Dorchester School District Two, Year 2: A Study of Apex Learning and Student Achievement

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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). MLB 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, and 2011-2012 school years. It examines the relationship of Apex Learning usage on ELA and math performance on the South Carolina High School Assessment Program (HSAP) during the 2011-2012 school year. The present study is a replication of previous work that utilized 2010-2011 HSAP achievement data.

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), 1.2 additional Quality of Work points are associated with an increase of one percentile point of HSAP score distribution.

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 of less than .05 gives us strong confidence in the result (a level conventionally called statistically significant), while a *p* value of greater than .20 gives no confidence. Between the two we may have some or limited confidence.

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FIGURE 1. PERCENTILE IMPROVEMENT FOR DIFFERENT QUALITY OF WORK SCORES

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 76.7, an amount associated with an average student gaining 44 percentile points, i.e. moving from the 50th percentile to the 94th percentile.

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 data for the 2008 through 2012 school years which included student demographic and achievement data. This was combined with data from the 2008-2012 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, three, or in some cases, four 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 2011-2012 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 the spring administration 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 194 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 2008 through 2012 school years. This data included student IDs and demographics and school identifiers. It also included assessment scores from the 8th grade PASS/PACT and 2011-2012 HSAP assessments. Dorchester provided over 6,000 unique student records.

Apex Learning provided student log data from the Apex Learning system. Data was only requested for students in credit recovery courses or evening school courses during the 2011-2012 school year. Log data included course and subject indicators, teacher and classroom names, time spent in the system, Quality of Work scores, and more. Apex Learning provided more than 3,000 records.

The analytic sample combined student ID and demographic data with assessment records and 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 2011-2012 HSAP, taken in the spring semester of the 10th, 11th, or 12th grade year. Given the amount of time between the pretest and the HSAP administration, one, two, three or in some cases, four 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) credit recovery courses, number of out of subject credit recovery courses; and subject.

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	0.015	0.0052	< .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 recovery courses, along with the basic usage metrics.

TABLE 2. STUDENTS INCLUDED IN ANALYSIS

Credit Recovery Students	Average
Count of ELA Students	88
Average ELA Credit Recovery Courses	1.13
Average ELA Quality of Work	76.23
Average ELA Time on Apex Learning (in minutes)	1859.99
Count of Math Students	106
Average Math Credit Recovery Courses	1.13
Average Math Quality of Work	75.99
Average Math Time on Apex Learning (minutes)	2448.43

Tables 3 and 4 provide the demographic breakdown for traditional and credit recovery students from the 2011-2012 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	1211		88		1299
10th Grade	1175	97%	73	83%	1248
11th Grade	29	2%	12	14%	41
12th Grade	7	1%	3	3%	10
Female	605	50%	33	37%	638
Male	606	50%	55	63%	661
Asian	28	2%	0	0%	28
African American	341	28%	43	49%	384
Hispanic	49	4%	3	3%	52
Native American	6	1%	1	1%	7
White	761	63%	39	44%	800
Unclassified	26	2%	2	2%	28
Native or Fluent English Speaker	1191	98%	88	100%	1279
Full Pay Lunch	809	67%	32	36%	841
Subsidized Lunch	402	33%	56	64%	658
Average HSAP Reading Score	233.19		216.55		232.07
Standard Deviation of HSAP Scores	20.75		20.12		21.12
Average of ELA Time on Apex (minutes)			1859.99		
Average ELA Quality of Work			76.23		

TABLE 4. MATH HSAP

Demographic Category	Traditional Students	Percent of Traditional Students	Credit Recovery Students	Percent of Credit Recovery Students	Total
Count of Students	1238		106		1344
10th Grade	1167	94%	84	79%	1251
11th Grade	51	4%	19	18%	70
12th Grade	20	2%	3	3%	23
Female	617	50%	43	41%	660
Male	621	50%	63	59%	684
Asian	29	2%	0	0%	29
African American	357	29%	49	46%	406
Hispanic	49	4%	3	3%	52
Native American	7	1%	1	1%	8
White	768	62%	51	48%	819
Unclassified	28	2%	2	2%	30
Native or Fluent English Speaker	1219	98%	105	99%	1324
Full Pay Lunch	818	66%	48	45%	866
Subsidized Lunch	420	34%	58	55%	478
Average HSAP Math Score	232.68		201.04		230.19
Standard Deviation of HSAP Scores	29.02		15.84		29.46
Average of Math Time on Apex (minutes)			2448.43		
Average Math Quality of Work			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, 10-11, and 11-12), 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 increased from the 09-10 cohort to the 10-11 cohort. In other words, a larger percentage of students spent an additional year taking credit recovery courses in the 11-12 school year. It is not possible to say what caused this increase.

TABLE 5. DORCHESTER STUDENTS AND CREDIT RECOVERY PARTICIPATION

	08 - 09 Cohort	09 - 10 Cohort	10 - 11 Cohort	11 – 12 Cohort
Number of Students	6007	6210	6290	6421
Number of Credit Recovery Students	115	310	439	626
Percent of Students in Credit Recovery	2%	5%	7%	10
Number of Students Returning the following Year	4084	4159	4200	
Number of Credit Recovery Students Returning the following Year	113	237	257	
Returning Credit Recovery Students Continuing in Credit Recovery	43	74	111	
Percent of Students Continuing in Credit Recovery	38%	31%	43%	
Evening School Attendance (All Apex Learning users)	74	92	87	211

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.