2012

LONGITUDINAL ANALYSIS OF THREE YEARS OF PASS ACHIEVEMENT DATA

Longitudinal Analysis of Three Years of PASS Achievement Data: 2009-2011

Executive Summary

This report is the first longitudinal study of Palmetto Assessment of State Standards (PASS) achievement data, similar in purpose to previous works that have documented the longitudinal trends of achievement data obtained from the Palmetto Achievement Challenge Test (PACT) assessment (EOC, 2006; EOC, 2005). The two major foci of this investigation are student retention and student academic achievement. The following results were found:

With respect to student retention:

- Retention was studied for grades 3, 4, 5, and 6 from 2009 to 2010.
- Approximately 96 percent of student records from 2009 were associated with records in 2010.
- The retention rate at each grade level is small, approximately 1 percent of students.
- Compared to promoted students, larger percentages of retained students are Male, African-American, have a Disability, and participate in the federal school lunch program.
- Based on the PASS data analyzed, academic benefits of retention for success at the next grade level were present from grade 3 to grade 4, but were minimal for all other grade transitions.

With respect to student achievement:

- Six cohorts were studied. A cohort consisted of students tested in all years, 2009 through 2011. Cohorts contained students tested in grades 3 through 5, 4 through 6, 5 through 7, and 6 through 8. Each cohort contained approximately 50,000 students.
- Differences in achievement by gender are present for Reading, but not for Mathematics.

- Students who receive free lunch achieve at substantially lower levels than do full-pay lunch students. Reduced lunch students achieve midway between these groups.
- Students who receive free lunch gain much less from one year to another than full-pay students. This trend ensures that these students will continue to achieve at lower levels.
- The patterns of achievement for students separated by grade 3 achievement levels are similar to the patterns of achievement obtained from PACT for students identified similarly.

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This report is the first longitudinal study of Palmetto Assessment of State Standards (PASS) achievement data, similar in purpose to previous works that have documented the longitudinal trends of achievement data obtained from the Palmetto Achievement Challenge Test (PACT) assessment (EOC, 2006; EOC, 2005). The two major foci of this investigation are student retention and student academic achievement.

Students are retained with the intent of providing additional academic instruction that will improve student academic performance at the current grade level and at subsequent grade levels. When students are retained, however, additional educational costs are incurred because the student will spend an additional year in school. Long term societal costs may be lower, however, if retention does improve academic achievement in a way that enhances employability. Other studies have shown that retention increases the probability that a student will drop out of school. Student retention was investigated in grades 3 through 6 to determine the overall rates of retention, whether students in some demographic groups are retained at higher rates than others, and whether retention appears to be beneficial to student achievement.

Summary information of student achievement as measured by the PASS assessment is used to provide information regarding the relative achievement levels of schools and districts, of groups of students within schools and districts, and to monitor achievement over time. In this investigation, patterns of achievement across grades are presented for all students, and for students with different initial achievement levels. Patterns in student achievement are presented and interpreted with respect to selected student characteristics. To further explain some differences in achievement by demographic group, analyses of changes in PASS scores from one year to another are also presented.

The data used in this study were obtained from PASS assessment administrations in 2009, 2010, and 2011. The data used to investigate student retention differed from the data used to investigate academic achievement. To examine trends of student achievement, four student cohorts were created. A cohort is a group of students who were tested in each year (2009 through 2011) and were promoted each year. Students who were retained were not included in a cohort. The first cohort tested in grade 3 in 2009, grade 4 in 2010, and grade 5 in 2011; the second cohort tested in grade 4 in 2009, grade 5 in 2010, and grade 6 in 2011; the third and fourth cohorts were defined similarly, with Spring 2009 testing in grades 5 and 6, respectively. These cohorts will referred to using the combination of grade levels at which students are tested. For example the first cohort will be referred to as the 3-4-5 cohort, and the second cohort as the 4-5-6 cohort, etc.

To examine student retention, data from 2009 and 2010 were used, so that as much as possible, the same students were used to examine retention as were used to examine academic achievement . For all students tested in grades 3 through 6 in Spring 2009 the grade level at which students were tested in the Spring of 2010 was obtained. Students who tested at the same grade level in Spring of 2009 and Spring of 2010 were assumed to be retained, and students tested at the next higher grade level in Spring of 2010 were assumed to have been promoted. Retention, then, was studied at each grade level from 3 through 6.

Table 1 presents summary information regarding the data used to examine retention and academic achievement. Notice that the cohort 3-4-5 contains fewer students than does the data on which retention was studied in grade 3. Each cohort always contains fewer students than the retention data, because the cohort only includes students for whom PASS assessment information could be obtained from all three years (2009, 2010, and 2011), and who were promoted each year. Although differences between the demographic composition of a cohort differs only slightly from the demographic

composition of the corresponding retention data, the following trends can be observed. The percentage of students identifying their racial/ethnic group as Other is always larger in a cohort than in the corresponding retention data, and the percentages of all other racial/ethnic groups is smaller in a cohort than in the corresponding retention data. Also, the percentage of Female students is consistently higher in a cohort than in the corresponding retention data. Finally, the percentage of students receiving free lunch is smaller in a cohort than in the corresponding retention data and the percentage of students paying for lunch is larger in a cohort than in the corresponding retention data.

Table 1. Demographic Characteristics of Each Grade Group and Cohort.

Racial/Ethnic Group	Retention Grade 3 (55,216)	Cohort 3-4-5 (52,368)	Retention Grade 4 (53,619)	Cohort 4-5-6 (50,572)	Retention Grade 5 (52,821)	Cohort 5-6-7 (49,899)	Retention Grade 6 (52,311)	Cohort 6-7-8 (48,985)
African-American	37.9	36.5	37.1	36.0	37.5	36.1	37.8	35.81
Hispanic	6.0	5.4	**5.4**	4.9	5.4	4.9	5.0	4.4
Other	3.0	6.8	2.8	6.6	2.6	6.6	2.6	6.6
White	53.1	51.3	54.7	52.5	54.6	52.5	54.6	53.1
Gender								
Female	49.2	49.4	48.8	49.0	48.7	49.0	48.4	49.1
Male	50.8	50.6	51.2	51.0	51.3	51.0	51.6	50.9
Lunch Status								
Free	50.2	49.6	48.9	48.5	48.0	47.5	46.7	45.5
Reduced	7.8	7.9	8.1	8.5	8.3	8.5	8.1	8.2
Full Pay	42.0	42.6	43.0	44.1	43.7	44.1	45.2	46.3

Retention

As previously described, to examine student retention all students tested in Spring 2009 were matched with students tested in Spring 2010. Students who were tested at the same grade level in Spring 2009 and Spring 2010 were assumed to be retained, and students who were tested one grade higher in Spring

2010 than in Spring 2009 were assumed to be promoted. Some students were tested in Spring 2009 and could not be identified in the Spring 2010 testing file (attrition). These students may have:

1) Moved to a non-public school in South Carolina;
2) Moved out-of-state;
3) Been tested using alternative assessments in 2010;
4) Been promoted two grade levels for 2010; or
5) Been excluded because inconsistent student information prevented student identification in both 2009 and 2010.

What are the rates of retention among each cohort?

Table 2 presents information regarding retention rates, promotion rates, and attrition rates for each of the four cohorts. Retention rates within the cohorts range from one half of one percent (0.5) for cohort 5-6-7 to slightly more than one percent (1.3) for cohort 6-7-8. The observed differences can be interpreted in different ways. From one perspective, because the largest retention rate among the cohorts is very small, differences among these rates may not be of great consequence, as the number of students retained within any of the cohorts is small. From a second perspective, although the overall retention rate is small, the largest retention rate (1.3 percent) is more than twice the smallest retention rate (0.5 percent).

Table 2. Promotion, Retention, and Attrition by Cohorts

		Promotion		Retention		Attrition	
Initial Grade	N in 2009	Number	Percent	Number	Percent	Number	Percent
3	55216	52158	94.5	606	1.1	2452	4.4
4	53619	50873	94.9	378	0.7	2368	4.4
5	52821	49937	94.5	286	0.5	2598	4.9
6	52311	49204	94.1	659	1.3	2448	4.7

Are larger percentages of students in some demographic groups retained than promoted?

Table 3 presents data that allow comparison between the percentage of each demographic group among retained students to the percentage of the same demographic group among students who were promoted. For example, among students in grade 3 in Spring 2009, the percentage of retained students who are male is 59.9 (+/-4.0), and the percentage of students who were promoted that are male is 50.7. Because the number of retained students is small, the percentage of each demographic group among retained students is presented with an estimate of how much the percentage may be in error. Because the number of students promoted is large, the errors are small and are not presented.

The following summary statements can be made:

- Across grades, a larger percentage of the retained students is male compared to the promoted students.
- Compared to promoted students, a larger percentage of retained students are African-American, are students with disabilities, and receive either free or reduced lunch.
- Smaller percentages of the retained students are enrolled in gifted and talented programs.
- The percentages of retained and promoted students that are Hispanic do not differ.
- The percentages of students who are not native English speakers also do not differ.

Table 3. Percentage of Students Among Retained and Not Retained Students for Each Cohort.

Percent of Students who are…	Initial Grade	Retained	Promoted*
Male	3	59.9 (+-4.0)	50.7*
	4	58.5 (+-5.0)	51.0*
	5	67.5 (+-5.6)	51.1*
	6	71.1 (+-3.6)	51.1*
African-American	3	57.8 (+-4.0)	38.2*
	4	52.5 (+-5.2)	37.4*
	5	52.1 (+-6.0)	37.9*
	6	56.8 (+-3.8)	37.9*
Hispanic	3	5.1 (+-1.8)	5.8
	4	4.2 (+-2.0)	5.2
	5	4.9 (+-2.6)	5.2
	6	3.5 (+-1.4)	4.8
Students with Disabilities	3	26.1 (+-3.6)	14.0*
	4	27.0 (+-4.6)	13.3*
	5	26.2 (+-5.2)	13.2*
	6	16.4 (+-2.8)	12.3*
Student with non-Speech Disability	3	17.8 (+-3.2)	8.9*
	4	19.8 (+-4.6)	9.9*
	5	23.8 (+-5.0)	11.2*
	6	15.0 (+-2.8)	11.5*
Non-English Speaker	3	96.3 (+-1.6)	94.1*
	4	96.3 (+-2.0)	94.6
	5	95.3 (+-2.4)	94.9
	6	96.9 (+-1.4)	95.3*
Gifted-Academic or Artistic	3	0.2 (+-0.4)	9.7*
	4	0.5 (+-0.8)	16.2*
	5	0.0	18.8*
	6	1.5 (+-1.0)	18.7*
Free or Reduced Lunch	3	84.1 (+-3.0)	57.5*
	4	80.3 (+-4.0)	56.7*
	5	74.5 (+-5.6)	56.3*
	6	82.0 (+-3.0)	54.2*

* Indicates a statistically significant difference between percentages for retained and not-retained students.

Does retention increase student achievement the next year at the same grade level?

Students are retained in the belief that providing additional academic instruction will better master the content and skills of the current grade level in order to provide a more firm academic foundation for

future academic work. Table 4 presents information that indicates that students do increase their achievement levels when assessed the second year in a repeated grade. Larger gains are made for Mathematics than for Reading, however, students also initially scored lower for Mathematics than for Reading.

Table 4. Percent of Repeating Students with Each Report Card Weight on First and Second Years in the Same Grade – Reading and Mathematics.

	Reading		Mathematics	
Report Card Weight	2009	2010	2009	2010
	Grade 3		Grade 3	
Not Met 1	21.8	7.2	60.2	15.2
Not Met 2	52.1	29.0	30.9	36.0
Met	25.1	43.7	8.6	38.3
Exemplary 4	0.5	10.1	0.4	7.2
Exemplary 5	0.5	10.0	0.0	3.3
Number of Students	570	572	570	572
	Grade 4		Grade 4	
Not Met 1	39.7	20.0	57.2	25.4
Not Met 2	30.0	25.1	18.1	22.0
Met	26.9	43.7	23.5	45.1
Exemplary 4	3.1	6.2	1.1	3.7
Exemplary 5	0.3	5.1	0.0	3.9
Number of Students	39.7	20.0	353	355
	Grade 5		Grade 5	
Not Met 1	34.1	24.8	57.9	28.3
Not Met 2	25.8	20.2	19.4	27.5
Met	37.7	46.9	21.8	37.6
Exemplary 4	2.0	3.5	0.8	5.0
Exemplary 5	0.4	4.7	0.0	1.6
Number of Students	252	258	252	258
	Grade 6		Grade 6	
Not Met 1	38.6	26.2	60.5	38.8
Not Met 2	33.1	27.2	19.2	18.5
Met	25.6	33.8	18.6	36.7
Exemplary 4	2.0	7.1	1.4	3.6
Exemplary 5	0.8	5.7	0.4	2.3
Number of Students	511	523	511	523

For Reading, 21.8 percent of students scored Not Met 1 in their first year in grade 3, and only 7.2 percent scored Not Met 1 in the second year at the same grade. In grades 4, 5, and 6, 34.1 to 39.7

percent of students scored Not Met 1 in their first year, and 20.0 to 26.2 percent of students scored Not Met 1 in the second year at the same grade. For Mathematics, from 57.2 to 60.5 percent of students scored Not Met 1 in their first year, and from 15.2 to 38.8 percent of students scored Not Met 1 in the second year at the same grade level.

Does retention increase student achievement at the next grade level?

Students are also retained in the belief that providing additional academic instruction will increase student academic achievement in future grades. A grade 3 student, for example, is retained with the hope and/or belief that an additional year of study in grade 3 will both provide greater mastery of the content and skills associated with the third grade curriculum and allow the student to be more successful with the knowledge and skills associated with the grade four curriculum. The next comparison made was between the levels of achievement obtained in grade 4 for students who were retained in grade 3 and the levels of achievement in grade 4 for students who were promoted after their first enrollment in grade 3. In order to make a fair comparison, students who scored at the level Not Met 1 who were retained were compared to students who scored at the Not Met 1 level who were promoted, and students who scored at the level Not Met 2 who were retained were compared to students who scored at the Not Met 2 level who were promoted. The same comparisons were made for each 2009 grade level. All results are presented in Table 5.

The results presented in Table 5 suggest that while modest gains are made from grade 3 to 4, gains made from grades 4 to 5, 5 to 6, and 6 to 7 are minimal. The percentage of students scoring Not Met at the next grade level is smaller among students who repeated a grade than among students who were promoted. Consider for example student progress from grade 3 to 4 for students who scored at the level Not Met 1 in Spring of 2009 on the Reading test. In grade 4, among retained students 69.1 percent scored at the level Not Met, while among promoted students 88.4 percent score at the level Not Met, a

difference of 19.3 percent. As students move from grade 4 to 5, 74.9 percent of retained students scored Not Met, and 80.0 percent of promoted students scored Not Met, a difference of 5.1 percent. The difference between the percentages of retained and promoted students scoring Not Met is 3.9 from grade 5 to 6. From grade 6 to 7, the difference between the percentages of retained and promoted students scoring Not Met is 9.9 percent. The overall trend is that with each higher grade level the benefits of retention do not appear to be as large.

A slightly different pattern is evident when considering students who initially scored Not Met 2. For Grade 3 to 4 a smaller percentage of retained students scored Not Met 1 (17.9) than did promoted students (25.5); however for all other grade levels the percentage of students scoring Not Met 1 is larger among retained students than among promoted students. The only grade for which any advantage appears for retaining students is grade 3.

Similar results are obtained for Mathematics (Table 6). For students progressing from grade 3 to 4, the percentage of retained students scoring Not Met is 46.8 percent, and the percentage of promoted students scoring Not Met 1 is 80.2 percent, a 33.4 percent difference. From grade 4 to 5 there is an 11.3 percent difference, from grade 5 to 6 there is an 8.5 percent difference, and from grade 6 to 7 there is a 10.5 percent difference.

The pattern for students who initially scored Not Met 2 is the same for Mathematics as for Reading. From grade 3 to 4 a smaller percentage of retained students scored Not Met 1 at the next grade, but for all other grade transitions, the percentage of retained students who scored Not Met 1 at the next grade level is higher.

Table 5. Percent of Students with Each Report Card Weight by Initial Report Card Weight in Spring 2009 and Grade Retention Status – Reading.

	Not Met 1		Not Met 2	
Final Report Card Weight	Retained	Promoted	Retained	Promoted
	Grade 3 to Grade 4			
Not Met 1	32.5	57.7	17.9	25.5
Not Met 2	36.6	30.7	31.3	37.6
Met	29.3	11.0	46.5	34.3
Exemplary 4	1.6	0.4	4.0	1.9
Exemplary 5	0.0	0.2	0.3	0.7
Number of Students	123	2304	297	8671
	Grade 4 to Grade 5			
Not Met 1	50.4	53.1	24.5	22.4
Not Met 2	24.5	26.9	20.8	27.6
Met	23.7	19.1	49.1	46.7
Exemplary 4	1.4	0.5	3.8	2.1
Exemplary 5	0.0	0.4	1.9	1.2
Number of Students	139	4746	106	7191
	Grade 5 to Grade 6			
Not Met 1	63.5	62.9	35.4	30.1
Not Met 2	29.4	26.1	30.8	38.0
Met	7.1	10.5	29.2	29.8
Exemplary 4	0.0	0.3	4.6	1.3
Exemplary 5	0.0	0.2	0.0	0.8
Number of Students	85	4273	65	4760
	Grade 6 to Grade 7			
Not Met 1	60.4	63.9	29.0	26.1
Not Met 2	20.8	27.2	32.0	40.1
Met	16.8	8.0	34.3	30.1
Exemplary 4	1.0	0.7	3.6	2.9
Exemplary 5	1.0	0.2	1.2	0.8
Number of Students	197	4456	169	7730

Table 6. Percent of Students with Each Report Card Weight by Initial Report Card Weight in Spring 2009 and Grade Retention Status – Mathematics.

	Not Met 1		Not Met 2	
Final Report Card Weight	Retained	Promoted	Retained	Promoted
	Grade 3 to Grade 4			
Not Met 1	29.7	54.9	11.9	18.3
Not Met 2	27.1	25.3	16.5	25.3
Met	39.9	19.2	66.5	53.3
Exemplary 4	3.2	0.4	2.8	2.6
Exemplary 5	0.0	0.2	2.3	0.6
Number of Students	343	6576	176	9260
	Grade 4 to Grade 5			
Not Met 1	52.7	59.2	25.0	27.0
Not Met 2	23.9	28.7	26.6	38.5
Met	21.9	11.7	46.9	33.5
Exemplary 4	1.5	0.3	1.6	0.9
Exemplary 5	0.0	0.1	0.0	0.1
Number of Students	201	6489	64	4406
	Grade 5 to Grade 6			
Not Met 1	53.4	67.3	32.7	34.2
Not Met 2	24.0	18.6	20.4	26.2
Met	22.6	13.8	44.9	38.8
Exemplary 4	0.0	0.2	2.0	0.7
Exemplary 5	0.0	0.1	0.0	0.1
Number of Students	146	6981	49	5004
	Grade 6 to Grade 7			
Not Met 1	61.2	70.5	33.7	37.5
Not Met 2	16.2	17.4	22.5	28.4
Met	21.0	11.9	39.8	33.2
Exemplary 4	1.3	0.3	4.1	0.8
Exemplary 5	0.3	0.1	0.0	0.1
Number of Students	309	7360	98	5267

Do these results imply that retention is an effective strategy for low achieving students?

An extensive body of work exists that examines the effectiveness of student retention on both the academic and social/emotional well-being of students at later points in a student's life. Jimerson, Ferguson, Whipple, Anderson, and Dalton examined students who were retained in kindergarten, grade 1, or grade 2 through grade 11[1]. They conclude that retention may be an ineffective strategy to address social/emotional issues of self-esteem and aggression students may have that impact student learning. Wu, West, and Hughes found both academic and social/emotional advantages to retention for three years following the retention, however, warned that longer term effects may not be as clearly advantageous[2]. They describe a "struggle-succeed-struggle" cycle, where retained students struggle when addressing new information, and where social acceptance and student identification/participation with school also follows an inconsistent pattern. Before student retention is accepted as a solution for all struggling students, a more thorough study of the contexts in which student retention is successful should be undertaken. Johnson and Rudolph have also concluded that retention gains are small and tend to diminish within three years[3]. Karweit notes "the consensus of several extensive reviews of grade retention is that there is not a positive effect for grade retention on academic achievement or on student personal adjustment" (p. 4)[4].

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[1]Jimerson, Shane R, Phillip Ferguson, Angela Whipple, Gabrielle E Anderson, and Michael J Dalton. "Exploring the Association Between Grade Retention and Dropout: A Longitudial Study Examining Socio-Emotional, Behavioral, and Achievement Characteristics fo Retained Students." *The Califorinia School Psychologist, Vol. 7*, 2002: 51-62.

[2]Wei Wu, Stephen G. West, Jan N. Hughes. 2010. "Effect of Grade Retention in First Grade on Psychosocial Outcomes." *J Educ Psychol*. 102(1): 135-152.

[3]Johnson, D., and Rudolph, A. (2001). *Critical Issue: Beyond Social Promotion and Retention—Five Strategies to Help Students Succeed*. Naperville, IL: Learning Point Associates, www.learningpt.org.

[4]Karweit, N. L. *Repeating a grade: Time to grow or denial of opportunity?* Baltimore: Center for Research on Effective Schooling for Disadvantaged Students, 1991.

To summarize the findings with respect to student retention:

- The retention rate at each grade level is small, approximately 1 percent of students.
- Compared to promoted students, larger percentages of retained students are Male, African-American, have a Disability, and participate in the federal school lunch program.
- Based on the PASS data analyzed, academic benefits of retention for success at the next grade level were present from grade 3 to grade 4, but were minimal for all other grade transitions.

Academic Achievement

Three aspects of academic achievement were investigated. First overall trends in achievement were obtained for each cohort for both Reading and Mathematics. Patterns in achievement were examined by gender and by participation in the federal school lunch program. Second, patterns in achievement were examined conditioned on first year achievement level. Finally, gains in achievement were examined by lunch program status and are also presented. In this study, academic achievement is measured in two ways; one is by the percentage of students scoring at the levels Met or Exemplary on PASS, and the second is by the mean (average) of the report card weights associated with each student's test score. The report card weights associated with student achievement range from 1 (Not Met 1) to 5 (Exemplary 5).

What are the patterns of achievement for all students, by gender, and by lunch status?

Figures 1 and 2 present the PASS performance for each cohort in Reading and Mathematics, respectively, where the percent of students scoring Met or Exemplary is on the vertical (Y) axis, and the student grade level is on the horizontal (X) axis. Although there is no cohort from grade 3 through 8 for this study, presenting all cohorts on one graph provides a visual that emulates what might be observed for a grade 3 through 8 cohort. For Reading, the percent of students scoring Met or Exemplary appears

to decrease as grade level increase, while for Mathematics the percent of students scoring Met or Exemplary appears to be irregular, increasing from grade 3 to 4, and decreasing from grade 4 through 8.

To determine progress in student achievement over time, each year's cohorts can be compared to the patterns of achievement of these initial cohorts. If achievement increases, cohorts at a later time will have higher percentages of students achieving the level Met, and if achievement decreases, later cohorts will have lower percentages of students achieving the level Met. Analyses that monitor and evaluate differences between future cohorts and the current cohort over time may provide the most insightful evidence for whether student achievement increases or decreases over time. The patterns of achievement observe in the present cohorts, then, may best be viewed as "baseline" achievement patterns to be used as reference for future achievement.

Figure 1. Pass Reading Performance for All Cohorts.

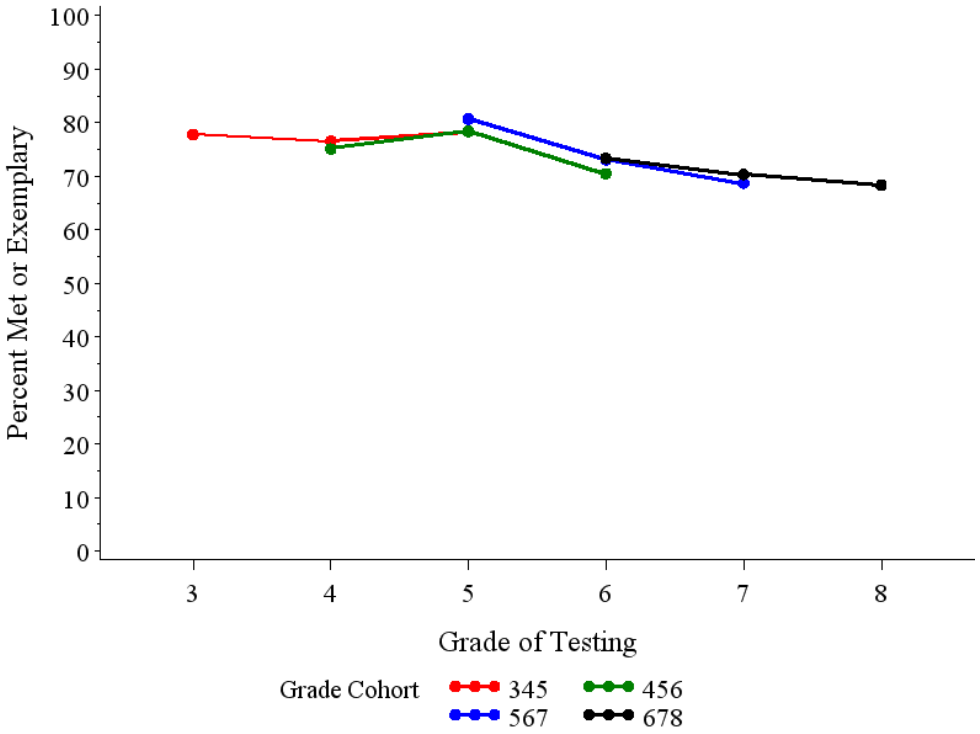
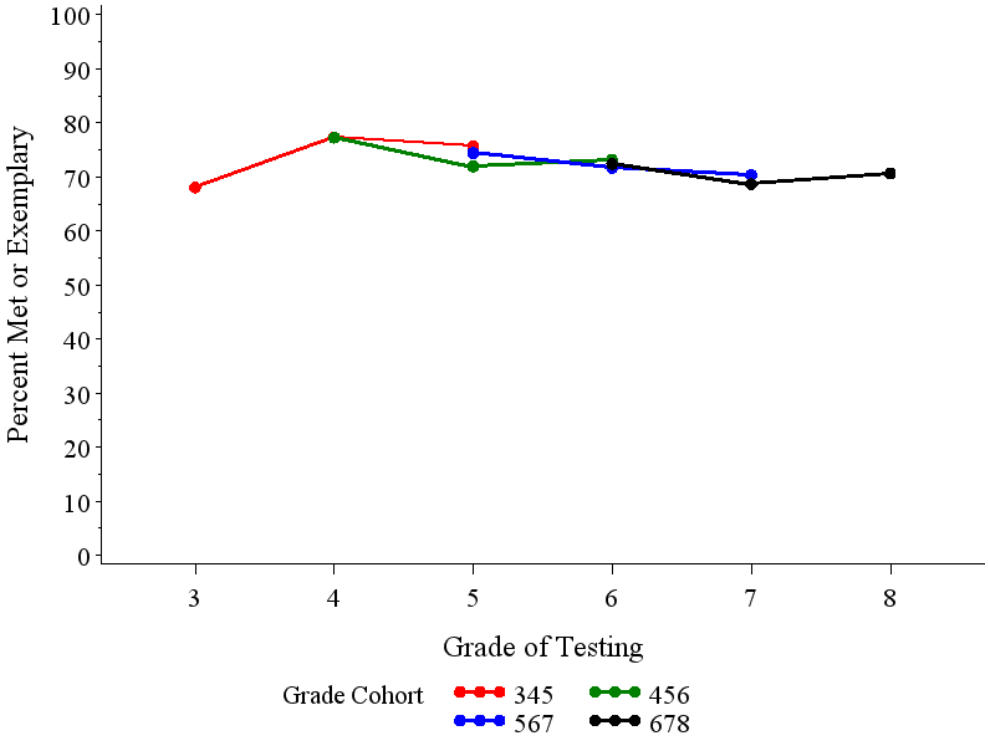


Figure 2. PASS Mathematics Performance for All Cohorts.



The relative achievement levels by gender and lunch status can be observed by graphing the percentages of students Met or Exemplary for each group of students. Approximately 10 percent more females score at the level Met or Exemplary for Reading, and this difference appears to consistent across grade level and cohorts (Figure 3). Differences between males and females are not as consistent across cohorts for the Mathematics test (Figure 4). At grades 3 and 4, differences between males and females appear to be minimal. At grades 5 through 8, females score 5-10 points higher than males, though the pattern differs both within and between cohorts.

Figure 3. PASS Reading Performance for all Cohorts by Gender.

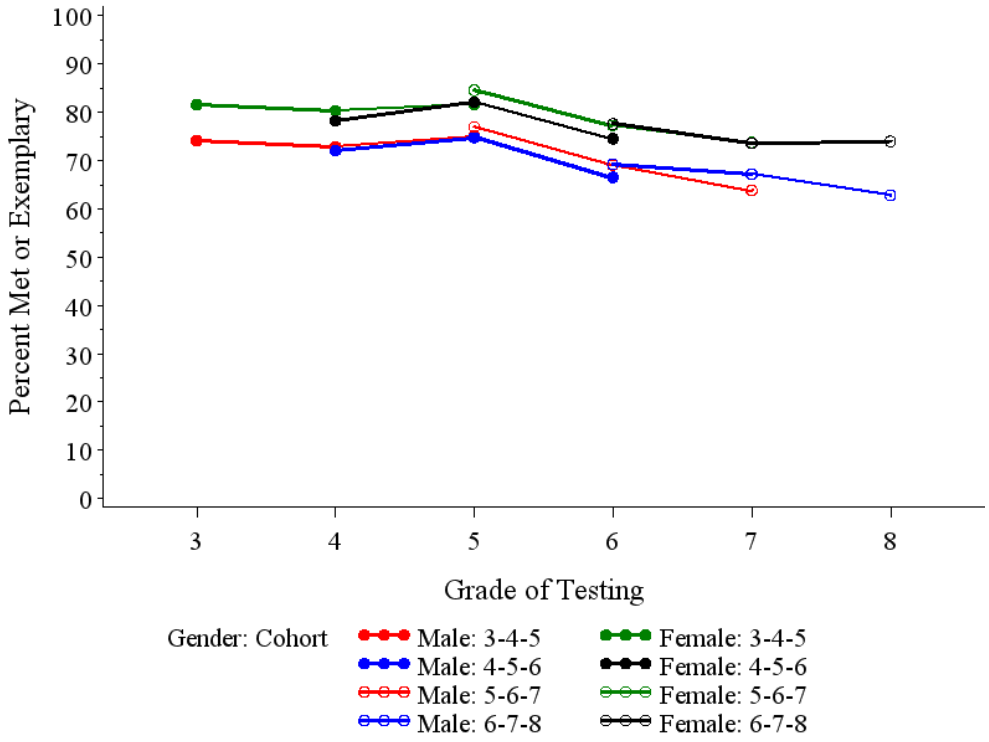
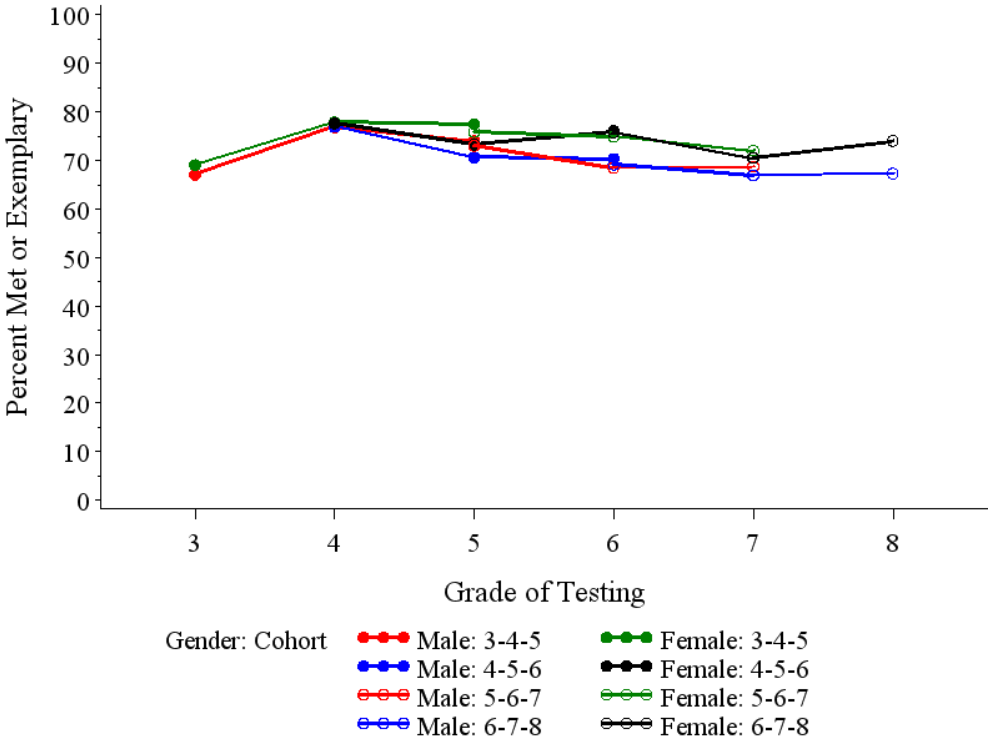


Figure 4. PASS Mathematics Performance for all Cohorts by Gender



Examining the pattern achievement by school lunch program status reveals that full-pay lunch students consistently score the highest, followed by students who receive reduced lunch rates. Students who receive free lunch demonstrate the lowest academic performance. This trend is present for both Reading (Figure 5) and Mathematics (Figure 6), and is consistent for each cohort. Approximately 12 percent more full-pay lunch students score at the level Met or Exemplary than do students who have reduced lunch rates. Approximately 15 percent fewer students who receive free lunch score Met or Exemplary than do students who have reduced lunch rates. The difference between the achievement of full-pay lunch students and students who receive free lunch appears to be slightly more than 20 percent for Reading, and appears to slightly larger for Mathematics.

Figure 5. PASS Reading Performance for all Cohorts by Lunch Status

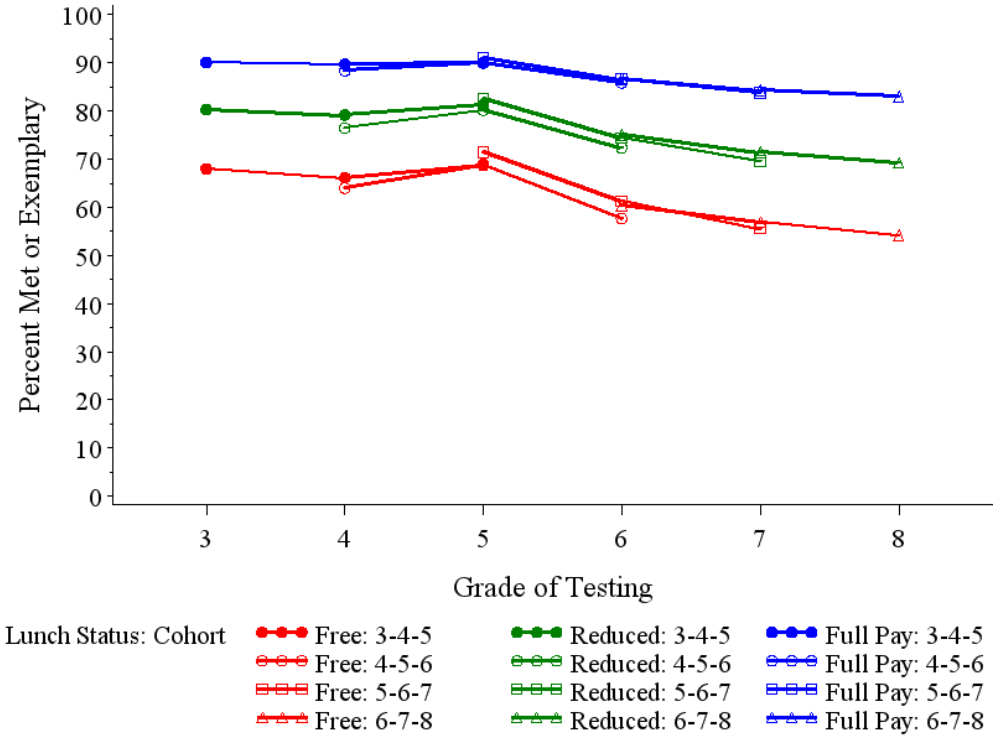
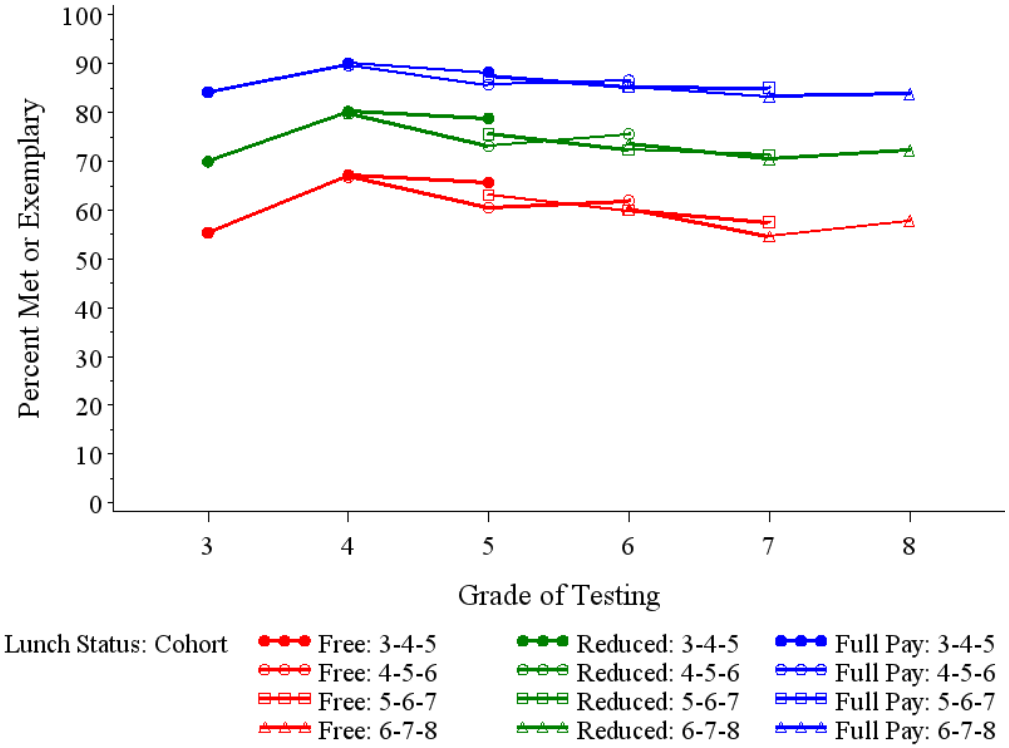


Figure 6. PASS Mathematics Performance for all Cohorts by Lunch Status.



Can the observed differences in achievement by lunch status be explained by differences in student gains from year to year?

Figures 7 and 8 present information that indicates that the progress students make from year to year differ by lunch status. Students receive a numeric score on the PASS assessment for each year. For each student the change between their scores in 2009 and 2010 was computed. For each 2009 score, the average of these changes was computed. In Figure 7 the horizontal axis indicates the grade 4 score of students in 2009, and the vertical axis is the average change score. Consider students who scored 650 in grade 4 of 2009. For students who receive free lunch the average score change was -5 points, for reduced lunch students the average score change was -3 points, and for full-pay lunch students the average score change was +3 points.

A clear pattern emerges, full-pay lunch students gain the most from year to year, and free lunch students gain the least from year to year. The average score change is smaller for students who receive free lunch than it is for students who receive reduced lunch rates, both of which are less than the average score change for full-pay lunch students.

How do these results inform the question asked? We previously observed differences in overall levels of achievement based on lunch status. These results indicate that students who receive free lunch also gain less from year to year than do reduced lunch students and full-pay lunch students. The consequence of this pattern is that achievement gaps between full-pay and free lunch students will widen each year. In order to decrease differences by lunch status group, free lunch students will instead need to increase in achievement at rates greater than those of full-pay lunch students.

Figure 7. Changes in the Percent Met from Grade 4 to Grade 5 for Reading.

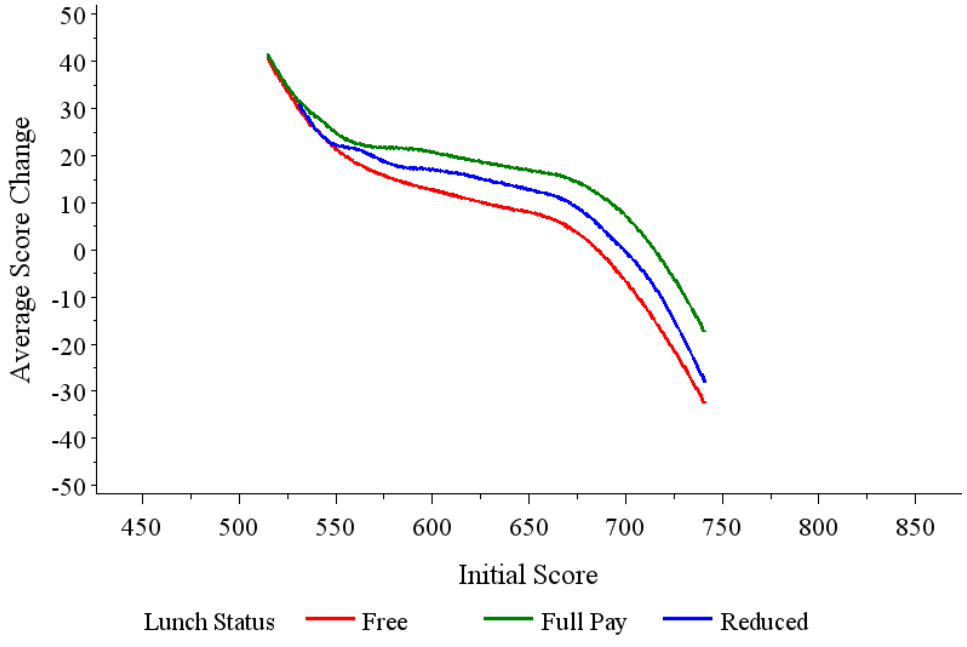
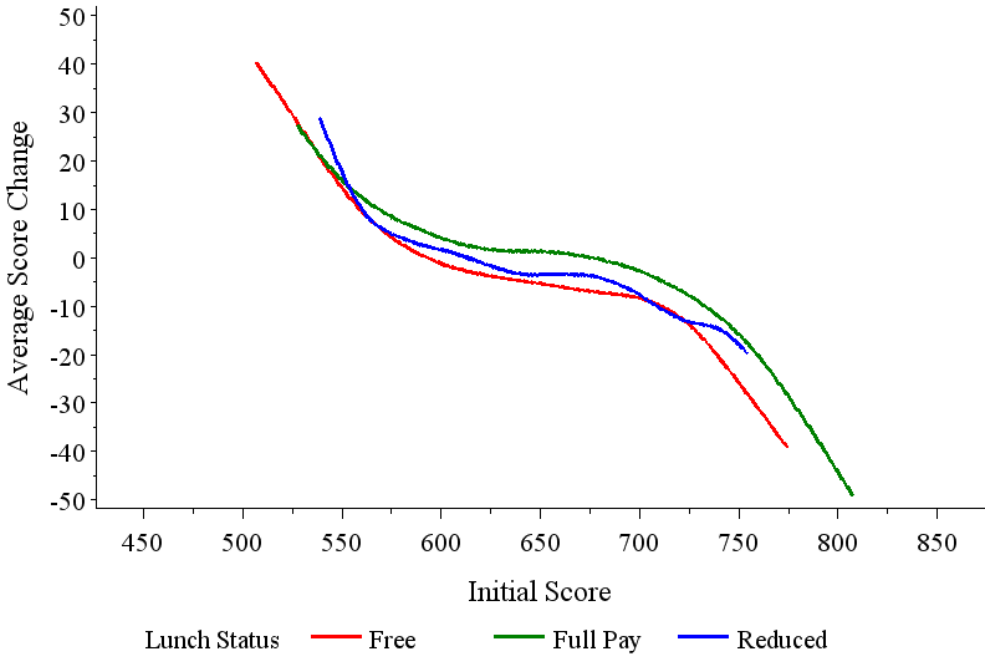


Figure 8. Changes in the Percent Met from Grade 4 to Grade 5 for Mathematics.



How do the observed patterns in achievement compare to patterns of achievement obtained from PACT?

Previous work by the EOC (2006) presented graphs of the mean report card weights in grades 3 through 8 for students initially scoring at each achievement level (Below Basic 1, Below Basic 2, Basic, Proficient, and Advanced) in grade 3. Corresponding analyses are presented in Figures 9 and 10 for the cohort initially tested in grade~~s~~ 3 in Reading and Mathematics.

In grade 3 the mean report card weights are 1, 2, 3, 4, and 5 because each group was selected based on these initial report card weights. In grade 4 the students initially scoring at the lowest report card weight (Not Met 1 increased markedly, and students initially scoring at the highest report card weight (Exemplary 5) decreased markedly. These changes are another manifestation of the "regression to the mean" effect.

Figure 9. Mean PASS Report Card Weight for Groups by Report Card Weight in Grade 3, Spring 2009 - Reading.

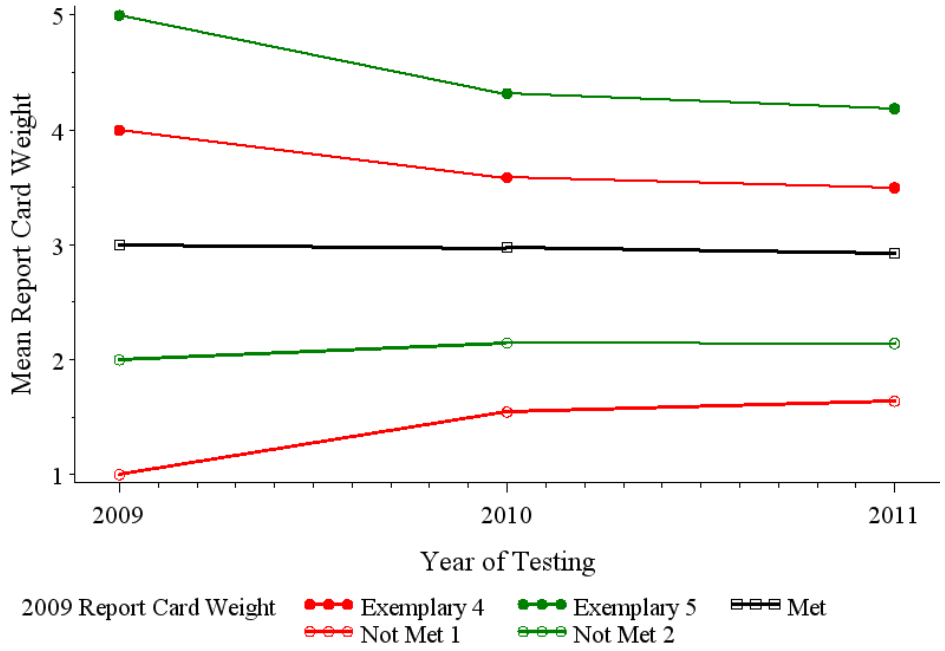
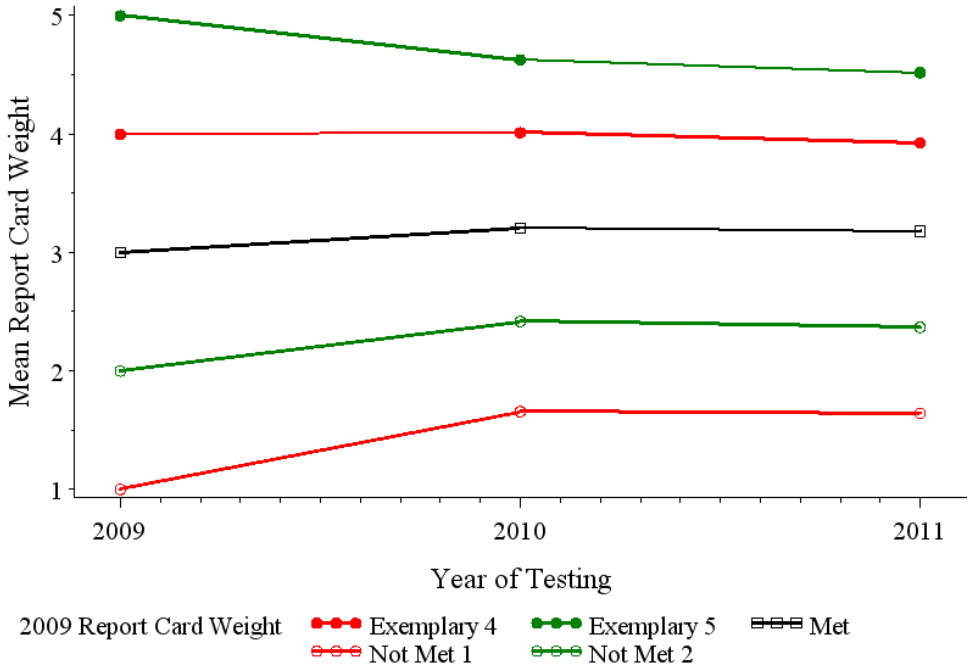


Figure 10. Mean PASS Report Card Weight for Groups by Report Card Weight in Grade 3, Spring 2009 - Mathematics.



Students scoring at Not Met 2 or Exemplary 4 in grade 3 have a more modest "regression to the mean" effect, though it is evident. The pattern observed here for PASS data is similar to that observed for PACT (EOC, 2006).

To summarize the findings with respect to student achievement:

- Differences in achievement by gender are present for Reading, but not for Mathematics.
- Students who receive free lunch achieve at substantially lower levels than do full-pay lunch students. Reduced lunch students achieve midway between these groups.
- Students who receive free lunch gain much less from one year to another than full-pay students. This trend ensures that these students will continue to achieve at lower levels.
- For cohorts of students initially tested in grade 3, PASS achievement patterns appear to be similar to PACT achievement patterns.