DRAFT

A. To what extent does MSTA contribute to changes in teaching practice, student performance and school improvement outcomes?

3.   Student Performance

In order to study the actual achievement of students as a result of implementing MSTA, total of 11,639 student records were entered into a SPSS database. Of these, 6,801 were students in MSTA schools and 4,838 students were in matched control group schools.

Table # below indicates the mean or average scale scores for MCAII Math for three different grade cohorts across three years. MSTA became operational in schools in the fall of 2008, so the 2008-09 scores reflect the only year in the table that may have been affected by MSTA implementation. The 4th grade MSTA cohort scores declined slightly over the years – 457 to 555 to 653. The 5th grade MSTA cohort declined slightly from 554 to 653 to 751. The 6th grade cohort declined slightly from 653 to 753 to 852. Since scale scores were used for this analysis, the actual scores goe up as a function of grade level. The scale scores range in the 300s for 3rd graders, the 400's for 4th graders, and so on. After the implementation year of 2008-09, the greatest difference between the MSTA scores and the control group scores was only 2.9 in 6th grade, with the control group having the higher scores. Table # indicates the N counts for each grade and year.

Table # Mean MCAII Math Scale Scores for MSTA Schools and Control Group

Grade	2006-07		2007-08		2008-09	
	MSTA	Control	MSTA	Control	MSTA	Control
4	457.6	458.4				
5	554.5	554.1	555.0	555.5		
6	653.0	654.9	653.9	654.0	653.9	656.0
7			753.3	754.3	751.9	753.1
8					852.3	852.0

Table # N Counts for MSTA and Control Groups by Grade Cohort

Grade	2006-07		2007-08		2008-09	
	MSTA	Control	MSTA	Control	MSTA	Control
4	1323	794				
5	1806	1613	1354	821		
6	1776	1584	1977	1750	1445	860
7			1938	1778	2253	1891
8					2186	1883

Analysis of Covariance (ANCOVA) was conducted on this data in order to determine what variables contributed the most to the dependent variable. In this case the dependent variable was gain or change from MCAII Math scores from 2007-08 to 2008-09. This seems like a reasonable dependent variable since our hypothesis is that student achievement scores would increase due the implementation of MSTA during the 2008-09 school year. The covariates in this test included the test score gains from 2006-07 to 2007-08 and all the student demographic variables available in the MDE Universal File. The results of the ANCOVA analysis are presented in Table # below. Also reported in Table # are the Person Correlations of these variables to the dependent variable, which also indicates the effect size.

Table # ANCOVA and correlation results with *Gain from 2008 to 2009*

Variable	F ratio	Correlation (MSTA)	Correlation (Control)
Gain 2007 to 2008	1427.6**	-.36**	-.37**
Gender	.009		
LEP	5.1*	.02	.03*
Special Ed.	4.5*	.04**	.00
Free/Reduced	9.3**	.05**	.05**
Migrant	.05		
Ethnicity	.81	.01	.04**
Language Code	1.5	-.02	-.04*
MSTA/Control	.06		

*p<.05
**p<.01

The ANCOVA results indicate that Gain from 2007 to 2008, LEP (Limited English Proficient), Special Ed., and Free and Reduced lunch status are the variables that contribute the most to the dependent variable of Gain from 2008 to 2009. Assignment to MSTA or control groups did not have a contributing influence on test score gains from 2008 to 2009. Although some of the variables show statistically significant results, only one variable, Gain 2007 to 2008, showed a substantial correlation. Correlations of at least .3 are considered to have a moderate effect on the dependent variable. The F ratio and the negative correlations for this variable indicate that as test score gains go down from 2007 to 2008, test score gains in 2008 to 2009 go up and visa versa. It is therefore prudent to examine the MSTA implementation year further by comparing MSTA students and control students relative to both 2008 to 2009 test score gains and 2007 to 2008 test score gains. A t-test for independent means will perform this function and the results are displayed in Table # below.

Table # t tests between MSTA and control group with mean MCAII Math gains

	2007-2008 Mean MCAII Math Gain	2008-2009 Mean MCAII Math Gain
MSTA	99.17	99.08
Control	99.18	99.20
t value	-.056	-.71

*p<.05
**p<.01

The mean gains in the table above are artifacts of the scale scores. Therefore, a gain of 100 indicates no gain in tested achievement. Since these mean gains are less than 100, the achievement from one year to another in both the MSTA group and the control group declines slightly. The critical test is the difference in mean gains in 2008-2009, the MSTA implementation year, between the MSTA group and the control group. The difference between the groups is so slight that the t tests reveal no statistically significant difference between the groups.

A similar analysis was conducted using the Algebra strand in the MCAII Math test. The strands are reported as raw scores (e.g. number of algebra items answered correctly). The maximum number of items possible varied from test to test, so in order to make valid comparisons, the Algebra score was calculated as a ratio of the number of items answered correctly and the maximum number of items. Consequently, the Algebra score is always a value less than 1. 100 percent correct would be a score of 1.

Table # Mean Algebra Scores for MSTA Schools and Control Group

Grade	2006-07		2007-08		2008-09	
	MSTA	Control	MSTA	Control	MSTA	Control
4	.79	.80				
5	.78	.77	.72	.75		
6	.60	.63	.55	.55	.63	.65
7			.57	.57	.68	.71
8					.69	.67

Table # reveals that MSTA Algebra scores in the 4th grade cohort declined across the three years – from .79 to .72 to .63. MSTA Algebra scores in the 5th and 6th grade cohort declined from 2006-07 to 2007-08; but increased from 2007-08 to 2008-09, the MSTA implementation year. This is in contrast to the MCAII Math scores which declined across all three years.

In order to determine the level of contribution that independent variables have on the dependent variable, Algebra gains in 2008-09, ANCOVA and correlations were again conducted. Table # shows the results.

Table # ANCOVA and correlation results with *Algebra score gains from 2008 to 2009*

Variable	F ratio	Correlation (MSTA)	Correlation (Control)
Gain 2007 to 2008	2220.3**	-.42**	-.46**
Gender	2.4		
LEP	.23		
Special Ed.	.29		
Free/Reduced	.175		
Migrant	1.6		
Ethnicity	.16		
Language Code	.88		
MSTA/Control	4.52*		

*p<.05
**p<.01

Since the student demographic variables did not show a significant contribution to 2008-09 Algebra gains, correlations need not be conducted to show effect size. However, ANCOVA revealed that previous year Algebra gains did have a significant impact on Algebra gains in 2008-09, so correlations were conducted to see the effect size. These correlations are relatively high, which indicates that there is a fairly large effect of 2007 to 2008 gain to 2008-09 gains. Again, the fact the correlations are negative indicates that as gains go down from 2006-07 to 2007 -08, gains tend to go up from 2007-08 to 2008-09 and visa versa. Also, assignment to a MSTA group or a control group contributes to the dependent variable. Therefore, t tests examining the effects of the two groups on Algebra gains in the MSTA implementation year of 2008-09 were conducted. Table # below illustrates the results of the t tests.

Table # t tests between MSTA and control group with mean Algebra gains

	2007-2008 Mean Algebra Gain	2008-2009 Mean Algebra Gain
MSTA	-.10	.08
Control	-.11	.09
t value	1.49	-.86

*p<.05
**p<.01

Even though the MSTA Algebra gains in 2007-08 were negative and MSTA Algebra gains in 2008-09 were positive, the same was true for the control group. Consequently, we cannot say that the implementation year gains in Algebra were due to the treatment of MSTA.

Next, similar analyses were conducted with data disaggregated by region. The table below illustrates the number of students in the database by region by group.

Table # Number of students by region by group

Region	MSTA	Control
1&2	307	123
3	693	243
4	859	705
5	343	174
6&8	725	136
7	1338	960
9	599	548
10	472	414
11	1465	1535

Since t tests between the MSTA group and the control group was justified when examining MCAII Math gains and Algebra strand scores, t tests by region was also conducted. Tables # and # below illustrate achievement gains in the implementation year of 2008-09 by region and by group.

Table # Mean scores and t tests by region and group for MCAII Math gains in 2008-09

Region	MSTA	Control	t value
1&2	97.4	97.9	-.68
3	99.7	97.2	3.5**
4	98.2	98.7	-1.1
5	98.7	97.7	1.2
6&8	100.5	98.8	2.1*
7	99.7	100.5	-2.0*
9	99.4	99.2	.32
10	96.4	100.9	-8.1**
11	99.3	98.8	1.5

*p<.05
**p<.01

Table # Mean scores and t tests by region and group for Algebra gains in 2008-09

Region	MSTA	Control	t value
1&2	.07	.18	-3.47**
3	.07	.07	-.22
4	.09	.08	1.1
5	.06	.04	.88
6&8	.08	.20	-4.42**
7	.09	.08	.85
9	.11	.12	-.72
10	.03	.08	-2.35*
11	.09	.08	1.2

*p<.05
**p<.01

Whereas there is no significant statistical difference between the MSTA and control groups during the implementation year of 2008-09 when examining gains across all regions, there are some significant differences when disaggregating the data by region. The two regions that demonstrated statistically significant gains in both MCAII Math scores and with the Algebra strand are Region 6&8 and Region 10. However, the results are inconclusive. Region 6&8 shows a significant difference in favor of MSTA over the control group using MCAII Math scores, but a significant difference in favor of the control group over MSTA when using Algebra scores. Region 10 shows a significant difference between the two groups using both MCAII Math scores and Algebra scores, but the gains are larger for the control group than they are for the MSTA group. Region 3 shows a significant difference in favor of MSTA using MCAII Math scores, but no difference when using Algebra scores. Region 1&2 shows a significant difference in favor of the control group using Algebra scores, but no difference when using MCAII Math scores.