

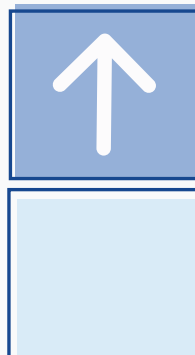


# A Study of Apex Learning and Student Achievement Year 1

Dorchester School District Two

February 2013

29  
percentile  
point Gain



Using Apex Learning



## Introduction

Dorchester School District Two utilizes Apex Learning digital curriculum in its credit recovery program to provide individualized, self-paced courses to assist students that have failed a course. The Apex Learning digital curriculum provides computer-delivered, individualized instruction in a variety of courses in subjects such as English language arts (ELA), math, science, social studies, and many electives. In Dorchester, students retake a course using the digital curriculum after receiving a failing grade in a course in a traditional classroom. When using the Apex Learning digital curriculum for credit recovery, students progress at their own pace, taking necessary time to master the material. Students take the course until a satisfactory grade is received. Dorchester utilizes a feature of the Apex Learning digital curriculum, Mastery-based Learning (MBL). In the 2010–2011 school year, MBL was set at 70%, requiring students to achieve 70% or higher on each unit of study before moving forward in a course. In most cases, students continue to take courses in traditional classrooms for original credit as they participate in credit recovery.

This study focused on high school students using the Apex Learning digital curriculum for credit recovery in math and ELA courses during the 2008–2009, 2009–2010, 2010–2011 school years. It examines the relationship of Apex Learning usage on ELA and math performance on the South Carolina High School Assessment Program (HSAP).

## Results

**For students using the Apex Learning digital curriculum for credit recovery, how is their Quality of Work metric related to achievement on the HSAP?**

*A positive relationship was found between students' Quality of Work scores on the Apex Learning digital curriculum and student performance on the HSAP.*

The Apex Learning Quality of Work metric measures a student's average score for completed and scored activities. It excludes partially completed activities and extra credit. The formula used for this calculation is: Points Earned on Completed Activities / Points Possible on Completed Activities.

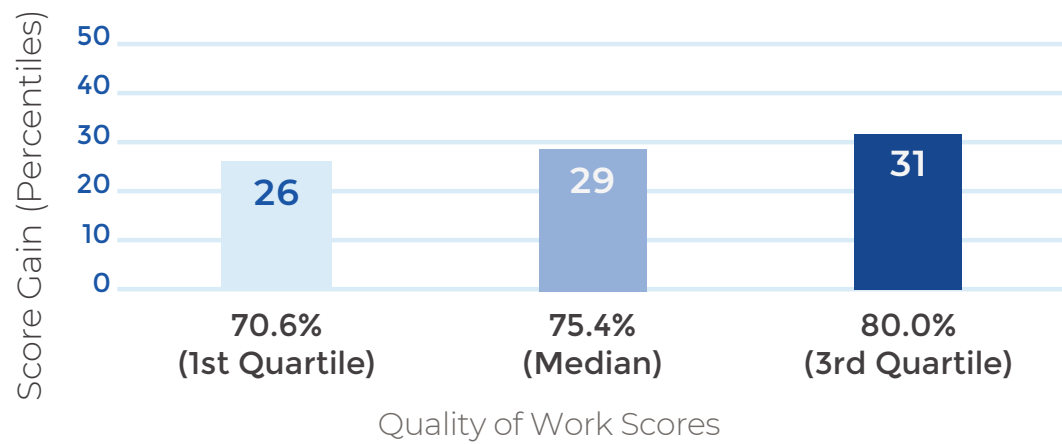
A positive relationship was found between Quality of Work and HSAP scores. The statistical test gives us strong confidence in this result ( $p < .01$ ). We found that for the average student (i.e. a student performing at the 50th percentile of HSAP score distribution for the sample), 2.3 additional Quality of Work points is associated with moving up by one percentile point of HSAP score distribution. Figure 1 shows the first quartile, median, and third quartile Quality of Work scores for the sample and their associated percentile increases compared to an average student with zero Quality of Work points. The average Quality of Work score achieved by the sample was 74.7, an amount associated with an average student gaining 29 percentile points, i.e. moving from the 50th percentile to the 79th percentile.

### LEVELS OF CONFIDENCE IN OUR RESULTS

Results are reported based on statistical calculations that give a measure of confidence expressed as a probability or p value. A low p value indicates a low probability that we would detect a difference like the one found in the study if no difference actually existed. A p value less than .05 gives us strong confidence in the result (a level conventionally called statistically significant), while a p value greater than .20 gives no confidence. Between the two we may have some or limited confidence.

**Figure 1:**

## Percentile Improvement for Different Quality of Work Scores



## Study Description

### Study Design

The study sought to associate Apex Learning digital curriculum usage with performance on the HSAP. The analysis excluded non-Apex Learning users, comparing the achievement of students who used the Apex Learning digital curriculum with higher quality as measured by the Quality of Work metric. The analysis controlled for ethnicity, socioeconomic status, age, gender, English Language status, time using the digital curriculum, and prior achievement, as measured by the Palmetto Assessment of State Standards (PASS) or Palmetto Achievement Challenge Test (PACT).

### Participants

Dorchester provided student data for the 2006 through 2011 school years including student, school, and course data. This was combined with data from the 2008–2011 Apex Learning logs, including course indicators, classroom names, activities completed, and Quality of Work metrics. Only students with pre- and posttest assessment scores for math and/or reading were included in the sample. The analytic sample allowed for individual students to have up to two records—one for each subject and assessment combination—in math, and ELA.

Student Apex Learning digital curriculum usage data was pulled from the years between taking the PASS/PACT and taking the HSAP. One, two, or in some cases, three years of Apex Learning digital curriculum usage may have been included in a given record.

## Outcome Measures and Calculations

Findings for the study are based on the HSAP assessment, which measures student performance on ELA and math; the assessment is traditionally given during the spring of the 10th grade. The majority of students in the sample came from the 10th grade, with a small amount of students in 11th and 12th grades (see Tables 3 and 4). Students taking the HSAP in 11th and 12th grades may be taking the assessment for the second, third, or even fourth time. Only HSAP scores from spring administrations were used.

The analysis investigated the association between Apex Learning digital curriculum usage and performance on the HSAP assessment. To accommodate tests given in different years, all assessment scores were converted to a comparable scale (technically, Z-scores, which are deviations from the averages measured in the units of standard deviation). For the purposes of this analysis, usage was understood to be Quality of Work scores. The sample included 201 student records.

## Conclusion

The analysis found that higher Quality of Work scores are associated with higher scores on the HSAP. This result suggests that students in credit recovery who achieve high Quality of Work scores perform better on the math and ELA HSAP assessment.

### CAUTIONS FOR INTERPRETING THESE RESULTS

This case study was conducted on behalf of Dorchester School District Two with the technical assistance of Empirical Education. In conducting or supporting the agency's conduct of the study, Empirical does not intend to generate evidence valid beyond the agency in which the case study was conducted.

## Technical Details

### Data Preparation

Dorchester provided student data for the 2006 through 2011 school years. This data included student IDs and demographics; student course data including course names and subject, and school identifiers. It also included assessment scores from the 2010–2011 HSAP assessment. Dorchester provided over 9,000 unique student records. The vast majority of students had multiple course and assessment records; this resulted in over 30,000 course and assessment records.

Apex Learning provided student log data for the 2008–2011 school year from the Apex Learning system. Log data included course and pathway indicators, teacher and classroom names, the number of activities completed, Quality of Work scores, and more. With multiple records per student, Apex Learning provided more than 27,000 records.

The analytic sample combined student ID and demographic data with 1) assessment records, 2) course data, and 3) Apex Learning log data, including Quality of Work scores. Pretest scores in Reading and Math came from the PASS or PACT administered at the end of students' 8th grade year. The outcome measure was the HSAP, taken in the spring semester of the 10th, 11th, or 12 grade year. Student IDs, courses (including number of courses per subject), demographics, and assessment records came from the data file provided by Dorchester; additional course data (including number of credit recovery courses) and Apex Learning log data were taken from the Apex Learning data file. Given the amount of time between the pretest and the HSAP administration, one, two, or in some cases, three years of Apex Learning digital curriculum usage data may have been included in a record.

The analytic sample allowed for individual students to have up to two records—one for each subject and assessment combination—in math and ELA. All assessment scores were converted to Z-scores, calculated by year and subject. The Quality of Work metric is a weighted average of all quality of work scores from a given subject, weighted by time spent per course.

### Analysis

Statistical analyses were performed using a linear mixed model, where the impact of the usage metric on the outcome (final assessment) is estimated adjusting for: the fixed effects of student characteristics (socioeconomic status, English Language status, gender, ethnicity, age); pretest; usage metrics; number of in subject (math or ELA) traditional courses, number of out of subject traditional courses, number of in subject (math or ELA) credit recovery courses, number of out of subject credit recovery courses; and subject.

Tests were run on the usage metric for correlation with the pretest. The goal of this test is to establish that the usage is not determined by the student’s level of preparation. If a strong relationship of this kind is established in the data, then attributing the outcomes to the use of an educational product becomes problematic. It was found, however, that the usage metrics are uncorrelated with the pretest. The students’ placement in Apex Learning can be therefore considered quasi-random and used as a “treatment” indicator without adjustments.

Table 1 shows the estimate on the Quality of Work variable, from the analysis model. The table presents the estimate, the standard error, and the p value. The p value of <.01 suggests that we have strong confidence in our result. The estimate is translated into a percentile gain, presented in Figure 1.

Table 1: Model Estimates			
Fixed Effects	Estimate	Std. Error	p value
Quality of Work	0.011	0.0051	<.01

### Participants

Table 2 provides the basic statistics on the students used in the analysis, showing the number of records for math and ELA credit

Table 2: Credit Recovery Students	
Credit Recovery Students	Average
Count of ELA Students	106
Average ELA Credit Recovery Courses	1.07
Average ELA Quality of Work	73.06
Average ELA Time on Apex Learning (in minutes)	12158.94
Count of Math Students	95
Average Math Credit Recovery Courses	1.16
Average Math Quality of Work	76.36
Average Math Time on Apex Learning (minutes)	3129.19

Tables 3 and 4 provide the demographic breakdown for traditional and credit recovery students from the 2010–2011 school year, by ELA and Math courses. Student records used in the analysis were drawn from the credit recovery pool. Not all records were used because some students were missing pretest scores.

Table 3. Reading HSAP					
Demographic Category	Traditional Students	Percent of Traditional Students	Credit Recovery Students	Percent of Credit Recovery Students	Total
Count of Students	1609	.	106	.	1715
10th Grade	1503	93%	81	76%	1584
11th Grade	79	5%	22	21%	101
12th Grade	23	1%	3	3%	26
Female	791	49%	34	32%	825
Male	818	51%	72	68%	890
Asian	35	2%	2	2%	37
African American	487	30%	44	42%	531
Hispanic	93	6%	6	6%	99
Native American	13	1%	1	1%	14
White	949	59%	48	45%	997
Unclassified	32	2%	5	5%	37
Native or Fluent English Speaker	1567	97%	102	96%	1669
Full Pay Lunch	1062	66%	38	36%	1100
Subsidized Lunch	547	34%	68	64%	615
Average HSAP Reading Score	233.97	.	210.59	.	232.53
Standard Deviation of HSAP Scores	25.93	.	21.44	.	26.28
Average of ELA Time on Apex (minutes)	.	.	2158.94	.	2005.42
Average ELA Quality of Work	.	.	73.06	.	72.39

Table 4. Math HSAP

Demographic Category	Traditional Students	Percent of Traditional Students	Credit Recovery Students	Percent of Credit Recovery Students	Total
Count of Students	1657	.	105	.	1762
10th Grade	1514	91%	71	68%	1585
11th Grade	113	7%	30	29%	143
12th Grade	27	2%	4	4%	31
Female	813	49%	35	33%	848
Male	844	51%	70	67%	914
Asian	34	2%	2	2%	36
African American	514	31%	44	42%	558
Hispanic	89	5%	6	6%	95
Native American	14	1%	0	0%	14
White	970	59%	49	47%	1019
Unclassified	36	2%	4	4%	40
Native or Fluent English Speaker	1619	98%	103	98%	1722
Full Pay Lunch	1084	65%	41	39%	1125
Subsidized Lunch	573	35%	64	61%	637
Average HSAP Math Score	225.21	.	203.37	.	223.91
Standard Deviation of HSAP Scores	27.50	.	17.34	.	27.49
Average of Math Time on Apex (minutes)	.	.	2941.98	.	2941.98
Average Math Quality of Work	.	.	75.99	.	75.99

Table 5 presents a breakdown of credit recovery patterns, dating back to the 2008–2009 school year. Segmenting the available records by cohort (08–09, 09–10, and 10–11), the table presents the total number of student records provided, the number and percentage of students participating in credit recovery, and then the number of those students that returned the following school year. Finally, on the last line, the table presents the percentage of returning students that had a credit recovery course in both years. To qualify as a participating credit recovery student for this table, a student must have spent more than five hours in an Apex Learning digital curriculum course. The table shows that the percentage of students returning to credit recovery dropped from the 08–09 cohort to the 09–10 cohort. In other words, a smaller percentage of students spent a second year taking credit recovery courses in the 10–11 school year. It is not possible to say what caused this drop.

Table 5. Dorchester Students and Credit Recovery Participation

	08 - 09 Cohort	09 - 10 Cohort	10 - 11 Cohort
Number of Students	6007	6210	6290
Number of Credit Recovery Students	115	310	439
Percent of Students in Credit Recovery	2%	5%	7%
Number of Students Returning the following Year	4084	4159	.
Number of Credit Recovery Students Returning the following Year	113	237	.
Returning Credit Recovery Students Continuing in Credit Recovery	43	74	.
Percent of Students Continuing in Credit Recovery	38%	31%	.
Evening School Attendance (All Apex Learning users)	74	92	87

### Considerations

The study is limited in two ways. First, there was a lack of a well-defined comparison group. Second, there is a possibility of omitted variable bias, as only a limited number of variables were included in the datasets provided by Dorchester School District Two and Apex Learning, and some of those data could not be used in the analysis because it could not be reliably linked. Therefore, the results presented here should be considered preliminary. Since the estimated impact of Apex Learning usage will depend on the particulars of the Dorchester School District Two learning environment, the study should be replicated in other settings.

### Additional Background

Apex Learning offers a comprehensive digital curriculum to meet high school graduation requirements in math, science, English, social studies, world languages, and selected electives. The curriculum is designed to support academic success for all students, from those not prepared for grade-level academic challenges to those capable of accelerating their learning. Because students come to high school at varying levels of readiness, Apex Learning has designed its digital curriculum with multiple course pathways, each designed to meet specific needs of students as they transition from middle school to high school and progress toward graduation.

Dorchester Two School district is located in Summerville, South Carolina, and provides K through 12 education to over 20,000 students. Three primary high schools, and one alternative program make up the secondary division. The use of the Apex Learning digital curriculum for credit recovery was introduced in the 2007–2008 school year, and expanded to all high schools in the 2008–2009 school year.





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### Contact

#### Apex Learning

1215 Fourth Ave., Suite 1500

Seattle, WA 98161

Phone: 1 (206) 381-5600

Fax: 1 (206) 381-5601

[ApexLearning.com](http://ApexLearning.com)