

Data & Accountability Department

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THE RELATIONSHIP BETWEEN MID-YEAR BENCHMARK AND END-OF-GRADE ASSESSMENTS: 2010-11

Contact: Brad McMillen

BACKGROUND

This analysis was conducted to examine the relationship between student performance on mid-year benchmark assessments and End-of-Grade (EOG) tests in both reading and math in grades 3-5 in school year 2010-11. For the purposes of this comparison, files containing scores from each of the tests were merged using each student's NCWISE ID number, and only students who had scores in both files were used in the analysis. Table 1 shows the number of students taking each of the tests in 2010-11 at each grade level. There were over 10,000 students in each category, except grade 5 reading with 9,815. Any student who only took one of the two tests was not included in any further analysis; for example, in grade 3 math, 950 (11,264 - 10,314) EOG scores were not used due to lack of corresponding benchmark scores.

Table 1
Number of Students taking Benchmark Assessments and EOG Tests in 2010-11

Grade Level	Math			Reading		
	Students with Benchmark Scores	Students with EOG Scores	Matches	Students with Benchmark Scores	Students with EOG Scores	Matches
3	10,495	11,264	10,314	10,604	11,168	10,384
4	10,646	11,260	10,487	10,612	11,152	10,128
5	10,273	10,803	10,100	10,273	10,737	9,815

Benchmark assessment scores are calculated as the percent of items correct, so the possible values range from 0-100. EOG raw scores are converted to developmental scale scores by the Testing Program staff at the NC Department of Public Instruction. Table 2 shows some basic descriptive statistics from the results of each assessment. Developmental scale scores from the EOG are designed to increase across grades 3-8, and Table 2 shows that the mean score did increase with grade level. There is no basis upon which to compare performance on the benchmark assessments across grade levels.

Great appreciation is extended to Amy Huebeler (Contractor) for her contributions with the analysis and preparation of this report.

The standard deviation of the benchmark score was about 19 for all grades and subjects, although grade 5 reading had a lower value of 16.61. The standard deviation of the EOG score ranged from 8.75 in grade 5 reading to 11.52 in grade 3 reading. The lower standard deviations for EOG scores correspond to tighter ranges of observed values than were seen in the benchmark assessment results. Note that the range of 100 observed on the benchmark assessment in grade 4 reading is accurate and is the result of one student obtaining a score of zero on the test.

Table 2
Descriptive Statistics for Benchmark and EOG Scores

Subject	Type of Test	Grade Level	Mean	Median	75 th Percentile	Range	Standard Deviation
Math	Benchmark % Correct	3	59.6	60.0	72.0	95.8	18.04
		4	72.1	76.0	88.0	92.0	18.96
		5	67.2	70.8	84.0	92.0	19.63
	EOG Scale Score	3	348.4	349.0	356.0	54.0	10.23
		4	354.8	355.0	362.0	50.0	9.42
		5	360.2	361.0	367.0	49.0	9.33
Reading	Benchmark % Correct	3	67.7	73.7	84.2	94.7	19.08
		4	68.8	70.0	85.0	100.0	19.08
		5	72.4	76.2	85.7	90.5	16.61
	EOG Scale Score	3	342.8	344.0	351.0	59.0	11.52
		4	349.0	350.0	357.0	52.0	9.93
		5	354.1	355.0	361.0	53.0	8.75

Students are assigned an achievement level of I, II, III, or IV based on the developmental scale score achieved on the EOG test. An EOG score corresponding to a level of III or IV is considered an indicator of proficiency in the subject. Table 3 shows the minimum scores required on each EOG exam by the state for students to obtain achievement levels III or IV.

Table 3
Minimum EOG Scores Required for Achievement Levels III and IV in 2010-11

Subject	Grade Level	Level III	Level IV
Math	3	339	352
	4	345	358
	5	351	363
Reading			
Reading	3	338	350
	4	343	354
	5	349	361

The following analysis will examine the relationship between benchmark assessment scores and EOG scores and whether benchmark scores can be used as a predictor of performance on the EOG exam.

CORRELATIONS

The mid-year benchmark assessment and EOG test scores are highly correlated based on 2010-11 results, see Table 4 for each subject and grade level.

Table 4
Correlations Between Percent of Questions Answered Correctly on Benchmark Assessments and EOG Scores for Grades 3-5 in 2010-11

Grade Level	Math		Reading	
	Correlation	p-value	Correlation	p-value
3	0.79	< .0001	0.75	< .0001
4	0.82	< .0001	0.86	< .0001
5	0.81	< .0001	0.71	< .0001

Correlations can range in value from -1 to +1, with a value of zero indicating that there is not a relationship and a value close to -1 or +1 indicating a strong negative or positive relationship, respectively. The positive values for correlation in table 4 indicate that the EOG score and the percent correct on the benchmark assessment increase together in all subjects and grade level. The p-value is the probability that we would see the calculated correlation value if the correlation between the two variables is actually equal to zero; a p-value of less than 0.05 is small enough to conclude that the correlation is not zero. Therefore, the observed correlations with p-values of $p < .0001$ indicate significant positive relationships between the percent correct on the benchmark assessment and the EOG score in all subjects and grade levels. We can reasonably expect that a

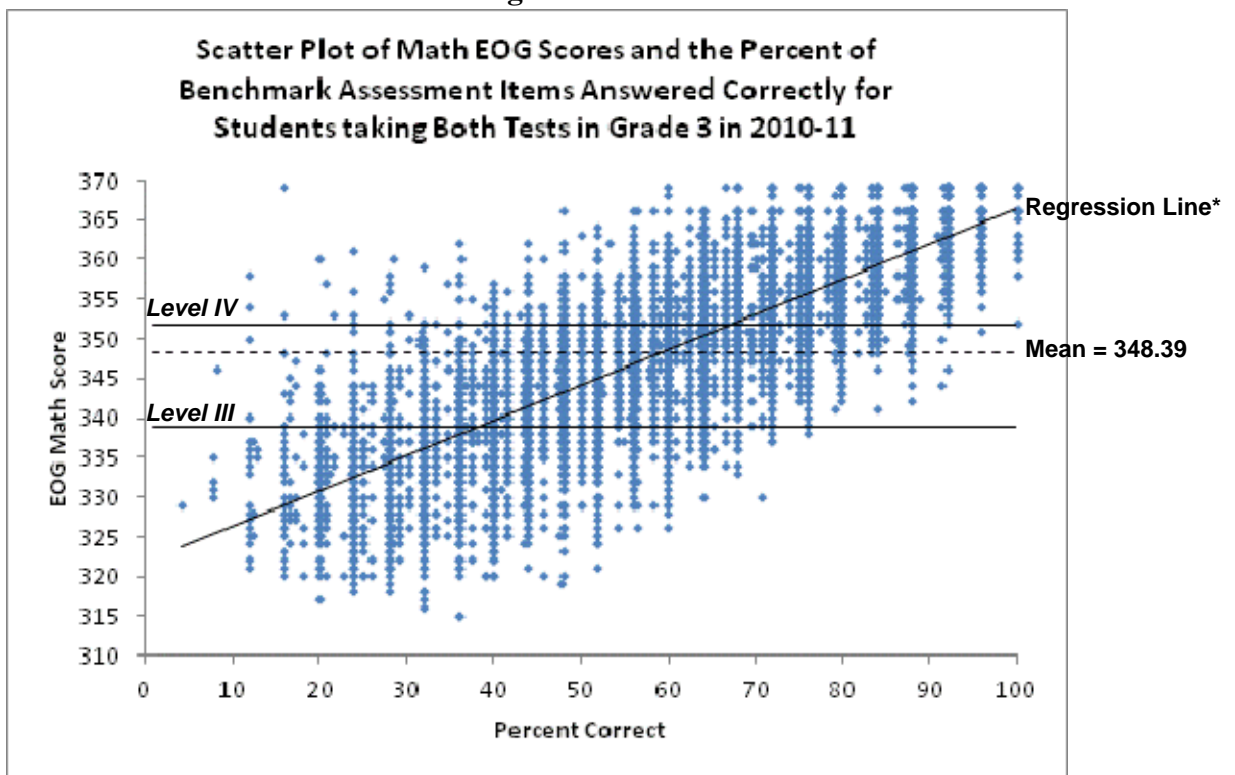
student who received a high score on one of the exams also received a high score on the other (and vice versa).

REGRESSION ANALYSIS

Because the EOG and benchmark scores are highly correlated, we can use a regression analysis to determine whether benchmark assessment results may be used to predict performance on the EOG test. A linear regression analysis by subject and grade level shows that benchmark assessment scores can predict EOG scores while accounting for about two-thirds of the variation in EOG scores for math and over half of the variation in EOG scores for reading.

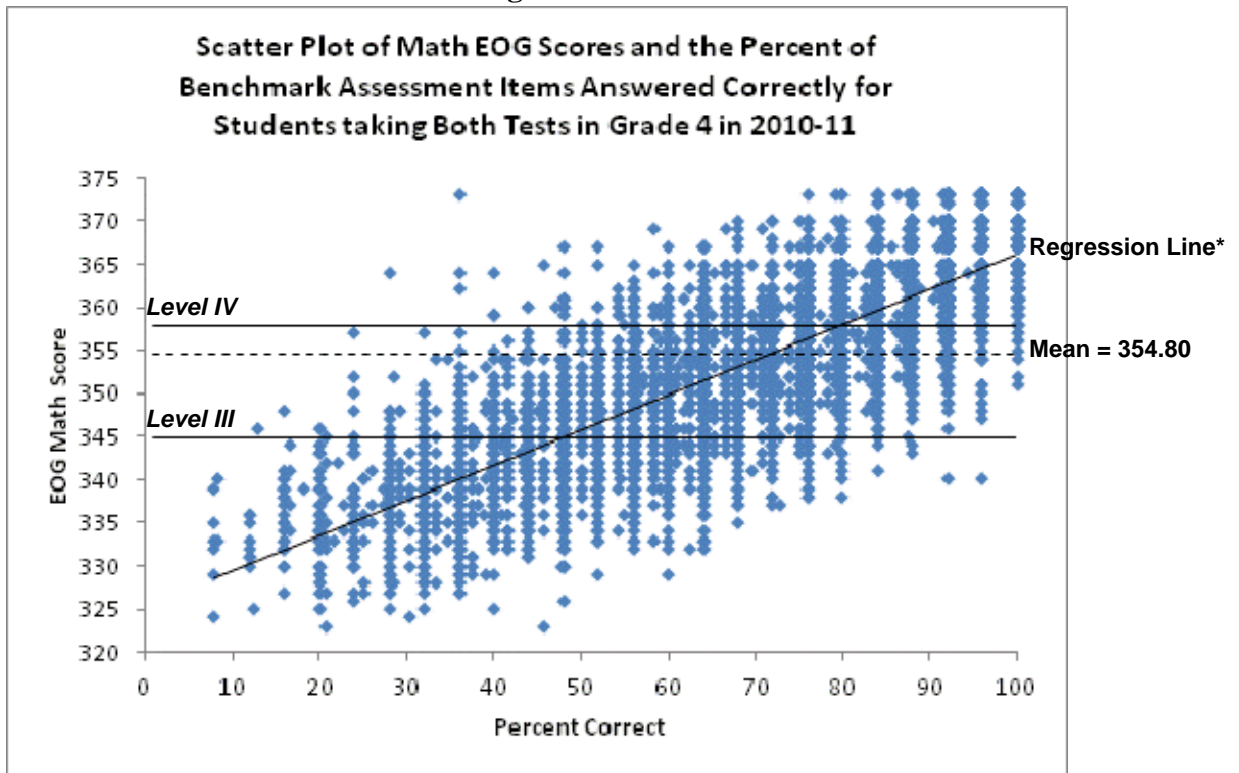
In the scatterplots shown in Figures 1-6, the positive correlation found in each subject and grade level is illustrated by the upward direction of the data points. A simple linear regression line shows how an EOG score may be predicted using the percent of items correct on the benchmark assessment. The adjusted R-squared values shown below the plots give the percent of variation in EOG scores that can be explained by the regression model. The lines labeled Level III and Level IV represent the achievement levels used by the NC Department of Public Instruction Testing Program that were displayed in Table 3.

Figure 1



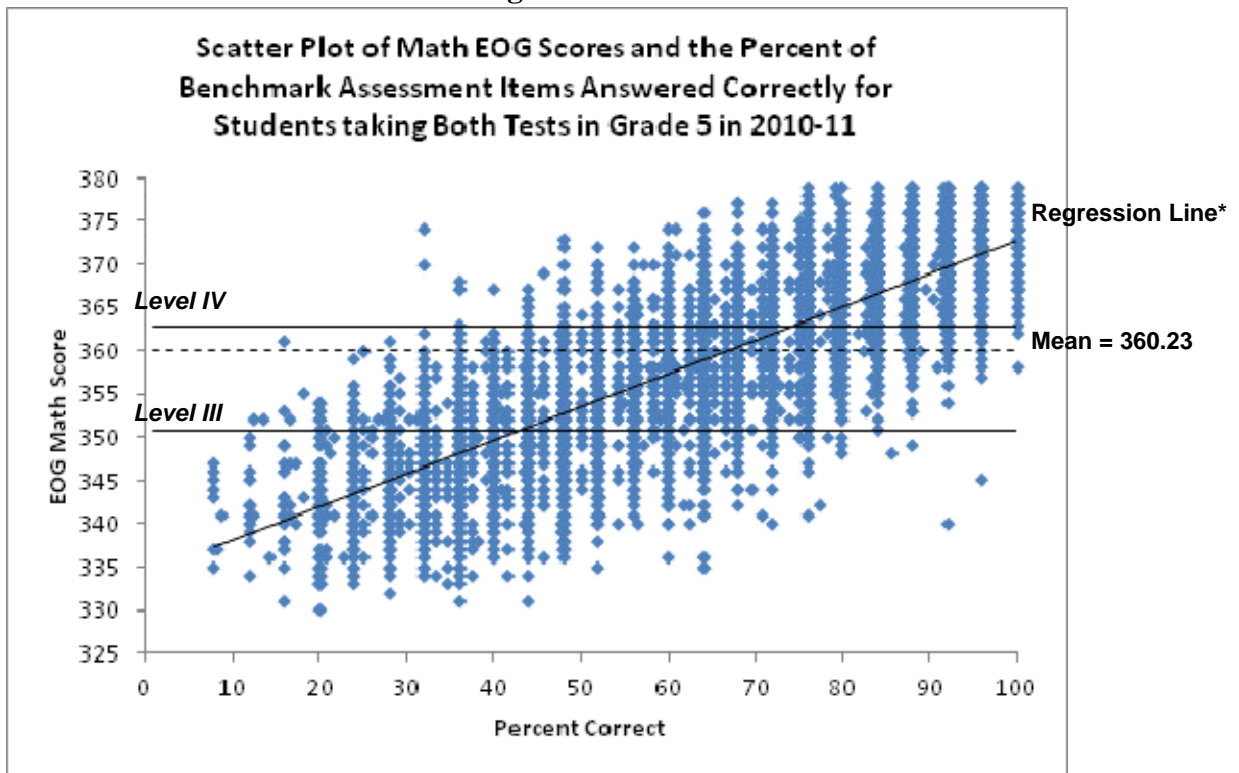
*** EOG Math Score = 321.80 + (0.45 * Percent Correct) (Adjusted R-squared = 0.62)**

Figure 2



* $EOG\ Math\ Score = 325.43 + (0.41 * Percent\ Correct)$ (Adjusted R-squared = 0.67)

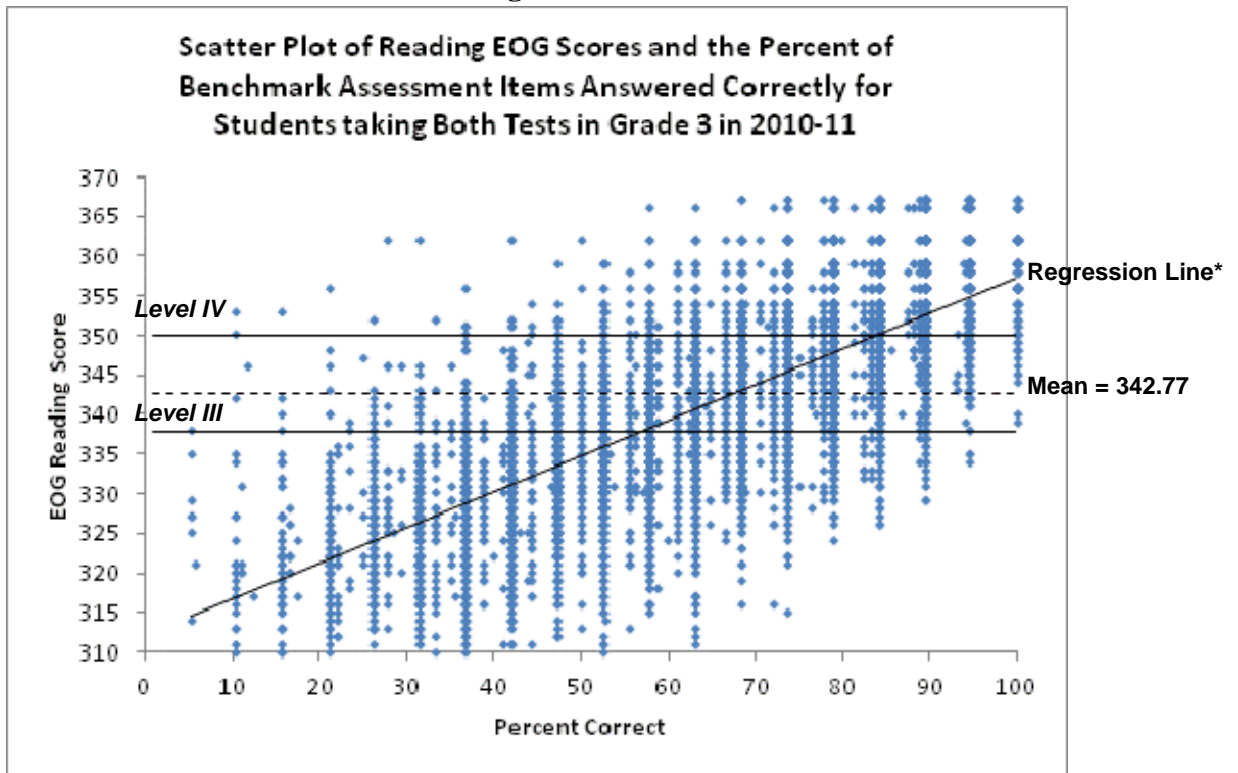
Figure 3



* $EOG\ Math\ Score = 334.24 + (0.39 * Percent\ Correct)$ (Adjusted R-squared = 0.66)

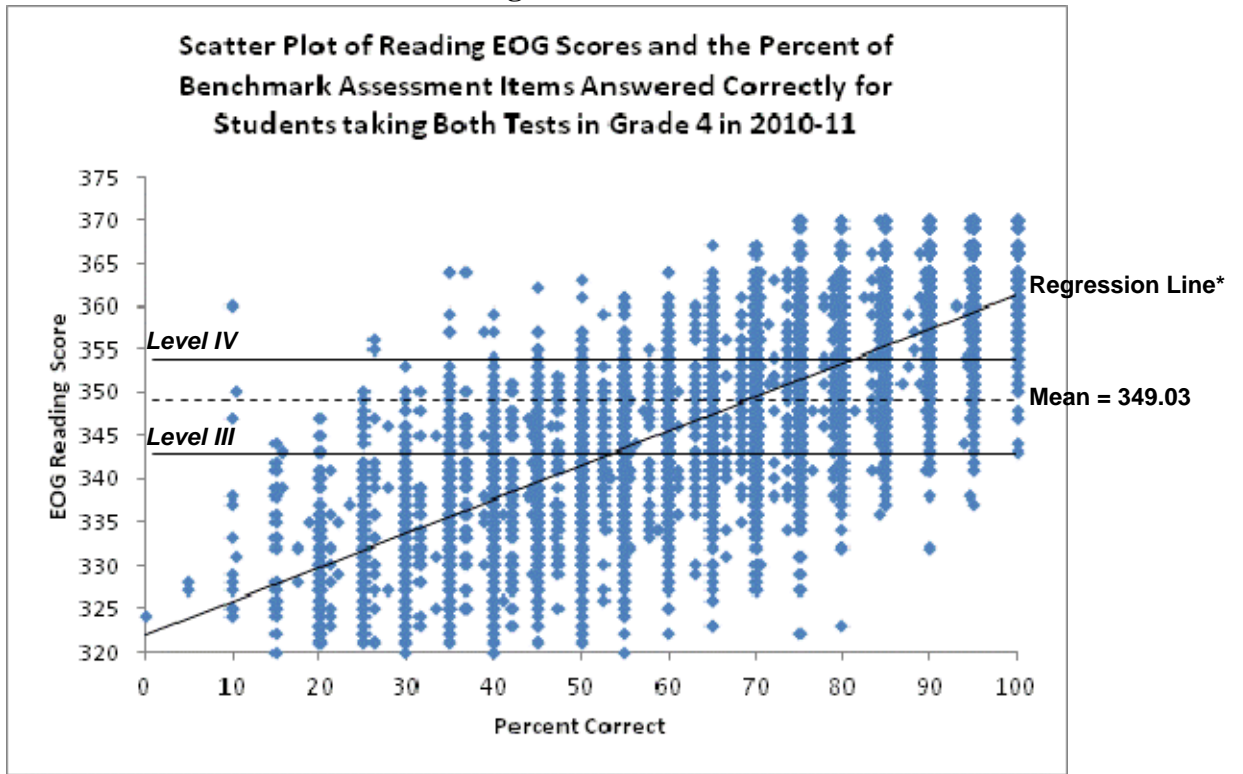
The plots of reading scores appear more scattered than math, particularly in grade 3. This corresponds to the higher range and standard deviation observed in Table 2. The adjusted R-squared values are also slightly lower for reading in all three grades. Even though grade 5 reading showed lower standard deviations of both benchmark and EOG scores, the adjusted R-squared value is the lowest for this combination of grade and subject at 0.51.

Figure 4



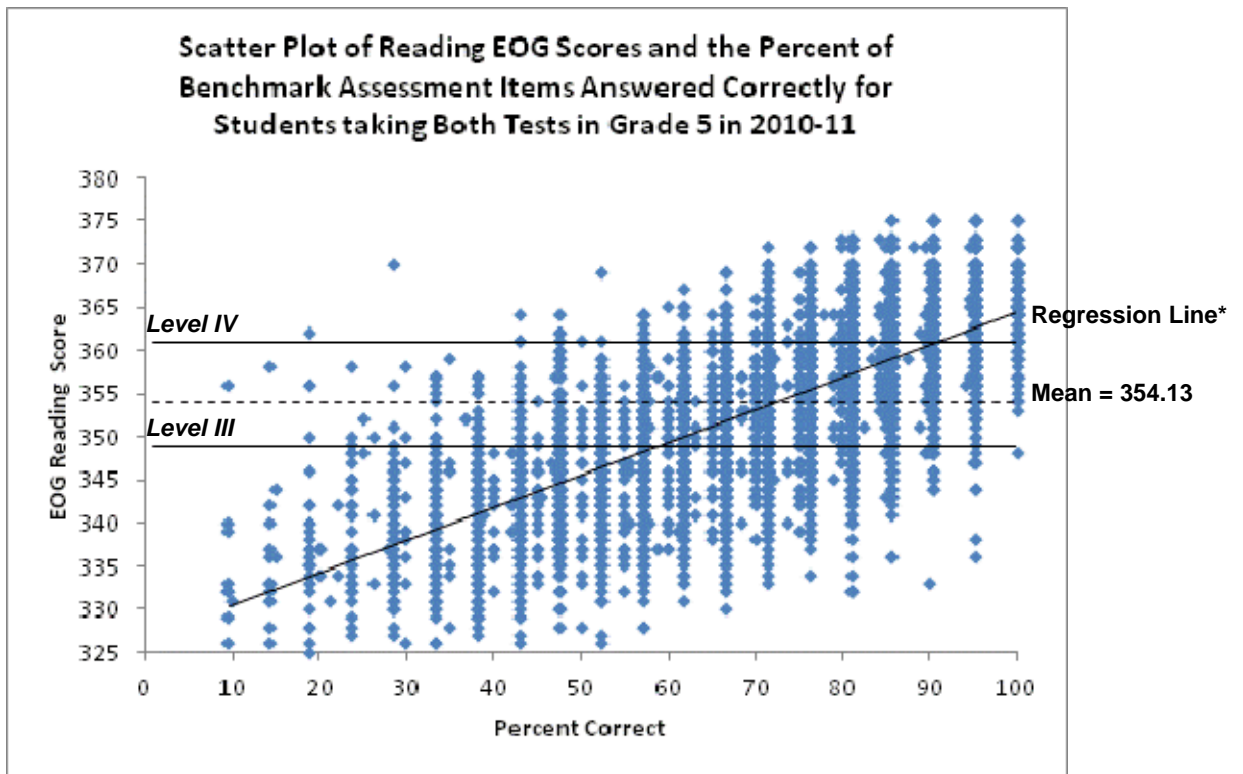
* $EOG \text{ Reading Score} = 312.29 + (0.45 * \text{Percent Correct})$ (*Adjusted R-squared = 0.56*)

Figure 5



* EOG Reading Score = 321.98 + (0.39 * Percent Correct) (Adjusted R-squared = 0.57)

Figure 6



* EOG Reading Score = 326.87 + (0.38 * Percent Correct) (Adjusted R-squared = 0.51)

Thus, the benchmark assessments given mid-year can provide valuable information about which students are likely to do well on the EOG test and which may need extra support. As given, the math benchmark assessment is particularly strong.

RECOMMENDATIONS

In order to help determine which students are likely to do well on the EOG test, crosstabulations of Benchmark scores with EOG achievement level are provided in appendixes A and B. Appendix A shows that all students in grade 3 mathematics who achieved more than 70% correct on the benchmark assessment passed the EOG test, and all students in grades 4 and 5 mathematics who achieved more than 80% on the benchmark assessment passed the EOG. We see in Appendix B that we would expect at least 92% of grade 3 students with reading benchmark scores over 75%, grade 4 students with benchmark scores over 70%, and grade 5 students with benchmark scores over 80% to pass the EOG reading test.

We recommend the benchmark assessments be used in 2011-12 mid-year with individual student scores assigned. Checks should be made for all students scoring in the bottom 25% to see that they are receiving assistance or are scheduled to receive assistance in the spring and whether it appears to be working. Regular classroom teachers should also be sure these students receive appropriate remediation and support, that their instruction is coordinated with whomever else is providing support, and that students and parents have ways to boost the students' learning at home between the time of mid-year assessments and the end of the school year.

Appendix A

Percent of Students at Each EOG Achievement Level within Benchmark Results Range in Mathematics

% Correct on Benchmark	Grade 3					Grade 4					Grade 5				
	EOG Achievement Level				EOG Pass Rate	EOG Achievement Level				EOG Pass Rate	EOG Achievement Level				EOG Pass Rate
	1	2	3	4		1	2	3	4		1	2	3	4	
0-30%	30%	48%	20%	3%	23%	43%	48%	9%	0%	9%	25%	58%	17%	0%	17%
31-40%	13%	43%	41%	3%	44%	22%	54%	23%	1%	24%	10%	57%	33%	1%	33%
41-45%	4%	34%	57%	4%	62%	10%	50%	40%	1%	41%	5%	40%	53%	2%	56%
46-50%	2%	22%	65%	11%	76%	6%	40%	51%	2%	54%	3%	32%	62%	3%	65%
51-55%	1%	16%	65%	18%	83%	3%	28%	66%	3%	69%	1%	23%	70%	6%	76%
56-60%	0%	7%	64%	29%	93%	1%	22%	72%	5%	77%	0%	12%	74%	14%	88%
61-65%	0%	4%	54%	42%	96%	1%	12%	75%	11%	87%	0%	6%	72%	22%	94%
66-70%	0%	2%	41%	58%	98%	0%	6%	75%	19%	94%	0%	3%	66%	31%	97%
71-75%	0%	0%	31%	68%	100%	0%	3%	69%	28%	97%	0%	2%	52%	46%	98%
76-80%	0%	0%	17%	83%	100%	0%	2%	52%	46%	98%	0%	1%	36%	64%	99%
81-85%	0%	0%	6%	94%	100%	0%	0%	37%	63%	100%	0%	0%	20%	80%	100%
86-90%	0%	0%	3%	97%	100%	0%	0%	20%	80%	100%	0%	0%	11%	89%	100%
91-95%	0%	0%	1%	99%	100%	0%	0%	11%	89%	100%	0%	0%	6%	94%	100%
96-100%	0%	0%	1%	99%	100%	0%	0%	3%	97%	100%	0%	0%	4%	96%	100%
TOTAL	4%	14%	41%	41%		3%	12%	43%	42%		2%	14%	41%	43%	

Appendix B

Percent of Students at Each EOG Achievement Level within Benchmark Results Range in Reading

% Correct on Benchmark	Grade 3					Grade 4					Grade 5				
	EOG Achievement Level				EOG Pass Rate	EOG Achievement Level				EOG Pass Rate	EOG Achievement Level				EOG Pass Rate
	1	2	3	4		1	2	3	4		1	2	3	4	
0-30%	79%	13%	6%	1%	8%	56%	34%	9%	1%	10%	66%	25%	8%	1%	9%
31-40%	64%	26%	9%	1%	10%	34%	44%	20%	2%	22%	49%	37%	14%	0%	14%
41-45%	48%	33%	18%	2%	20%	26%	46%	26%	2%	28%	34%	51%	14%	1%	15%
46-50%	34%	38%	26%	2%	28%	14%	42%	40%	4%	44%	24%	44%	31%	2%	33%
51-55%	29%	32%	34%	4%	39%	10%	36%	49%	5%	54%	17%	43%	39%	0%	40%
56-60%	19%	30%	46%	6%	51%	6%	31%	53%	10%	63%	13%	36%	48%	3%	51%
61-65%	10%	24%	54%	11%	65%	3%	24%	59%	14%	73%	7%	32%	57%	4%	61%
66-70%	5%	19%	58%	17%	75%	2%	15%	62%	21%	83%	6%	28%	59%	7%	66%
71-75%	3%	11%	54%	33%	87%	1%	7%	56%	37%	92%	3%	17%	67%	13%	80%
76-80%	1%	6%	48%	44%	92%	0%	4%	45%	50%	95%	1%	11%	66%	22%	88%
81-85%	1%	4%	37%	59%	96%	0%	2%	33%	65%	98%	1%	7%	57%	36%	93%
86-90%	0%	2%	30%	68%	97%	0%	1%	21%	78%	99%	0%	3%	50%	47%	96%
91-95%	0%	1%	21%	78%	99%	0%	1%	14%	85%	99%	0%	1%	33%	65%	99%
96-100%	0%	0%	10%	90%	100%	0%	0%	8%	92%	100%	0%	1%	15%	85%	99%
<i>TOTAL</i>	<i>15%</i>	<i>15%</i>	<i>38%</i>	<i>31%</i>		<i>8%</i>	<i>18%</i>	<i>39%</i>	<i>35%</i>		<i>7%</i>	<i>18%</i>	<i>49%</i>	<i>26%</i>	