Evaluation Report Amendment Year 4

Inquiring Minds:

Reading to Learn and Innovate in Mathematics and Science

(IQ-MS)

BSCS Evaluation Report (ER 2016-01A)

Submitted by
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Student Outcomes 2012-2016

This section includes updated findings for the student outcomes for all years of the IQ-MS evaluation study. This amendment details new data analysis, notably the student outcomes for the 2015/2016 school year. The scores in table 1, below show the school-level means for treatment and comparison schools for year 4 of the project evaluation. The school-level means were used instead of student-level data because not all the treatment and comparison schools participated in the year 4 IQ-MS activities. However, the most complete analysis of the impact of the program should include as many treatment and comparison schools as possible.

Table 1. Raw Mean 2011/2012, 2012/2013, 2013/2014 Student Scores by Treatment

Content	Treatment 2011/2012	Comparison 2011/2012	Treatment 2012/2013	Comparison 2012/2013	Treatment 2013/2014	Comparison 2013/2014	Treatment 2014/2015	Comparison 2014/2015	Treatment 2015/2016	Comparison 2015/2016
Science							**Palmetto**		**Palmetto**	
Mean	628.29	629.95	625.03	622.80	630.29	628.58	621.41	616.68	621.26	612.77
n	2719	3607	2740	2699	2289	2139	3766	5925	9 (schools)	7 (schools)
Standard Deviation	51.79	54.63	48.56	47.65	54.20	52.05	50.97	50.15	5.56	12.70
Math							**ASPIRE**		**SC Ready**	
Mean	624.95	635.80	618.11	625.11	621.09	625.11	418.95	419.13	1740.80	1739.64
n	3957	5979	4047	4381	3173	2898	3961	6184	9 (schools)	7 (schools)
Standard Deviation	49.62	52.90	47.45	46.87	48.25	47.16	9.21	6.30	2.52	3.73
ELA							**ASPIRE**		**SC Ready**	
Mean	623.46	634.24	620.85	623.32	616.94	620.02	423.47	423.51	1742.11	1740.13
n	3957	5979	4044	4516	3171	2895	3949	6142	9 (schools)	7 (schools)
Standard Deviation	50.78	92.72	51.36	50.90	52.57	53.06	7.93	7.86	2.15	2.38
Writing							**ASPIRE**			
Mean	619.27	641.32	623.63	623.05	626.40	626.54	423.34	423.39		
n	1055	2857	3551	3835	2655	2886	3764	5176		
Standard Deviation	51.52	58.00	46.45	43.79	49.18	46.17	5.52	5.41		

Figures 1-3 detail the mean scale scores for each year, by treatment. The plots visually represent the changes in scale scores for each treatment by year. In 2014-2015 South Carolina adopted the ACT Aspire assessment in math, ELA, and then in 2015 the SC READY assessment was implemented. These new assessments are on a different scale than the previous Palmetto assessment so we created Z scores for math, ELA, and writing to look at mean differences by treatment across the years. Additionally, in 2016 (as mentioned above) we used the mean student score by grade from the South Carolina website to calculate the school mean scores.

As you will see in the math (figure 2) and ELA (figure 3) graphics, there is a sharp increase in student mean score for 2016 in the treatment group. It is unclear what caused this change. Is there something about the new assessment that favors the treatment? Or perhaps there is a big difference in the school means from the state website and the student-level data that was reported from the schools in years past. Either way, it is recommended that these results be considered somewhat unexpected. One way to confirm this result would be to go back to the state website and compile the scores for each of the treatment and comparison schools for every year (for this report we only used 2012 and 2016 data.

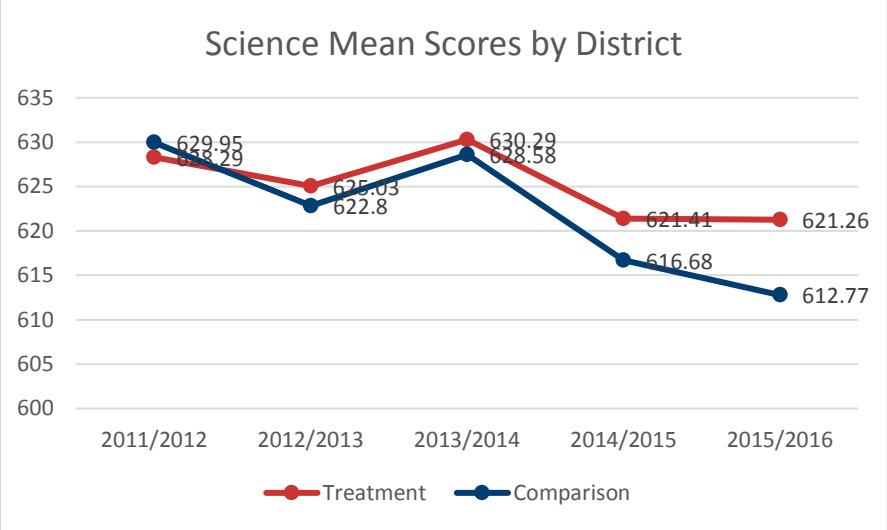

Figure 1. Mean science scale scores by treatment for 2012, 2013, 2014, 2015, 2016 (PASS for all years)

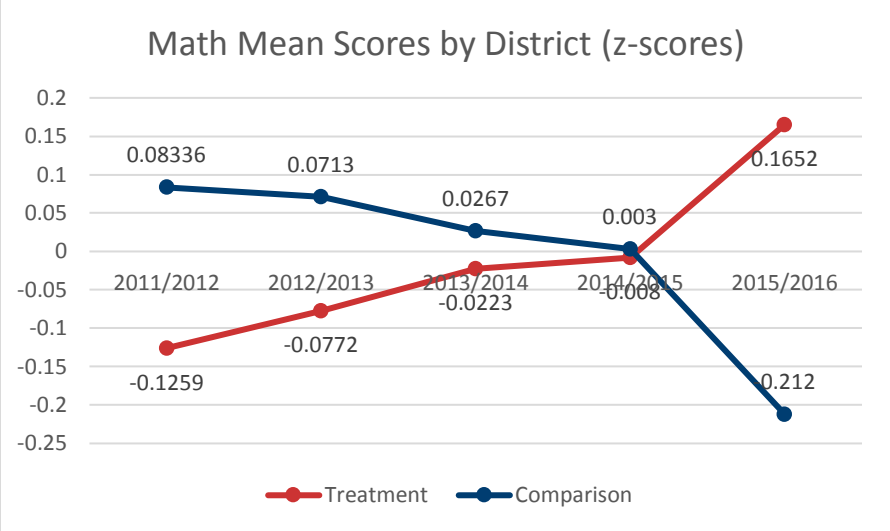

Figure 2. Mean math scale scores (converted to z-score) by treatment for 2012, 2013, 2014, 2015 (Aspire), 2016 SC Ready

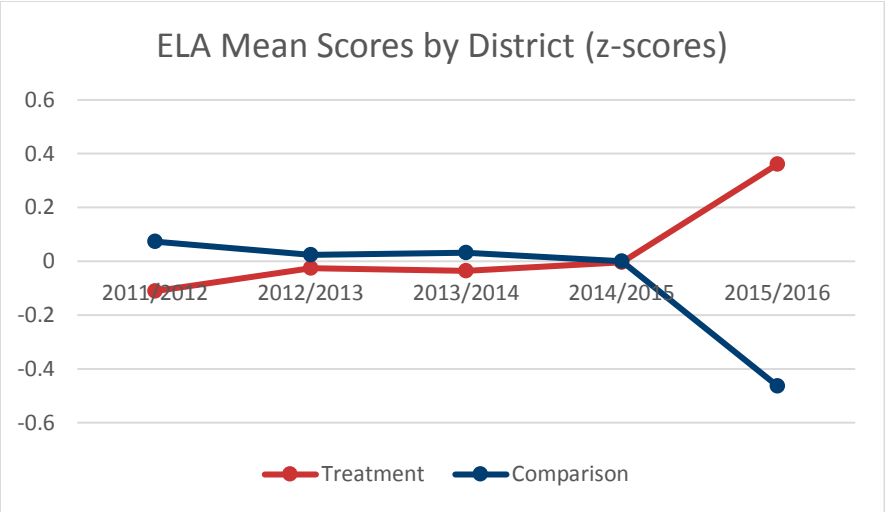

Figure 3. Mean ELA scale scores (converted to z-score) by treatment for 2012, 2013, 2014, 2015 (Aspire), 2016 SC Ready

Testing the Treatment Effect in All Schools

To estimate the effect of IQ-MS professional development on student achievement, we used an ordinary least-squares (OLS) regression model with mean school-level student scores (in years past this has been at the student level) for each of the individual content areas from the 2015/2016 test serving as the outcome variable. For math and ELA the outcome variable was the new SC READY assessment. For science, the outcome variable was the science assessment from the South Carolina Palmetto. All outcomes were grand mean centered. Writing scores were not available for 2016.

The independent variables included the IQ-MS treatment status variable (IQ-MS = 1, comparison = 0) and a baseline achievement covariate (school-level grand mean centered score from 2011/2012). Table 2 illustrates the results of the OLS regressions for each content area.

Table 2. Regression with 2012/2013, 2013/2014, 2014/2015, and 2015/2016 Content Scale Score as Outcome Measure

		2012-2013			2013-2014			2014-2015 (ASPIRE Math, ELA, Writing)			2015-2016 (SCPASS Science, SCREADY Math and ELA		
Content Area		**B**	**p-value**	**Effect Size (Lower CI, Upper CI)**	**B**	**p-value**	**Effect Size (Lower CI, Upper CI)**	**B**	**p-value**	**Effect Size (Lower CI, Upper CI)**	**B**	**p-value**	**Effect Size (Lower CI, Upper CI)**
Science	**Treatment**	3.68	.002	d = .08 (-.02, .14)	2.69	.11	d = .05 (-.03, .13)	10.23	.000	d = .21 (.10, .32)	4.38	.334	g = .44 (-4.21, 5.009)
	2011/2012 score (pretest)	.56	.000		.61	.000		.60	.000		.57	.029	
Math	**Treatment**	-3.91	.000	d = -.08 (-.13, -.03)	-3.25	.005	d = -.05 (-.13, .00)	.34	.22	d = .05 (-.06, .16)	.124	.486	g = .27 (-1.29, 1.74)
	2011/2012 score (pretest)	.68	.000		.68	.000		.084	.000		.762	.001	
ELA	**Treatment**	-1.76	.067	d = -.03 (-.13, .00)	-4.12	.003	d = -.08 (-.13, .00)	.62	.064	d = .08 (-.03, .19)	.250	.111	g = .49 (-.61, 1.59)
	2011/2012 score (pretest)	.65	.000		.65	.000		.088	.000		.767	.000	
Writing	**Treatment**	2.00	.031	d = .04 (.00, .10)	-.93	.44	d = -.02 (-.09, .05)	.16	.559	d = -.03 (-.08, .14)			
	2011/2012 score (pretest)	.57	.000		.55	.000		.04	.000				

In 2016, we observed growth in the positive effect size in **science** (from d = .21 in 2015) to a Hedges' g (adjusted for the small school-level sample size) of .44 in science. Because of the small sample size and large standard deviations, the confidence intervals are much wider. However, this finding is consistent with the means we report above and the trends of the past two years, showing growth in the treatment group, compared to the comparison group. Last year (2015), was the first time that we observed positive treatment effects in **ELA** (d = .08) and **math** (d= .05). This trend held up in 2016, with growth in the effect sizes in both content areas (math = .27 and ELA = .49.