Closing the Mathematics Achievement Gap in High Poverty Middle Schools: Enablers and Constraints

Robert Balfanz and Vaughan Byrnes

Center for Social Organization of Schools, Johns Hopkins University

Reprint requests to: Dr. Robert Balfanz, 3003 N. Charles St. Suite 200, Baltimore, Maryland, 21218

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Abstract

National and international comparisons have found that the mathematics achievement levels of US students fall far behind those of other developed nations, and that within the US itself, the students who are falling behind come predominantly from high poverty and high minority areas. This paper reports on a series of analyses that followed 4 cohorts of students from 3 such schools through the middle grades, 4th to 8th grade, where studies have found the mathematics achievement gap to develop most rapidly. The cohorts followed in these analyses attended schools that were implementing whole-school reform models, that implemented research based and proven curriculums, subject specific teacher training and professional development, multiple layers of teacher and classroom support, as well as school climate reforms. The research found that students at these schools implementing the whole-school reform models made greater progress in closing the mathematics achievement gap than at the other 23 high poverty high minority schools in their district. The paper also finds that in all the schools, while a significant proportion of students were successfully closing the achievement gap, the majority of students were still falling further behind. Using the results from a Binary Logistic Regression model, the paper then shows which factors were key in enabling or constraining a students' ability to close the achievement gap during their middle school years. The paper concludes that various student, classroom, and school level factors are all key in helping students to close the gap and that whole-school reform models, while often time and cost intensive, address issues at all of these levels and may be more able to effect the

achievement gap than other more simply implemented reforms that many school districts favor. It also concludes that while few detailed analytical studies that follow entire cohorts of students through their middle school years exist, more are needed for better understanding the factors that effect students' performance in the middle grades and what changes are needed for further improvement.

Keywords

Middle; School; Reform; Model; Mathematics; Achievement; Gap; Cohorts;

Text

For many high poverty students, the middle grades are where achievement gaps in mathematics become achievement chasms. Nearly all high poverty students enter kindergarten with the most basic mathematical knowledge at hand, they can count and recognize basic shapes (West, Denton, & Reaney 2000), but many end middle school ill-prepared to succeed in a rigorous sequence of college preparatory mathematics courses in high school (Balfanz, McPartland, & Shaw, 2002). National and international comparisons of student achievement indicate that it is between 4th and 8th grade where U.S. students in general, and minority and high poverty students in particular, fall rapidly behind desired levels of achievement (Beaton et al., 1996; Schmidt et al., 1999). In nearly all of the nation's states there is a 30 to 50 percentage point difference between white students and the largest minority group in the percent of students scoring at basic on the 8th grade NAEP exam (Blank & Langesen, 1999). Many of these minority students, in turn, are concentrated in high poverty urban schools. For the minority students attending these schools, and the nation as a whole, high concentrations of students with low mathematical proficiency at the end of the eighth grade has serious consequences. The ability to succeed in college preparatory mathematics courses in high school has been linked to success in post-secondary schooling and to life-long opportunities for success (Pelavin & Kane, 1990; U.S. Department of Education, 1997). In addition, large concentrations of poor and minority students that receive weak academic preparations in their middle school years help to create neighborhood high schools in our nation's largest cities that function as

little more than dropout factories rather than stepping stones to a strong education and upward mobility (Balfanz & Legters, 2001).

Many explanations have been offered to explain the middle grades mathematics achievement gap. Weak and unfocused curriculums (Schmidt et al 1999), shortages of skilled, trained, and knowledgeable mathematics teachers (National Commission on Mathematics and Science Teaching, 2000), unequal opportunities to learn challenging mathematics (Raudenbush, Fotiu& Cheong 1998) , under-motivated students (Bishop 1999) , and the turbulence of early adolescence have all been advanced based on credible, if not always comprehensive or incontrovertible, evidence as plausible causes. Each has also brought its own set of reforms. The last decade has seen the advent of more challenging learning standards and higher stakes accountability systems for schools and students, the movement towards smaller learning communities in large middle schools or the conversion of middle schools into K-8's (in efforts to create more personalized learning environments), the spread of research-based mathematics curriculums, and attempts to develop and maintain a stronger corps of middle grades mathematics teachers (Burrill 1998). Yet, while there has been an overall upward trend in elementary and to some extent middle school mathematics achievement during this period and some notable success in high poverty schools, there has been no dramatic and widespread shrinking of the middle grade mathematics achievement gap between more and less advantaged students (Lee 2002).

One possible explanation for this is that the relatively easy and inexpensive legislative reforms which primarily effect the context of learning-increased graduation requirements, higher stakes testing, and district or statewide standards-have been enacted

with some force in the high poverty middle schools that many poor and minority students attend. The more expensive and difficult reforms, however, which directly impact classroom practice-strong instructional programs, more supported, better trained, and more knowledgeable mathematics teachers, and improved learning climates-have not, by and large, been implemented successfully on a broad scale in high poverty, high minority middle schools (Balfanz, Ruby, & Mac Iver 2002). Thus, while the push for higher levels of achievement may have increased, the tools needed to make it happen broadly in high poverty middle schools may not have followed in sufficient scope and magnitude.

A second possible explanation is that we don't know enough about the origins and contours of the middle grades mathematics achievement gap, particularly among poor and minority students who enter the middle school behind grade level, to develop sufficiently targeted interventions. Simply put, few large scale data sets exist or have been developed which enable poor and minority students to be followed longitudinally over the middle grades at the classroom level, where teaching and learning occur. Consequently, nearly all our theories and explanations of the achievement gap are based on correlations, cross-sections, and/or national or state level comparisons many levels removed from classroom teaching and learning. As a result, many of our insights are based on mean or average levels of group performance rather than close analysis of individual or classroom level achievement growth patterns over the middle grades that would enable a closer examination of the factors that enable and constrain the closing of the mathematics achievement gap.

This paper presents evidence to support both possibilities. It examines gains in mathematical achievement of multiple cohorts of high poverty middle grades students

between the 4th and 8th grades in the school district of Philadelphia over the past six years. It finds that the first three schools in the district to implement a comprehensive set of instructional, teacher support, and school climate reforms (embedded in the Talent Development Middle Schools reform model) had significantly greater numbers of students close their mathematics achievement gaps than the other 23 middle schools in the district which also serve high poverty and high minority student bodies. It also finds strong bi-modal tendencies in the achievement growth patterns of high poverty middle grades students who enter middle school behind grade level. Across all the high poverty middle grade schools in the district, a significant number of students who entered middle school behind grade level left 8th grade much closer to grade level and in some cases at or above it. For these students, something about their middle grades mathematics experience worked. The majority of students who attended high poverty middle schools, however, left eighth grade farther, often considerably farther behind grade level, than when they entered middle school.

The finding that significant numbers of high poverty students closed their mathematics achievement gaps during middle school shows that it can be done and alerts us to the need to search for the factors that enable it. The fact that most students did not close their gaps simultaneously signals the need to better understand the factors that constrain achievement growth in the middle grades. The remainder of this paper reports on our initial findings.

Data and Methods

In order to better understand what enables and constrains students from closing achievement gaps during the middle school years in large urban, high poverty, minority-dominated schools, we have looked at a wealth of data collected in the Philadelphia School District over a 6 year time period. In this paper we further focus our analysis on three middle schools-Central East, Cooke, and Beeber-which are demographically representative of the district's other high poverty, high minority schools-but different in that they were implementing a comprehensive whole school reform model (Talent Development Middle Schools) during the time period under study. This enables us to examine both the impact of comprehensive reform and examine the factors which enable and constrain mathematics achievement gains in the middle grades of schools that where implementing many of the reforms being proposed to close minority achievement gaps (strong instructional programs, increased teacher support and training, and enhanced school learning climates).

Demographic and school data presented in Table 1, from the 1996-97 school year, shows that the majority of students in these three schools are minority students from low-income families, and that the schools suffer from high student turnover and extremely large class sizes, emphasizing the difficult settings in which education occurs for these students who enter middle school already far behind state and national averages (13-15th percentile on 5th grade (PSSA) state achievement test).

INSERT TABLE 1 HERE

Students were included in the analyses if we had data for their pre-test, post-test (on the Stanford-9 Achievement test), gender, race, school, cohort, effort (survey response), behavior, and attendance. Under these constraints data was available for a total of 1,233 students from 4 cohorts at the 3 schools (See Appendix 1, Tables A1 and A2 for Sample Characteristic). From the sample data, we also see that students for whom we had all the necessary data had slightly higher attendance rates than the school averages, not a surprise as the more data present for the student, the more likely it was that they were at school on a regular basis and their data recorded. The data used in this study was provided by the Philadelphia City School District and supplemented by additional testing and surveying done by the Talent Development program.

The first cohort began 5th grade in 1996-97, the second in 1997-98, the third in 1998-99, and the fourth in 1999-00. They finished 8th grade in 1999-00, 2000-01, 2001-02, and 2002-03, respectively. Due to testing limitations, the cohorts were not measured through all of middle school but by various lengths of time depending on the cohort and the middle school. Cohorts 2, 3 and 4 were measured through 5th, 6th and 7th grades in CEMS and Cooke, and only 6th and 7th grades in Beeber. Cohort 1 was measured through 5th, 6th, 7th and 8th grades in CEMS, 6th, 7th and 8th grades in Cooke, and not at all in Beeber. While most Cohorts were first tested (pre-test) in the spring, Cohorts 2, 3, and 4 in Beeber and Cohort 1 in Cooke were all pre-tested in the fall.

Logistical Regression Analysis was conducted to determine the impact of certain enabling and constraining factors in whether or not students were able to close achievement gaps during their middle school years. In the regression models that were run, the outcome measured was whether students were “Catching Up” during middle

school years. This was determined by a dummy variable coded '1' if a student gained more Grade Equivalents on the SAT-9 standardized test than time spent in school (i.e.: if a student gained more than 3.0 Grade Equivalents during a 3 year time span) and '0' if they gained fewer GEs than the time elapsed.

The factors we were able to control for were a student's average attendance rate over the time span, their average behavior mark in classes, their ethnicity, what cohort they were in, which of the three schools they attended, their effort in Math class (as determined by their responses to the question "How hard are you working in Math class?" on the Talent Development Student Survey, given a 1 to 7 response scale, 1 being 'Not hard at all' and 7 'As hard as I can') and finally what percent of their homerooms during the time span were 'High Gain Homerooms' (a High Gain Homeroom being one in which the class average gain on the SAT-9 test was more than the time elapsed in terms of Grade Equivalents). Students' gender was also available but the only factor not to prove significant.

Findings

<u>High Poverty Middle Grades Mathematics Achievement Growth Appears to Follow a Bi-Modal Pattern</u>

The most striking evidence from the study is the bi-modal distribution of gains across the middle schools and cohorts. This can be seen in Table 2. Looking first at the average gain by each cohort within each school, we see that the average gain in terms of Grade Equivalents is almost equal to, and in some cases greater than, the amount of time

measured in Middle School. This implies that the cohorts in each school are staying on course, gaining as much as is expected by national standards, and in some cases even surpassing them. However, when the gains are broken down by those who 'Caught-up' and those who did not, we see that those 44% of students who 'Caught-up' gained significantly more than expected while those who did not fell far behind national standards. We also see from Table 3 that in each school and cohort, both groups started off middle school below grade equivalency, and so those who 'Caught-up' over the time measured made great strides in getting back to national norms, while those who did not continued to fall even further back before reaching High School.

INSERT TABLE 2 HERE

We see a similar pattern when looking at the other 23 high poverty, high minority middle schools (80%+ minority, 80%+ low income families) in the Philadelphia School District. As seen in Table 3, roughly a fifth to a quarter of the students are gaining through the middle school years while the others continue to fall further behind in terms of grade equivalencies.

INSERT TABLE 3 HERE

This bi-modal distribution is also triangulated and confirmed by looking at the results of the three Talent Development Middle Schools and the district's other 23 high poverty high minority middle schools on the state assessment-the PSSA, a standardized

test administered state wide by the Pennsylvania Department of Education (Table 4). The PSSA scores are not reported in terms of grade equivalencies, but looking at state percentiles, another group-normed measure, we see that middle school students are gaining on average 2 to 5 state percentiles but that there is a great distinction between two groups. Roughly a third to a quarter of students are gaining more than 20 state percentiles while the other two-thirds to three-quarters of the students are losing 2 to 3 percentiles and falling further behind the majority of the student population.

INSERT TABLE 4 HERE

A Higher Percent of Students in Talent Development Middle Schools Had "Catch-Up" Gains

From Tables 3 and 4, we can also see that the cohorts at Talent Development Middle Schools appear to be doing better over the middle school years than those students at the district's other high minority high poverty middle schools. T-tests confirm that the differences between the two groups of schools hold up as statistically significant. On the SAT-9 standardized test, the 27% of TDMS students catching up is significantly greater than the comparable 19% in the rest of the district at the .001 level (*p*=0.000**; t*=7.311;df=13696*). For the state administered PSSA exam, 33% of TDMS students gained more than 10 state percentiles while only 24% of students in the district's other schools gained as much, a difference significant at the .001 level (*p*=0.000**; t*=8.167;df=13003*). For the 9 groups included in our regression analysis (4 cohorts at two school and 3 at a third school), we find an average of 42% of students "catching up" on the SAT-9, although we know the students in the analysis had a higher than average

attendance rate. Graph 1, below, shows the percent of students gaining more than 10 state percentiles on the PSSA for each of the district's 26 high minority high poverty middle schools, the two oldest TDMS schools achieving the highest percents in the entire district.

INSERT GRAPH 1 HERE

Factors which Enable and Constrain "Catching Up"

When we break down the SAT-9 gains made by both students who 'Caught-up' and those who did not, we find that there is no immediately discernable pattern in their gains from year to year. Students who are 'Catching Up' do not gain consistently each year, and neither group tends to gain more in early or later years in any consistent fashion (See Appendix 1, Table B).

Though puzzling at first, this seems less surprising when examining the results from the Logistic Regression Model. When we entered students' behavior marks, attendance rates, effort in math class, and the percent of their homerooms that were high-gain homerooms, no one single factor is far more predictive of catching up than another, and all are highly significant in effecting a student's odds of catching up during his/her middle school years (see Appendix 1, Table C). The variation between the different cohorts, the advantage of being placed in a highly effective homeroom one year (but maybe not the next), the effect of a student's attendance (susceptible to a student's health and family life), the student's effort in class, and their behavior in school, as well as the

variation between all three schools, can all cause large swings in a student's year to year gains for both students who 'Catch-up' and those who do not.

In order to provide a clearer sense of the impact of each of these variables, we constructed graphs that show how changes in each of the variables impacts a students odds of catching up, holding the other factors steady at the sample averages.

High Gain Classrooms

For the percent of high-gain homerooms that a student passed through (the percent of their homerooms where the class averaged grade equivalent gains of more than a year) there was a 37% difference in the probability of catching up between a student who went through no high-gain homerooms and a student for whom all their homerooms were high-gain. For the sample, 13% of students had 0% high-gain homerooms; 3% of students had 25%; 32% of students had 33%; 20% of students had 50%; 18% of students had 67%; and 14% of students had 100%.

INSERT GRAPH 2A HERE

Attendance

There was a 20% difference in the probability of "catching up" for a student who had a 60% attendance rate versus a student who attended every day of school during the three to four years measured. In the sample, 47% of students had attendance rates of 95% or higher; 30% had attendance rates greater than or equal to 90% but less than 95%; 14%

had attendance rates greater than or equal to 85% but less than 90%; and 9% of students had attendance rates lower than 85%.

INSERT GRAPH 2B HERE

Effort

Students who said they were "working as hard as I can" in math class (responses of 7 on the scale) had a 19% greater probability of "catching up" than did students who said they were "not working hard at all" in math class (responses of 1 on the scale). Half the sample (49% of students) said they were working towards the highest end of the scale (response averages higher than 6 on a scale of 1 to 7), while 41% responded in the middle of the scale (response averages less than or equal to 6 but greater than 4; the remaining 10% of students said they were working at the lower end of the scale (response averages of 4 or less).

INSERT GRAPH 2C HERE

Behavior

There was a 22% difference in the probability of catching up for students who averaged behavior marks of excellent (score of 1) compared to those who averaged behavior marks of unsatisfactory (score of 3). Half the sample (49%) averaged behavior

marks near excellent while the other half (51%) had marks closer to satisfactory or unsatisfactory.

INSERT GRAPH 2D HERE

Discussion

The graphs used to illustrate the logistic regression analysis vividly indicate that both opportunity to learn and individual level factors enable and constrain the closing of mathematics achievement gaps in high poverty middle schools. The graphs also show that there is no single magic bullet. No one factor alone significantly enables or constrains more than several others. Schools need to provide teachers and classrooms that enable the average student to gain more than a grade equivalent of mathematical skill and knowledge per year for multiple years. At the same time students need to show up, behave in class, and try hard to learn. When these factors come together, achievement gaps close. Of the students from the sample who were in the high end for all these categories (at least two-thirds of their homerooms were 'High gain,' they had attendance rates of 95% or higher, averaged behavior marks of around 'Excellent', and put forth greater effort in math class), a remarkable 77% were 'catching up' during their middle school years.

This highlights the importance of comprehensive whole school reforms for high poverty schools. A solitary focus on either classroom, teacher, or student variables is not enough. It appears that all three have to be impacted in positive manners, in simultaneous fashions to create the teaching and learning conditions which enable

students to close their mathematics achievement gaps and leave middle school ready to succeed in challenging high school courses. High poverty schools need strong instructional programs and sustained and intensive teacher support to provide students with the opportunity to attend a "high gain" classrooms every year. They need organizational reforms which to create stronger student-teacher bonds and more caring and daring classroom environments which promote student effort and improve attendance. They need climate programs which reward positive behavior, have clear and consistent sanctions for negative behavior, and specific strategies to reduce and eventually eliminate out of control classrooms in which little or no learning can occur. And they need these elements to be implemented to be in place at the same time in a continuous fashion.

At the same time these findings signal the difficulty of strongly implementing and sustaining comprehensive and integrated whole school reforms in high poverty schools. Although significantly higher numbers of students made "catch up" gains in the three Talent Development Middle Schools compared to the other high poverty, high minority concentration middle schools in the district, the odds of students consistently experiencing high gain classrooms throughout middle school varied considerably from cohort to cohort within the Talent Development schools and for most students did not approach 75 %.

Finally, these initial findings demonstrate both the utility of following large numbers of high poverty middle grade students at the classroom level as they move through middle school and the many unanswered questions which remain to be explored. For example, the factors that work to create high gain classrooms need to be better

understood, as do the factors that effect school climate and induce students to attend more often, work harder, and behave better in their classes.

Conclusion

High poverty students who enter the middle grades below grade level in mathematics appear to follow one of two dramatically different paths through middle school. For a significant number of the students in the cohorts examined something positive happened in middle school. A string of good teachers and successful instructional experiences, a new found self confidence in mathematics, increased effort, and/or better attendance in some combination combined to create an effective teaching and learning experience in the middle grade mathematics, and these students learned. They made large achievement gains, substantially closed their achievement gaps, and in some cases left 8th grade performing above grade level. For the majority of high poverty students in the cohorts examined, however, middle school mathematics was not a successful experience. They entered the middle grades behind grade level, and left even further behind, unprepared to succeed in challenging high school courses without substantial and sustained doses of extra-help. For these students both individual actions- poor attendance, bad classroom behavior, and lack of effort- appear to have played a constraining role but so too did the fact that they experienced few if any high gain classrooms as they passed through middle school.

The longitudinal individual level data set examined in this study provides some evidence to support both the hypothesis presented at the outset on why a mathematics

achievement gaps continue to exist between minority and majority and advantaged and disadvantaged students despite wave after wave of reform efforts over the past twenty years. The fact that the three high poverty middle schools that implemented reforms which directly effected classroom practice-a strong school-wide instructional program in mathematics, significantly increased teacher support and training (including in-classroom non-evaluator peer coaching), and organizational reforms to improve student-teacher interactions (looping, small learning communities, teacher teams)-produced significantly higher percentages of students who made "catch-up gains" suggests that these reforms had yet to reach the other 23 high poverty, high minority concentration middle schools in the district. At the same time, the fact that regression analysis which included percent of high gain classrooms a student experienced, attendance, behavior and effort still left more unexplained than explained regarding the factors that enable and constrain the closing of achievement gaps argues that we still have much left to learn and understand about this process.

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Tables

TABLE 1-School Demographics

	CEMS	Cooke	Beeber
% White	13%	1%	1.0%
% Black	28%	77%	98.5%
% Hispanic	47%	9%	0.5%
% Asian	12%	13%	0%
Student Attendance Rate	90%	87%	90%
% Low Income families	86%	87%	71%
% 8th Graders in School Previous Year	76%	68%	85%
Percent of Classes with 30 or more students	79%	62%	100%
Teacher Attendance Rate	93%	93%	94%
Mean State Percentile 5th Grade PSSA	16.6	13.6	N/A
Mean State Percentile 8th Grade PSSA	19.4	16.3	23.7

TABLE 2-Average Gains Over Middle School

School/ Cohort	Time in Terms of GE	Overall Gain	Catching Up	Net Gain Mean	Pre-Test Behind GE	Post-Test Behind GE
Beeber 2 (F6-S7)	1.6	+1.1	No (68%)	+0.5	-0.7	-1.7
			Yes (32%)	+2.3	-2.2	-1.4
Beeber 3 (F6-S7)	1.6	+1.5	No (46%)	+0.5	-0.9	-2.0
			Yes (54%)	+2.4	-1.7	-0.8
Beeber 4 (F6-S7)	1.6	+2.1	No (26%)	+0.6	-1.0	-1.9
			Yes (74%)	+2.6	-1.9	-0.8
Cooke 1 (F6-S8)	2.6	+3.0	No (42%)	+1.9	-2.0	-2.6
			Yes (58%)	+3.8	-2.1	-0.8
Cooke 2 (S4-S7)	3.0	+2.8	No (68%)	+2.1	-1.4	-2.4
			Yes (32%)	+4.2	-1.1	+0.2
Cooke 3 (S4-S7)	3.0	+2.9	No (57%)	+2.1	-1.0	-2.0
			Yes (43%)	+4.0	-0.7	+0.3
Cooke 4 (S4-S7)	3.0	+3.2	No (60%)	+2.3	-1.2	-2.0
			Yes (40%)	+4.6	-0.5	+1.1
CEMS 1 (S4-S8)	4.0	+3.5	No (60%)	+2.5	-0.4	-2.0
			Yes (40%)	+5.1	-0.0	+1.2
CEMS 2 (S4-S7)	3.0	+2.5	No (67%)	+1.5	-0.0	-1.5
			Yes (33%)	+4.6	+0.3	+1.9
CEMS 3 (S4-S7)	3.0	+2.2	No (81%)	+1.5	-0.5	-2.0
			Yes (19%)	+5.2	+0.2	+2.4
CEMS 4 (S4-S7)	3.0	+2.8	No (65%)	+1.7	-0.3	-1.6
			Yes (35%)	+4.8	+0.6	+2.4

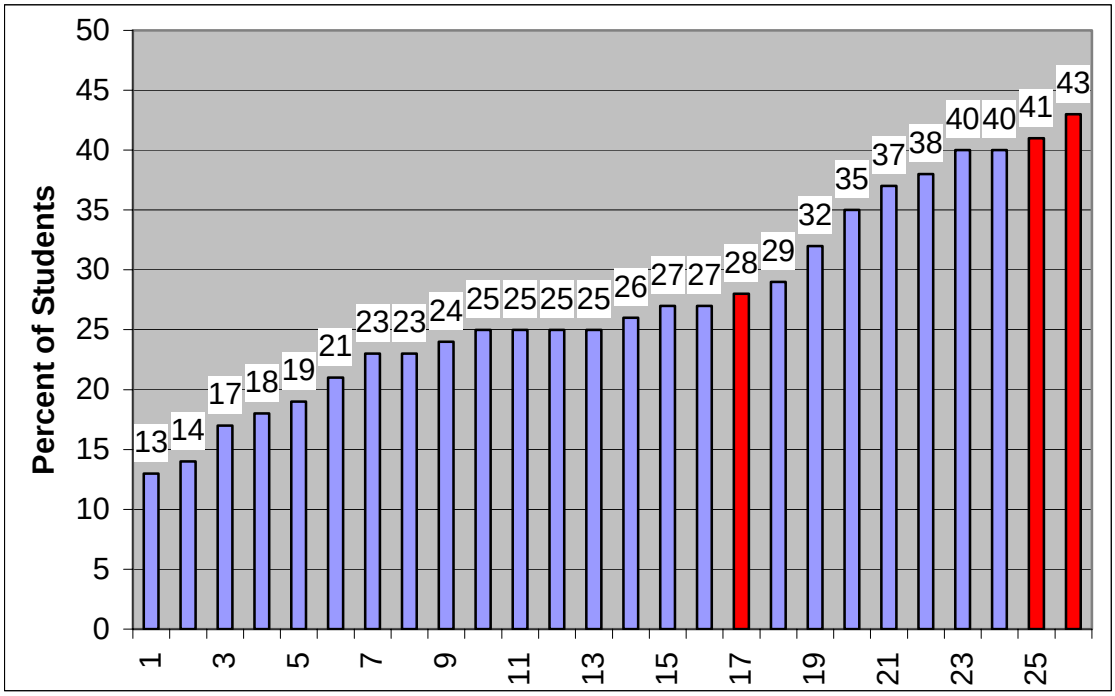
TABLE 3-District Comparison-Other High Poverty, High Minority Middle School
(23 Schools, 11,868 Students)

Cohort	Time in Terms of GE	Overall Gain	Catching Up	Net Gain Mean	Pre-Test Behind GE	Post-Test Behind GE
Cohort 2 (S4-S7)	3.0	+2.1	No (81%)	+1.6	-0.9	-2.3
			Yes (19%)	+4.2	-0.9	+0.3
Cohort 3 (S4-S7)	3.0	+1.9	No (84%)	+1.6	-0.8	-2.2
			Yes (16%)	+4.0	-1.0	0.0
Cohort 4 (S4-S7)	3.0	+2.3	No (77%)	+1.8	-0.8	-2.0
			Yes (23%)	+4.2	-1.0	+0.2
All 3 Cohorts	3.0	+2.1	No (81%)	+1.6	-0.8	-2.2
			Yes (19%)	+4.1	-1.0	+0.1
TDMS Comparison Group N= 1,830	3.0	+2.5	No (72%)	+1.7	-0.7	-2.0
			Yes (28%)	+4.4	-0.4	+1.0

TABLE 4-PSSA Gains-Cohorts 1,2,3

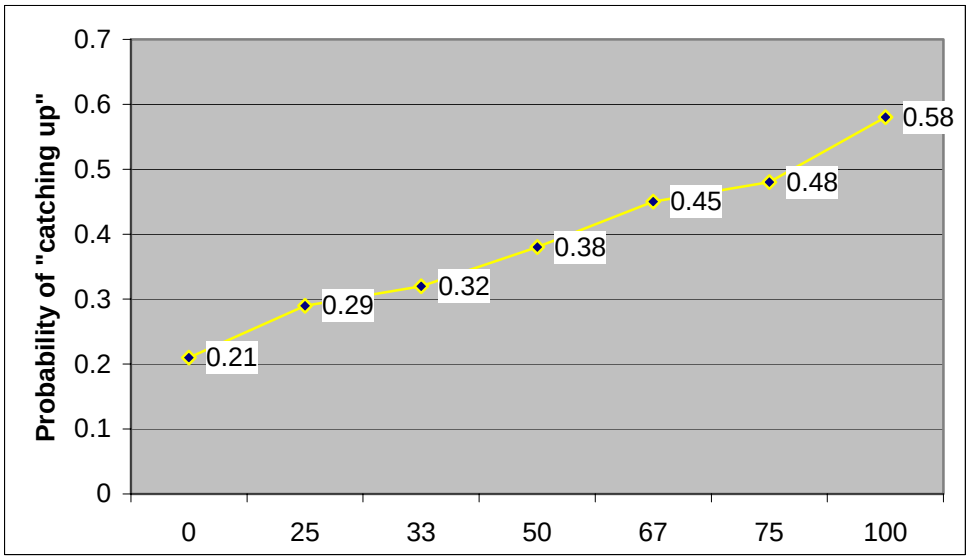
Group	Overall Gain	Gained 10 or more State Percentiles	Net Gain Mean	Pre-Test Mean	Post-Test Mean
TDMS 3 Schools 1,785 Students	+5.8	No (67%)	-2.0	18.6	17.1
		Yes (33%)	+21.3	20.9	37.4
Other Schools 23 Schools 11,220 Students	+2.6	No (76%)	-3.0	16.2	13.5
		Yes (24%)	+20.6	17.0	32.8

GRAPH 1-Percent of Students Gaining 10 or More State Percentiles From 5th Grade to 8th Grade on MATH – PSSA Test in High Poverty, High Minority Schools *(Data for 3 Cohorts '00,'01, &'02 Averaged)*



RED = TDMS Schools

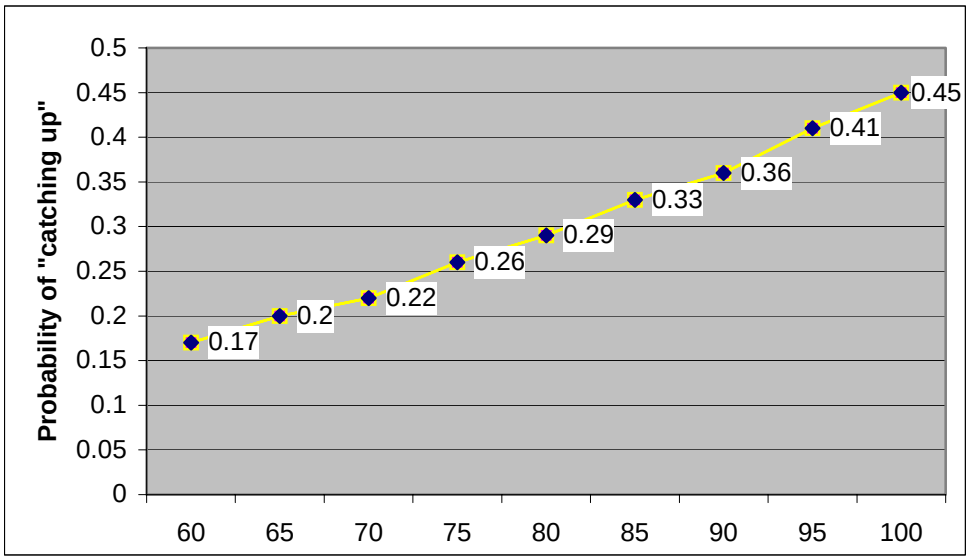
GRAPH 2A (*Impact of Attending High Gain Classrooms*)



Percentage of High-Gain Homerooms

(CEMS student; Non-Asian Student; from Cohort 1; attendance rate of 92%; behavior of 2; effort of 6)

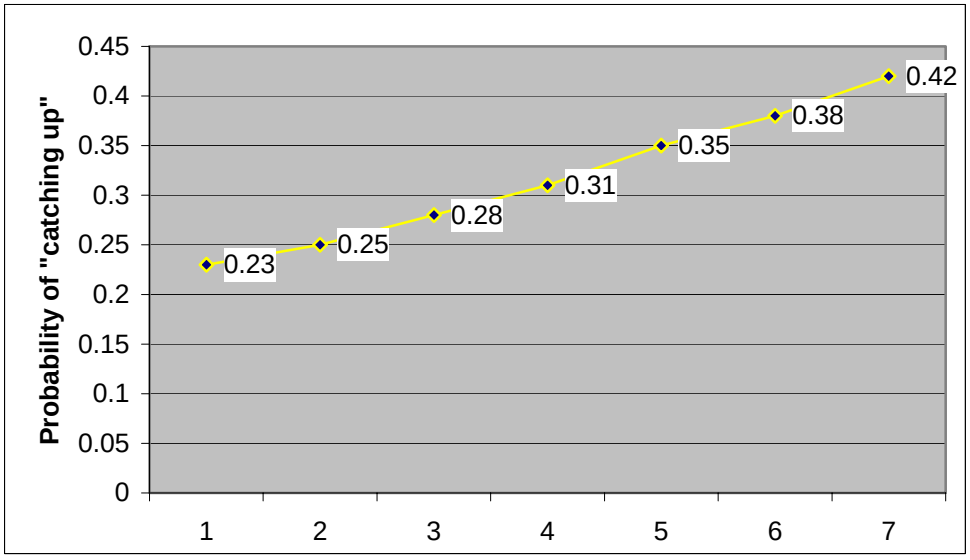
GRAPH 2B *(Impact of Attendance)*



Percentage of total school days attended

(CEMS student; Non-Asian Student; from Cohort 1; with effort of 6; behavior of 2; high-gain homerooms of 50%)

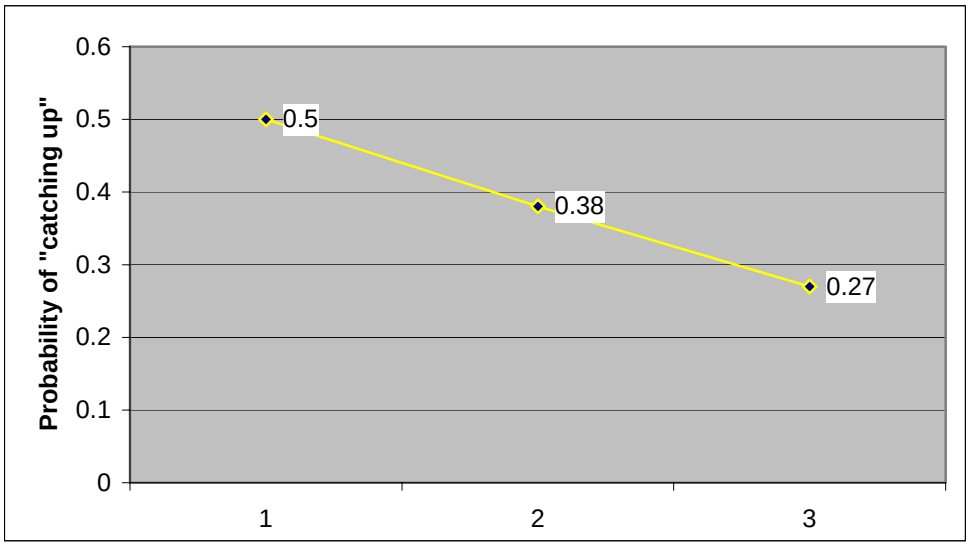
GRAPH 2C *(Impact of Effort)*



Average Effort

(CEMS student; Non-Asian Student; from Cohort 1; with attendance rate of 92%; behavior of 2; high-gain homerooms of 50%)

GRAPH 2D *(Impact of Behavior)*



Average Behavior Marks

(CEMS student; Non-Asian Student; from Cohort 1; with attendance rate of 92%; effort of 6; high-gain homerooms of 50%)

APPENDIX

TABLE A1
Sample Statistics
N = 1,233

	Mean	Std. Dev.
Average Attendance Rate	93%	0.06
Average Behavior Mark (1=Excellent, 2=Satisfactory 3=Unsatisfactory)	1.5	0.36
Average Percent of High Gain Homerooms	48%	0.29
Average Effort	5.9	1.19

TABLE A2
Sample Statistics
N = 1,233

CEMS	38%	**% Asian**	11%
Cooke	28%	**% Hispanic**	17%
Beeber	34%	**% Black**	68%
Cohort 1	26%	**% White**	4%
Cohort 2	30%	**% Female**	53%
Cohort 3	18%	**% 'Catching Up'**	44%
Cohort 4	27%		

TABLE B-Year By Year Gains

School	Cohort	Catching Up	Average 5th Grade Gain	Average 6th Grade Gain	Average 7th Grade Gain	Average 8th Grade Gain
CEMS	1	No (60%)	+1.2	+0.3	+0.7	+0.2
		Yes (40%)	+1.6	+1.6	+0.8	+1.1
	2	No (67%)	-0.3	+1.2	+0.6	
		Yes (33%)	+0.9	+2.2	+1.5	
	3	No (81%)	+0.3	+0.6	+0.7	
		Yes (19%)	+1.1	+1.1	+3.0	
	4	No (65%)	-0.1	+0.8	+1.0	
		Yes (35%)	+0.3	+1.9	+2.7	
Cooke	1	No (42%)		+1.2	+0.5	+0.2
		Yes (58%)		+1.6	+0.6	+1.6
	2	No (68%)	+1.3	+0.5	+0.4	
		Yes (32%)	+2.2	+0.8	+1.4	
	3	No (57%)	+0.9	+0.3	+0.8	
		Yes (43%)	+1.7	+1.0	+1.4	
	4	No (60%)	+0.6	+0.9	+0.7	
		Yes (40%)	+1.3	+1.4	+1.9	
Beeber	2	No (68%)		+0.3	+0.3	
		Yes (32%)		+1.0	+1.3	
	3	No (46%)		-0.1	+0.6	
		Yes (54%)		+0.6	+1.8	
	4	No (26%)		-0.1	+0.7	
		Yes (74%)		+0.8	+1.8	

TABLE C
Logistic Regression Model Results

Model Attributes

R-Square	Chi-Square	Significance	Percentage of Concordant Cases	N
0.138	183.105	0.000	65.8	1,233

Parameter Attributes

Variable	Parameter Estimate	Significance	Odds-Ratio
Attendance	3.415	0.004**	30.429
Behavior	-0.506	0.010**	.603
Asian	0.632	0.002**	1.881
Cohort 2	-0.858	0.000**	.424
Cohort 3	-0.601	0.004**	.548
Cohort 4	-0.467	0.020*	.627
Cooke	0.395	0.013*	1.485
Beeber	0.991	0.000**	2.694
Effort	0.149	0.007**	1.161
Percent of High Gain Homerooms	1.640	0.000**	5.157
Constant	-4.333	0.000**	0.13