361.9	66	361.2	64	0.6	0.1	Above
		2007	8008	361.7	64	361.8	64	-0.2	0.1	NDD
		2008	8399	361.7	60	362.0	62	-0.3	0.1	Below
		3-Yr-Avg	23782	361.7	63	361.7	63	**0.0**	0.1	NDD
	8	2006	7404	363.1	66	362.0	62	1.1	0.1	Above
		2007	7999	363.8	64	363.2	62	0.6	0.1	Above
		2008	8574	363.9	61	364.0	62	-0.1	0.1	NDD
		3-Yr-Avg	23977	363.6	64	363.1	62	**0.5**	0.1	Above

- Progress significantly Above the average district in the state.
- Progress Not Detectably Different from the average district in the state.
- Progress significantly Below the average district in the state.

Figure 3. End of Course EVAAS Math District Value-Added Reports

Test	Year	N	Mean Student Score	Mean Score %-ile	Mean Pred Score	Pred. Score %-ile	District Effect	Effect Std Err	District vs State Avg
Algebra I	2007	8529	156.5	71	154.9	65	1.6	0.1	Above
	2008	9693	156.7	69	155.2	63	1.5	0.1	Above

Test	Year	N	Mean Student Score	Mean Score %-ile	Mean Pred Score	Pred. Score %-ile	District Effect	Effect Std Err	District vs State Avg
Geometry	2007	7183	154.1	62	153.9	61	0.2	0.2	NDD
	2008	7208	155.0	61	154.9	61	0.1	0.2	NDD

Test	Year	N	Mean Student Score	Mean Score %-ile	Mean Pred Score	Pred. Score %-ile	District Effect	Effect Std Err	District vs State Avg
Algebra II	2007	6607	153.2	61	153.3	61	-0.1	0.2	NDD
	2008	7871	154.0	63	153.3	60	0.7	0.2	Above

- Progress significantly Above the average district in the state.
- Progress Not Detectably Different from the average district in the state.
- Progress significantly Below the average district in the state.

Figure 4. SAT Math EVAAS District Value-Added Report

Test	Year	N	Mean Student Score	Mean Score %-ile	Mean Pred Score	Pred. Score %-ile	District Effect	Effect Std Err	District vs State Avg
Math	2008	3152	534.6	63	508.1	54	26.4	1.8	Above

- Progress significantly Above the average district in the state.
- Progress Not Detectably Different from the average district in the state.
- Progress significantly Below the average district in the state.

Although the EVAAS district level analyses for WCPSS show that, on average, WCPSS is doing well when compared to other North Carolina LEAs, variability in effectiveness exists school to school and when schools are profiling as less effective, cohorts of students at these schools are likely to leave 12th grade at lesser achievement levels than would be possible if school improvement planning benefited from more reliable analyses of student test scores. This variability is illustrated in Figures A1-A3 in Appendix A. Note the number of schools for the same grade/subject with differing levels of effectiveness in the EVAAS analyses. Reliable

measures of schooling influence, such as those provided on the EVAAS website, are critical to the process of raising academic achievement.

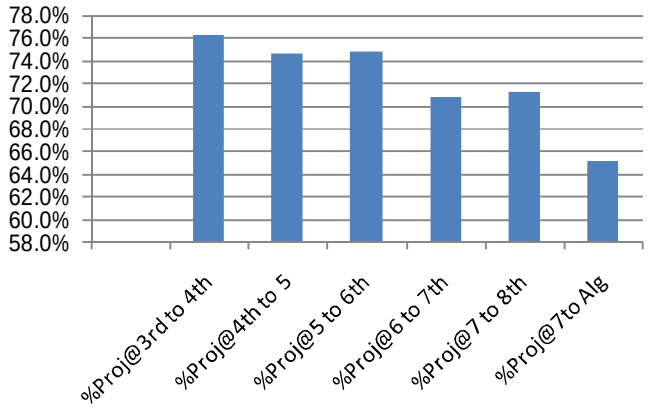
The ultimate goal for any district should be to improve the achievement of each student cohort as the students progress across grades. The table below shows the 2006, 2007 and 2008 tested math state percentile of WCPSS students who had 3 test scores prior to the grade reported. N/A indicates a difference in scaling or, in the case of SAT, not available. Note the consistency within cohorts and across cohorts. The WCPSS math achievement is essentially flat when compared to the state.

Table 3. WCPSS Mean Math Achievement Expressed in State Percentiles (2006-2008)

	Mean State Percentile		
Grade / Subject	**2006**	**2007**	**2008**
4	64%	62%	61%
5	63%	62%	61%
6	66%	62%	62%
7	66%	64%	60%
8	66%	64%	61%
Algebra I	N/A	71%	69%
Geometry	N/A	62%	61%
Algebra II	N/A	61%	63%
SAT Math	N/A	N/A	63%

If one of the goals of WCPSS is to improve student achievement as cohorts of students progress across grades, some attention should be given to how likely students are to reaching meaningful academic benchmarks in the future. Thus, the subsequent discussion in this report shows the academic erosion that occurs in math achievement potential as WCPSS students progress across grades. Although not dramatically dissimilar from state performance, it should be an area of concern for any district desiring for high school graduates to be competitive globally. The graph in Figure 5 is a representation of the percentage of students with a 70% or better likelihood of scoring proficient in math in the 2008-2009 school year, given the average North Carolina educational opportunity. The 7th graders are projected to both 8th grade math and 8th grade Algebra I. Note the gradual decline in the percentage of students likely to score proficient in 8th grade Algebra I as the bars decrease in size, left to right in the chart below.

Figure 5. WCPSS percentages of students likely to be proficient or higher in 2008-2009



Note the dramatic difference in the percentage of students projected to be proficient in middle school Algebra I as compared to the students projected to be proficient in math in grade eight. Middle school Algebra I is hugely important for students with the desire and potential for technical careers.

Projections used to calculate the percentages in Figure 5 above are provided as a part of the EVAAS results provided for state, district and school users. They are not adjusted either positively or negatively by individual student or school demographic variables and provide WCPSS users a metric more reliable than individual student test scores. EVAAS individual student projections on the website are available to multiple future tests (the next year's EOG, future graduation tests and various levels of performance on the SAT).[5] The EVAAS projection process has been reviewed and approved by the US Government Accounting Office and four different US Department of Education Peer Review Committees. As a part of those reviews, empirical evidence showed that the EVAAS projections three years into the future are more highly related to the scores students earned on the future tests than a single score for a student in the previous grade/subject.

The individual student projections provide an objective way for educators to plan for an appropriate adjustment in either curricular offering or instructional strategy based on the need of the individual student. Another way to view exiting achievement is the percentage of students likely to be proficient in the next grade within the same grade subject. Did the percentages of students expected to be proficient or better remain constant across grades? Recall, however, that achievement in WCPSS has remained relatively constant across grades ranging from the 60th to the 71st percentiles when compared to the state distribution of tested students. If WCPSS is to move beyond the North Carolina state average in math achievement for graduating students, this pattern merits attention to ensure that as many academically prepared students as possible are enrolled in rigorous courses. Global competitiveness mandates that access to rigorous courses should be determined by academic readiness rather than student demographics.

[5] See for example: Wright, S. P., Sanders, W. L., and Rivers, J. C. (2006). Measurement of Academic Growth of Individual Students toward Variable and Meaningful Academic Standards. Pages 385-406 in R. Lissitz (Ed.), Longitudinal and Value Added Models of Student Performance. Maple Grove, MN: JAM Press. Available at http://www.sas.com/govedu/edu/wrightsandersrivers.pdf.

A reasonable question to ask about EVAAS students' projections to 8th grade Algebra I in North Carolina would be, "how reliable are they?" Table 4 reports the number and percentage of students at various probabilities of reaching proficiency, the number testing in Algebra I in 2008 and the Number and percentage of students testing at Levels III or IV in the ranges of probability reported.

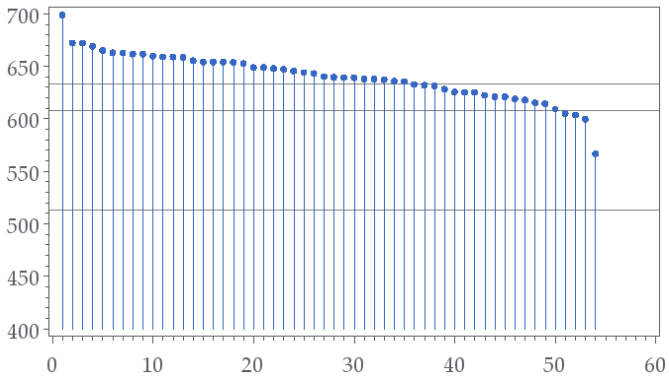
Table 4. Summary of 2007 NC 7th graders' probabilities of proficiency when compared to their tested performance in 2008

Probability of Level III or IV	Student Count	Enrolled in Algebra I in 8th Grade (2008)		Scored Level III or IV	
		N	%	N	%
0 – 10%	6,364	19	0.3%	2	10.5%
10 – 20%	6,146	56	0.9%	7	12.5%
20 – 30%	6,092	128	2.1%	43	33.6%
30 – 40%	6,041	182	3.0%	66	36.3%
40 – 50%	6,354	342	5.4%	169	49.4%
50 – 60%	6,278	452	7.2%	276	61.1%
60 – 70%	6,881	823	12.0%	581	70.6%
70 – 100%	42,144	18,670	44.3%	17,914	95.9%

What cut should be used to determine the students to complete Algebra I in middle grades? Many North Carolina districts have used 70% or better as an indicator of Algebra I readiness in grade eight, and this seems reasonable given the empirical evidence presented above.

Some would question the urgency of enrolling as many adequately prepared students as possible in middle school Algebra I. To address this question with empirical evidence, students with SAT math scores in 2008 were linked to their 7th grade math scores when possible. Of the linked students, the state 7th grade distribution was divided into four quartiles. The graph in Figure 6 shows the range of SAT math score averages by North Carolina LEA for students who were in the top quartile of math achievement as seventh graders and who took Algebra I in middle school. The horizontal lines provide three reference points to illustrate the gap between the NC state average SAT math scores and those likely required for success in technical majors. The first line represents the NC state average in 2006 (513); the second, the average entering NCSU freshman score in 2006 (608); and the third, the average entering NCSU freshman planning to major in math/physical science (633). Note that those taking middle school Algebra I almost all achieved the NCSU entering freshman (2006) SAT math average. Based on these NC results, the recommendation would be Algebra I in middle school for any student meeting an objective measure of academic preparation.

Figure 6. Variability in mean SAT math scores by LEA for students performing in the top quartile of NC 7th grade math



Note: Means are ranked according to LEA math average. The horizontal lines represent key SAT benchmarks described on the previous page.

How does WCPSS profile against the state average, given the performance of the top quartile of seventh grade math students when they took SAT math in 2008? The percentages of scores for students with middle school Algebra I and for those without middle school Algebra I are reported for the state as a whole and for WCPSS students in Table 5 below. The WCPSS SAT performance strengthens the argument that as many students as possible should have access to middle school Algebra I.

Table 5. Comparison of WCPSS SAT performance to state performance for students with and without Algebra I in grade eight

	SAT Math 513	SAT Math 608	SAT Math 633
With MS Algebra I			
State	96.3%	66.4%	50.5%
WCPSS	99.1%	80.3%	66.0%
Without MS Algebra I			
State	91.3%	43.1%	27.4%
WCPSS	96.2%	50.0%	28.9%

Note: Averages from 2006: state average, 513; entering NCSU freshmen, 608; and NCSU freshmen majoring in math/physical sciences, 633.

Clearly students benefiting from Algebra I in middle school were more likely to reach higher math achievement levels as measured by SAT math. Given the magnitude of the differences in SAT math scores among those students who take middle school Algebra I and those who do not, another important question is, "what percentage of Algebra ready students are enrolling in middle school?" Figure 7 shows the proportions for the state and for a sampling of NC LEAs of

Algebra- ready students who are enrolling in middle grades as opposed to the Algebra ready students who are not enrolling. Students were determined to be Algebra ready in 8th grade if they tested in 7th grade math in 2007, tested in some subject in 2008 and had a probability of testing at proficient of 70% or better. Notice that although WCPSS enrolls about half of the students academically prepared for Algebra I in middle school, Chapel Hill/Carrboro, Charlotte Mecklenberg, Guilford County and Durham County are enrolling greater percentages of Algebra I ready students in middle school.

Figure 7. Students with 70% likelihood of achieving Levels III or IV in 8th grade in Algebra I. Students completed seventh grade in 2007
Note: Enrolled, Eligible is represented by EE and Not Enrolled, Eligible is represented by NE.

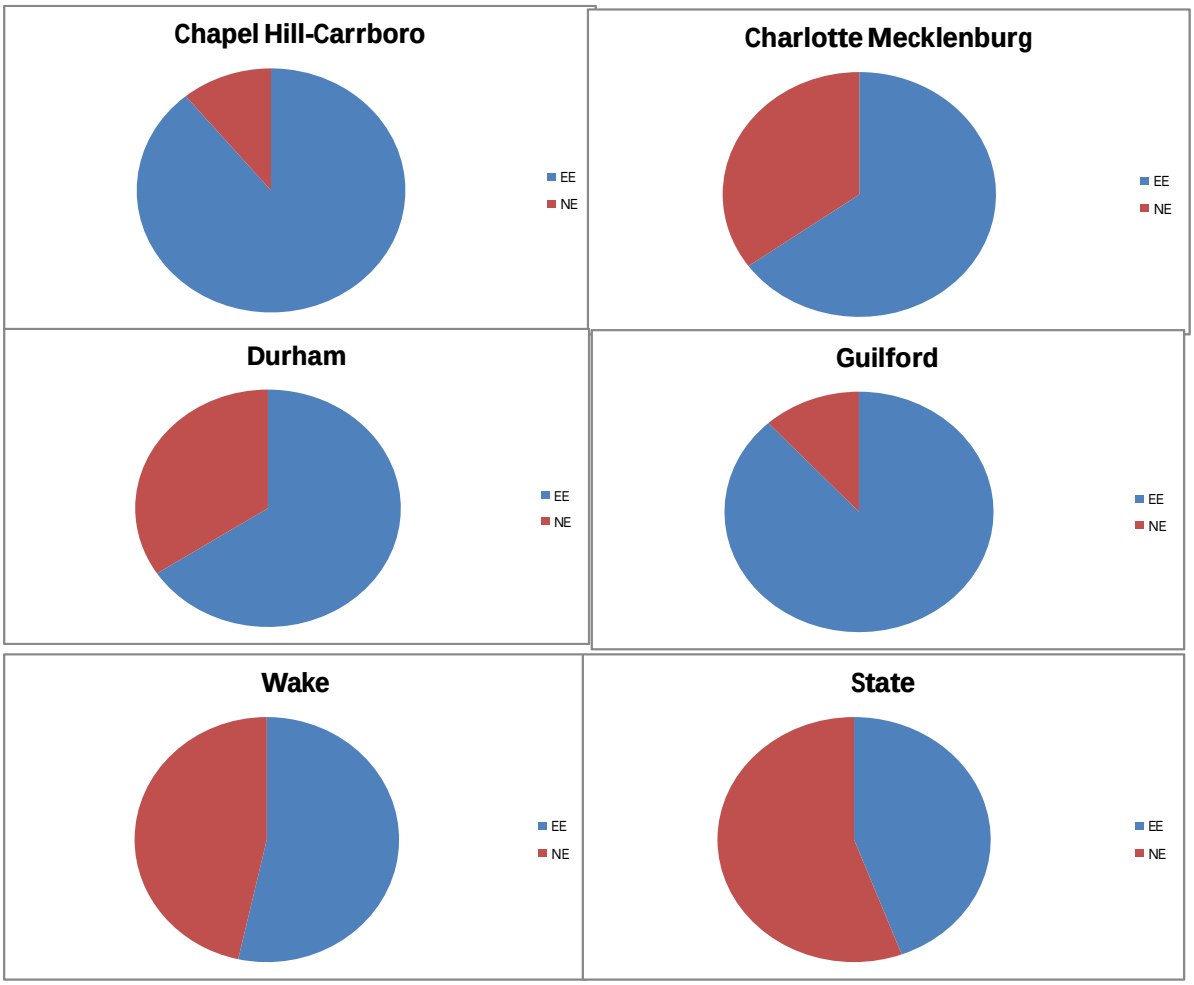
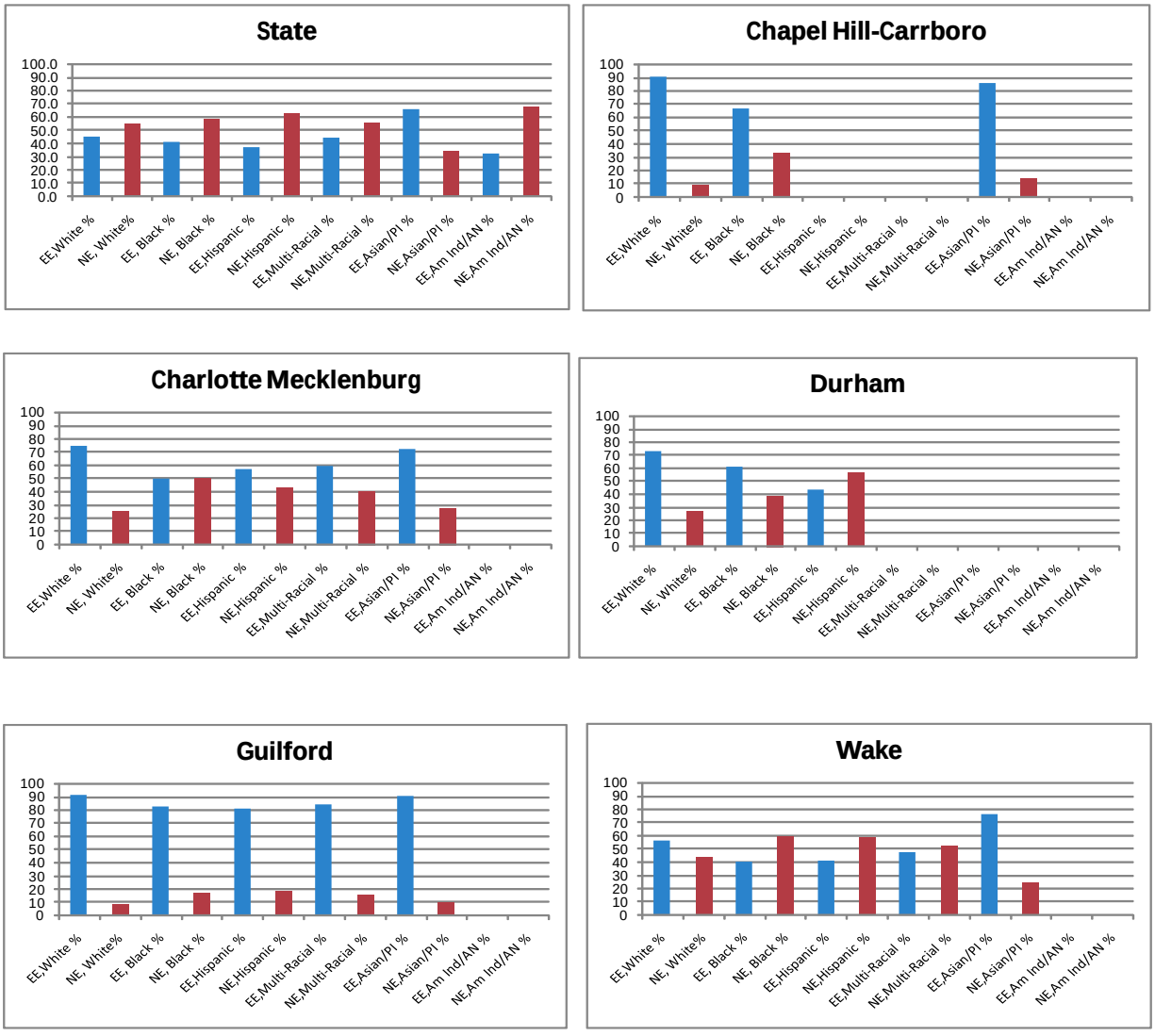


Figure 8. Comparison of Algebra ready students by ethnicity
Note: EE indicates enrolled students and NE indicates students who did not enroll but were academically prepared to be successful



Given the state and district goals of closing achievement gaps, raising achievement and increasing the number of students academically prepared for STEM college majors, Figure 8 provides insight into the Algebra I opportunity for comparably prepared students according to their ethnicity. Although all students academically prepared to be successful in Algebra I should be encouraged to benefit from middle school opportunities, disparities among students associated with demographic groups would also be a concern. In Figure 8, note the percentage of Algebra ready students within an LEA or in the state from each ethnic group who enrolled compared to the percentage of Algebra ready students of the same ethnicity who did not enroll in Algebra I in middle grades. Within WCPSS, notice the gaps between the eligible/ enrolled and eligible/not enrolled for black and Hispanic students. Also note differences for the same ethnic groups that occur across districts.

Conclusions

The inequities in this report, such as those identified in middle school Algebra I access in WCPSS, only become obvious through carefully designed, robust analyses applied to the student test scores. Collectively, inequities such as this could cause the negative relationship between %FRPL students and the EVAAS estimates of schooling influences (value-added school effects). Clearly, the magnitude of the relationship is measurably different for WCPSS schools than for other schools in North Carolina. Without the capacity to present the results within a broader context, the E & R report would go unchallenged. For whatever reason, some set of conditions/policies/practices exist in WCPSS that influence student opportunity according to the level of poverty at the school.

Given the resources, talent and professional expertise available within WCPSS, this report is provided to encourage WCPSS to consider the progress of WCPSS students within a broader context than that provided by the within-district analyses presently used to guide policy makers. How might more reliable and non-adjusted estimates of schooling influence be added to the WCPSS school improvement processes? After years of careful research, the authors of this report maintain that the results from the EVAAS process do indeed provide the information to educators that will enable them to focus on any inequities in delivery of educational services that might exist. We have maintained from the beginning (1982) that the empirical evidence does not support the need for adjusting estimates of schooling influence for student demographic variables and it is inappropriate to do so when the process hides inequities in student opportunities for success.

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The SAS EVAAS group is a part of SAS Institute Inc. ®, Cary, NC.

Appendix A

Figure A1. Observable Variability in WCPSS Elementary/Middle School EVAAS Value-Added Math

Note: Reference is North Carolina State Average. Rows are school level and will include 2008 results as well as a 3-yr average when 3 years are available. Columns are specific to a test, and the colors within a column represent different levels of effectiveness for schools in a particular subject. Students in schools with green cells are making more academic progress than other comparably prepared students in North Carolina. Students in schools with yellow cells are making about the same progress as other comparably prepared students in the state. Students in schools with red cells are making decidedly less progress than other comparably prepared students in the state.

		4	5	6	7	8
School	2008	0.8	-1.1	--	--	--
	3-Yr-Avg	1.0	0.4	--	--	--
School	2008	1.3	-0.3	--	--	--
	3-Yr-Avg	1.8	0.1	--	--	--
School	2008	--	--	2.5	1.1	1.0
	3-Yr-Avg	--	--	2.2	1.0	1.7
School	2008	-1.1	-0.2	--	--	--
	3-Yr-Avg	-0.6	0.4	--	--	--
School	2008	-0.6	-0.5	--	--	--
	3-Yr-Avg	-0.4	0.7	--	--	--
School	2008	2.1	0.3	--	--	--
	3-Yr-Avg	1.8	0.2	--	--	--
School	2008	-3.2	-2.9	--	--	--
School	2008	1.1	-0.8	--	--	--
	3-Yr-Avg	1.2	0.7	--	--	--
School	2008	3.1	-0.8	--	--	--
	3-Yr-Avg	1.3	-0.7	--	--	--
School	2008	--	--	-0.4	-1.2	1.1
	3-Yr-Avg	--	--	-1.0	0.0	1.4

School	2008	-1.3	0.0	--	--	--
	3-Yr-Avg	-0.3	0.4	--	--	--
nentary	2008	-0.2	-1.6	--	--	--
	3-Yr-Avg	0.3	-1.1	--	--	--
School	2008	-1.0	2.2	--	--	--
	3-Yr-Avg	1.0	3.1	--	--	--
ampus	2008	--	--	-0.4	-2.0	-1.1
	3-Yr-Avg	--	--	0.1	-0.8	0.9
School	2008	0.4	-2.0	--	--	--
	3-Yr-Avg	1.2	-0.9	--	--	--
School	2008	-0.7	-2.7	--	--	--
	3-Yr-Avg	0.0	-0.9	--	--	--
School	2008	-3.4	-4.4	--	--	--
	3-Yr-Avg	-0.9	-0.7	--	--	--
School	2008	--	--	0.5	-0.6	-0.5
	3-Yr-Avg	--	--	0.6	-0.3	-0.0
School	2008	-0.5	1.2	--	--	--
	3-Yr-Avg	-0.2	1.3	--	--	--
School	2008	2.6	0.9	--	--	--
	3-Yr-Avg	1.6	0.2	--	--	--
School	2008	-0.1	1.7	--	--	--
	3-Yr-Avg	0.2	1.2	--	--	--
School	2008	-1.0	0.6	--	--	--
School	2008	-0.5	2.1	--	--	--
	3-Yr-Avg	-0.8	1.3	--	--	--
School	2008	1.4	0.8	--	--	--
	3-Yr-Avg	1.0	-1.5	--	--	--
School	2008	--	--	-0.2	0.6	0.2
	3-Yr-Avg	--	--	-0.9	0.3	-0.4
School	2008	1.2	0.9	--	--	--
School	2008	--	--	0.7	-1.5	-0.7
	3-Yr-Avg	--	--	0.1	0.1	-0.9

School	2008	--	--	2.1	0.1	0.4
	3-Yr-Avg	--	--	2.9	0.6	0.8
School	2008	2.9	2.0	--	--	--
	3-Yr-Avg	1.0	1.7	--	--	--
School	2008	--	--	-0.0	-0.8	0.5
	3-Yr-Avg	--	--	0.1	0.2	1.3
School	2008	-0.2	1.6	--	--	--
	3-Yr-Avg	-0.8	0.8	--	--	--
School	2008	0.8	1.1	--	--	--
	3-Yr-Avg	0.5	1.0	--	--	--
School	2008	--	--	0.8	0.1	-0.1
	3-Yr-Avg	--	--	0.7	0.3	1.3
School	2008	--	--	-1.8	-1.2	-1.9
	3-Yr-Avg	--	--	-1.0	-1.2	-0.9
School	2008	--	--	0.7	--	--
School	2008	1.8	2.2	--	--	--
School	2008	--	--	-0.5	-2.8	-2.2
	3-Yr-Avg	--	--	-0.7	-1.4	-0.3
School	2008	--	--	1.0	-0.4	-1.3
	3-Yr-Avg	--	--	0.3	-0.1	-0.6
School	2008	-0.2	-1.4	--	--	--
	3-Yr-Avg	-0.0	-1.1	--	--	--
School	2008	-0.0	1.7	--	--	--
	3-Yr-Avg	-0.6	0.4	--	--	--
School	2008	0.8	0.7	--	--	--
	3-Yr-Avg	2.1	0.8	--	--	--
School	2008	0.6	1.1	--	--	--
	3-Yr-Avg	1.1	0.5	--	--	--
School	2008	0.9	-0.9	--	--	--
	3-Yr-Avg	0.8	-0.8	--	--	--

School	2008	-0.3	1.4	--	--	--
	3-Yr-Avg	-0.3	0.9	--	--	--
School	2008	--	--	-1.0	-0.4	-0.2
	3-Yr-Avg	--	--	-0.4	-0.4	0.4
School	2008	1.0	-1.2	--	--	--
	3-Yr-Avg	0.7	-0.9	--	--	--
School	2008	0.3	1.4	--	--	--
	3-Yr-Avg	0.4	1.3	--	--	--
School	2008	0.6	1.9	--	--	--
	3-Yr-Avg	0.2	1.4	--	--	--
School	2008	0.4	1.1	--	--	--
	3-Yr-Avg	0.3	0.6	--	--	--
School	2008	--	--	1.9	1.7	0.4
	3-Yr-Avg	--	--	2.4	1.6	0.9
School	2008	-1.1	0.6	--	--	--
	3-Yr-Avg	-0.1	1.2	--	--	--
School	2008	0.6	-0.9	--	--	--
	3-Yr-Avg	0.9	-0.6	--	--	--
School	2008	2.0	-0.9	--	--	--
	3-Yr-Avg	2.3	-0.3	--	--	--
School	2008	2.2	-0.3	--	--	--
	3-Yr-Avg	3.0	-0.6	--	--	--
School	2008	--	--	-1.1	0.1	-1.6
	3-Yr-Avg	--	--	0.0	0.0	-1.0
School	2008	0.6	3.0	--	--	--
School	2008	-0.1	0.9	--	--	--
	3-Yr-Avg	0.5	0.4	--	--	--
School	2008	-0.1	-0.4	--	--	--
	3-Yr-Avg	-0.0	0.2	--	--	--
School	2008	1.4	2.4	--	--	--
	3-Yr-Avg	0.5	0.8	--	--	--
School	2008	0.7	2.6	--	--	--
	3-Yr-Avg	0.5	0.9	--	--	--

School	2008	-1.6	-0.0	--	--	--
	3-Yr-Avg	0.7	1.1	--	--	--
School	2008	1.0	-0.1	--	--	--
	3-Yr-Avg	1.0	-0.5	--	--	--
School	2008	2.1	0.2	--	--	--
	3-Yr-Avg	1.4	0.7	--	--	--
School	2008	1.7	1.8	--	--	--
	3-Yr-Avg	0.5	1.6	--	--	--
School	2008	-0.4	-1.7	--	--	--
	3-Yr-Avg	0.2	-0.7	--	--	--
School	2008	-1.1	-1.5	--	--	--
	3-Yr-Avg	-0.5	-0.4	--	--	--
School	2008	--	--	-0.2	-1.5	-1.2
	3-Yr-Avg	--	--	0.1	-1.2	0.1
School	2008	--	--	1.4	-1.0	-0.0
	3-Yr-Avg	--	--	0.8	-0.4	0.0
School	2008	0.3	-0.5	--	--	--
	3-Yr-Avg	0.3	-0.6	--	--	--
School	2008	-0.5	1.1	--	--	--
	3-Yr-Avg	0.8	0.4	--	--	--
ngview	2008	--	--	--	0.2	-3.1
	3-Yr-Avg	--	--	--	--	-2.1
School	2008	--	--	0.3	1.2	3.2
	3-Yr-Avg	--	--	0.7	1.1	3.1
School	2008	-0.1	0.3	--	--	--
	3-Yr-Avg	0.3	1.0	--	--	--
School	2008	--	--	-0.1	0.7	0.9
	3-Yr-Avg	--	--	0.1	0.6	1.1
School	2008	-1.4	0.8	--	--	--
	3-Yr-Avg	-1.3	0.8	--	--	--
School	2008	1.5	0.0	--	--	--
	3-Yr-Avg	0.9	-0.8	--	--	--

School	2008	--	--	-1.5	-0.6	-2.4
	3-Yr-Avg	--	--	-0.9	-0.3	-0.7
School	2008	1.8	0.8	--	--	--
	3-Yr-Avg	1.7	-0.1	--	--	--
Vernon	2008	--	--	--	-1.3	-1.0
	3-Yr-Avg	--	--	--	-0.2	-1.7
School	2008	1.1	1.9	--	--	--
School	2008	--	--	-0.5	-0.1	1.1
	3-Yr-Avg	--	--	-0.4	0.0	0.3
School	2008	-0.8	-0.7	--	--	--
	3-Yr-Avg	-0.3	0.0	--	--	--
School	2008	0.5	0.0	--	--	--
	3-Yr-Avg	-0.1	0.0	--	--	--
School	2008	-1.3	-0.0	--	--	--
	3-Yr-Avg	0.2	0.1	--	--	--
School	2008	2.3	-2.6	--	--	--
	3-Yr-Avg	2.4	-1.1	--	--	--
School	2008	-0.3	1.6	--	--	--
	3-Yr-Avg	0.1	0.7	--	--	--
School	2008	0.3	-0.9	--	--	--
	3-Yr-Avg	2.0	0.6	--	--	--
School	2008	-1.1	2.4	--	--	--
	3-Yr-Avg	-0.4	1.9	--	--	--
School	2008	0.5	-1.4	--	--	--
	3-Yr-Avg	0.4	-0.7	--	--	--
School	2008	-2.9	-2.0	--	--	--
	3-Yr-Avg	-1.6	-1.5	--	--	--
School	2008	1.7	1.1	--	--	--
	3-Yr-Avg	0.5	-0.4	--	--	--
School	2008	-0.7	0.8	--	--	--
	3-Yr-Avg	0.4	0.0	--	--	--
School	2008	-0.4	-0.2	--	--	--
	3-Yr-Avg	-0.5	0.0	--	--	--

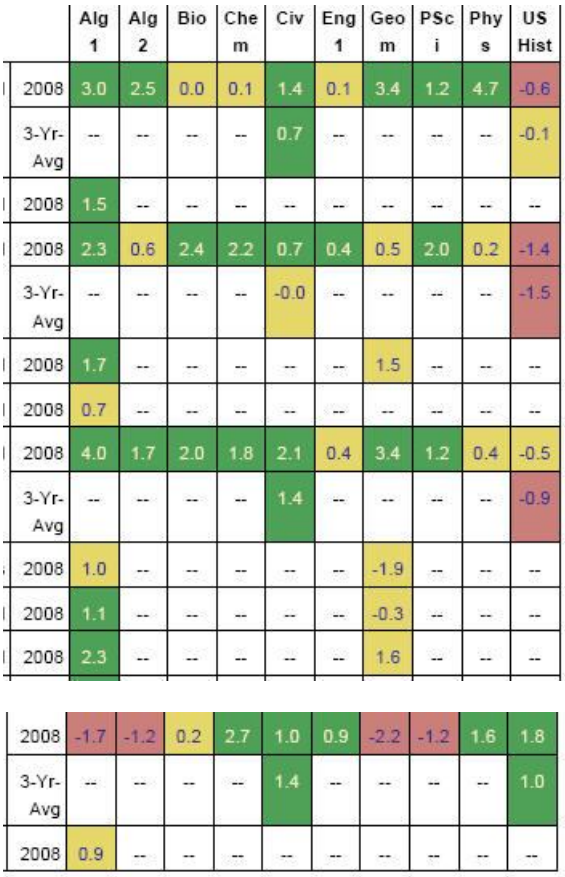
School	2008	--	--	0.4	1.1	1.3
	3-Yr-Avg	--	--	1.1	1.1	1.1
School	2008	1.5	2.8	--	--	--
School	2008	-0.8	-1.8	--	--	--
	3-Yr-Avg	0.1	-1.5	--	--	--
School	2008	2.4	0.3	--	--	--
	3-Yr-Avg	2.5	0.5	--	--	--
School	2008	0.6	0.3	--	--	--
	3-Yr-Avg	2.1	1.0	--	--	--
School	2008	--	--	4.6	1.2	1.0
	3-Yr-Avg	--	--	4.3	2.0	2.6
School	2008	-1.9	-1.4	--	--	--
School	2008	-0.3	-0.4	--	--	--
	3-Yr-Avg	0.1	-0.8	--	--	--
School	2008	0.2	-1.6	--	--	--
	3-Yr-Avg	0.9	-0.2	--	--	--
School	2008	-0.1	-0.6	--	--	--
	3-Yr-Avg	0.0	-0.9	--	--	--
School	2008	0.7	-1.3	--	--	--
	3-Yr-Avg	1.0	-1.3	--	--	--
School	2008	-0.6	-0.8	--	--	--
	3-Yr-Avg	0.2	0.1	--	--	--
School	2008	-0.0	-0.3	--	--	--
	3-Yr-Avg	-0.1	-0.2	--	--	--
School	2008	1.5	-1.8	--	--	--
	3-Yr-Avg	0.2	-1.5	--	--	--
School	2008	-0.6	-0.7	--	--	--
	3-Yr-Avg	1.1	0.6	--	--	--
School	2008	--	--	-0.1	0.2	0.8
	3-Yr-Avg	--	--	0.5	-0.3	-0.1
School	2008	1.4	-1.0	--	--	--
	3-Yr-Avg	2.0	-0.7	--	--	--

School	2008	-0.0	1.4	--	--	--
	3-Yr-Avg	0.6	0.0	--	--	--
School	2008	--	--	-0.2	0.4	1.1
	3-Yr-Avg	--	--	0.0	1.1	1.4
School	2008	-2.4	-2.2	--	--	--
	3-Yr-Avg	-0.5	-0.2	--	--	--
School	2008	-0.7	0.5	--	--	--
	3-Yr-Avg	0.9	0.4	--	--	--
School	2008	0.5	2.4	--	--	--
	3-Yr-Avg	0.0	2.9	--	--	--
School	2008	-2.0	0.6	--	--	--
	3-Yr-Avg	-0.6	0.4	--	--	--
School	2008	--	--	-0.7	--	--
School	2008	--	--	1.5	-0.2	0.1
	3-Yr-Avg	--	--	1.9	0.4	1.0
School	2008	-1.4	0.7	--	--	--
	3-Yr-Avg	0.1	0.2	--	--	--
School	2008	--	--	1.9	0.4	0.8
	3-Yr-Avg	--	--	1.7	0.6	1.2
School	2008	--	--	-0.4	-1.4	-0.7
	3-Yr-Avg	--	--	-0.2	-1.1	-0.4
School	2008	2.1	0.5	--	--	--
	3-Yr-Avg	-0.8	-0.7	--	--	--
School	2008	0.5	-0.4	--	--	--
	3-Yr-Avg	1.1	-0.2	--	--	--
School	2008	2.7	1.4	--	--	--
	3-Yr-Avg	1.2	0.5	--	--	--
School	2008	-0.3	0.8	--	--	--
	3-Yr-Avg	0.4	1.3	--	--	--
School	2008	-0.1	-1.9	--	--	--
	3-Yr-Avg	1.6	-0.1	--	--	--
School	2008	2.7	1.2	--	--	--
	3-Yr-Avg	2.2	1.0	--	--	--

Progress significantly Above the average school in the state.
Progress Not Detectably Different from the average school in the state.
Progress significantly Below the average school in the state.
-- The school does not have data for this test and subject in the most recent year.

Figure A2. Observable Variability among WCPSS Middle Schools (expressed in Algebra I scale) and High Schools (expressed in scale of test subject reported)

Note: Reference is North Carolina State Average. Rows are school level and will include 2008 results as well as a 3-yr average when 3 years are available. Columns are specific to a test, and the colors within a column represent different levels of effectiveness for schools in a particular subject. Students in schools with green cells are making more academic progress than other comparably prepared students in North Carolina. Students in schools with yellow cells are making about the same progress as other comparably prepared students in the state. Students in schools with red cells are making decidedly less progress than other comparably prepared students in the state. Schools with only Algebra I (Alg 1) are likely middle schools.



	Alg 1	Alg 2	Bio	Chem	Civ	Eng 1	Geom	PSci	Phys	US Hist
2008	3.0	2.5	0.0	0.1	1.4	0.1	3.4	1.2	4.7	-0.6
3-Yr-Avg	--	--	--	--	0.7	--	--	--	--	-0.1
2008	1.5	--	--	--	--	--	--	--	--	--
2008	2.3	0.6	2.4	2.2	0.7	0.4	0.5	2.0	0.2	-1.4
3-Yr-Avg	--	--	--	--	-0.0	--	--	--	--	-1.5
2008	1.7	--	--	--	--	--	1.5	--	--	--
2008	0.7	--	--	--	--	--	--	--	--	--
2008	4.0	1.7	2.0	1.8	2.1	0.4	3.4	1.2	0.4	-0.5
3-Yr-Avg	--	--	--	--	1.4	--	--	--	--	-0.9
2008	1.0	--	--	--	--	--	-1.9	--	--	--
2008	1.1	--	--	--	--	--	-0.3	--	--	--
2008	2.3	--	--	--	--	--	1.6	--	--	--
2008	-1.7	-1.2	0.2	2.7	1.0	0.9	-2.2	-1.2	1.6	1.8
3-Yr-Avg	--	--	--	--	1.4	--	--	--	--	1.0
2008	0.9	--	--	--	--	--	--	--	--	--

2008	-1.7	-1.2	0.2	2.7	1.0	0.9	-2.2	-1.2	1.6	1.8
3-Yr-Avg	--	--	--	--	1.4	--	--	--	--	1.0
2008	0.9	--	--	--	--	--	--	--	--	--

2008	2.3	1.5	-0.3	0.6	-0.1	0.5	-0.7	1.8	-1.6	0.8
3-Yr-Avg	--	--	--	--	0.7	--	--	--	--	1.1
2008	-1.4	--	--	--	--	--	--	--	--	--
2008	0.0	-1.3	1.3	2.0	0.7	-0.2	0.4	-2.4	0.3	1.2
3-Yr-Avg	--	--	--	--	0.0	--	--	--	--	1.2
2008	3.8	3.4	1.8	2.1	1.0	0.3	0.4	1.3	2.5	0.9
3-Yr-Avg	--	--	--	--	0.7	--	--	--	--	1.2
2008	1.7	--	--	--	--	--	--	--	--	--
2008	-1.0	--	--	--	--	--	--	--	--	--
2008	2.4	1.0	1.4	1.6	1.7	0.2	0.7	-1.3	2.5	0.0
2008	-0.9	0.3	0.3	-2.3	0.6	-0.3	1.5	0.7	0.4	-2.2
3-Yr-Avg	--	--	--	--	1.0	--	--	--	--	-1.2

2008	2.4	--	--	--	--	--	--	--	--	--
2008	2.3	--	--	--	--	--	--	--	--	--
2008	-1.8	--	--	--	--	--	--	--	--	--
2008	-1.8	--	--	--	--	--	--	--	--	--
2008	-2.1	1.6	--	-1.0	0.3	0.0	0.4	1.9	--	1.0
2008	-1.3	1.2	-1.0	--	--	-1.9	-0.4	-2.1	0.4	-0.8
2008	-2.7	-1.0	-2.8	3.3	--	-0.7	-3.8	--	--	-2.2
3-Yr-Avg	--	--	--	--	--	--	--	--	--	-1.5
2008	-3.9	-1.7	-2.2	--	--	-1.1	-4.0	-3.2	-4.1	-0.7
2008	-1.6	--	--	--	--	--	--	--	--	--

2008	3.3	1.3	1.5	1.3	1.1	0.7	2.3	-1.7	-0.6	-1.4
3-Yr-Avg	--	--	--	--	1.9	--	--	--	--	0.5
2008	0.7	--	--	--	--	--	--	--	--	--
2008	3.5	1.9	--	--	--	--	1.6	--	--	--
2008	--	--	--	--	--	-0.6	--	--	--	--
2008	5.5	--	--	--	--	--	--	--	--	--
2008	3.2	--	--	--	--	--	-0.2	--	--	--
2008	3.0	1.4	3.7	-0.2	1.3	0.1	-0.1	0.8	-0.1	1.3
3-Yr-Avg	--	--	--	--	0.8	--	--	--	--	0.5
2008	0.9	1.1	1.2	3.6	0.2	1.1	0.3	-0.0	4.1	-1.0
3-Yr-Avg	--	--	--	--	0.2	--	--	--	--	-0.1

2008	-3.1	--	--	--	--	--	--	--	--	--
2008	2.5	-1.7	1.5	2.9	2.0	0.6	0.4	1.2	3.9	-0.9
3-Yr-Avg	--	--	--	--	2.2	--	--	--	--	0.2
2008	-0.1	--	--	--	--	--	--	--	--	--
2008	2.0	1.6	0.7	-2.5	2.1	0.9	-0.2	0.8	-0.6	-1.3
2008	-1.7	-1.8	-3.4	--	-0.5	-0.3	-2.8	-4.1	--	-4.1
3-Yr-Avg	--	--	--	--	-1.2	--	--	--	--	-3.3
2008	1.7	--	--	--	--	--	--	--	--	--
2008	4.1	--	--	--	--	--	--	--	--	--
2008	4.1	1.5	1.7	4.1	0.7	1.4	3.5	2.9	4.3	-0.0
3-Yr-Avg	--	--	--	--	1.1	--	--	--	--	-0.2
2008	1.3	1.2	-0.9	-5.2	0.3	0.5	-0.5	-3.8	3.2	-2.3
3-Yr-	--	--	--	--	0.2	--	--	--	--	-1.5

Progress significantly Above the average school in the state.

Progress Not Detectably Different from the average school in the state.

Progress significantly Below the average school in the state.

-- The school does not have data for this test and subject in the most recent year.

Figure A3. Observable Similarity among WCPSS SAT School Math Effects

Note: Reference is North Carolina State Average. Rows are school level and will include 2008 results. Columns are specific to a test, and the colors within a column represent different levels of effectiveness for schools in a particular subject. Results are reported in the scaling units of the test reported. Students in schools with green cells are making more academic progress than other comparably prepared students in North Carolina. Students in schools with yellow cells are making about the same progress students in schools serving comparably prepared students.

	Comp	Math	Verb	Wrt
2008	61.2	38.6	21.7	30.8
2008	43.9	30.1	13.0	15.9
2008	68.3	33.4	33.8	26.0
2008	-10.4	-0.6	-9.1	-11.5
2008	-13.9	-1.6	-11.4	-8.0
2008	43.1	26.4	15.8	11.9
2008	-2.3	0.7	-3.2	-10.1
2008	78.1	43.1	32.9	42.6
2008	13.8	7.9	5.5	4.2
2008	63.6	38.5	24.0	28.0
2008	25.7	11.8	13.3	9.1
2008	34.9	21.6	12.6	15.5
2008	51.1	29.1	21.2	37.9
2008	45.3	24.4	19.9	23.9
2008	16.2	5.6	10.4	12.5
2008	40.2	23.3	16.0	18.0
2008	40.1	22.4	17.0	17.2
2008	82.5	35.9	45.5	57.5

Progress significantly Above the average school in the state.
Progress Not Detectably Different from the average school in the state.
Progress significantly Below the average school in the state.
-- The school does not have data for this test and subject in the most recent year.