EFFICACY STUDY

A Study of the Impact of Apex Learning Digital Curriculum

St. Mary's County Public Schools

September 2016

Introduction

In the 2010-2011 school year, St. Mary's County Public Schools (SMCPS) adopted Apex Learning Comprehensive Courses for use in the credit recovery program to increase the graduation rate and reduce the dropout rate. Four years later, SMCPS administrators added Apex Learning Tutorials as a strategy to support struggling students and enhance classroom instruction. Tutorials were developed to improve student mastery of the content and skills established by state-specific standards.

Figure 1. Demographics of St. Mary's County Public Schools	
District Enrollment 2015	17,887
Urban Locale	Rural Outskirts of Baltimore
Demographic Characteristics	
Am. Indian/AK Native	0%
Asian	3%
Black/African Amer.	18%
HI/Pac. Islander	0%
Hispanic/Latino	7%
Two or more races	6%
White	66%
Special Programs	
Free/Reduced Meals	34%
Limited English Proficient	≤ 5%
Special Education	9%
Title I (Elementary Only)	26%

In the 2014-2015 school year, SMCPS made Apex Learning Tutorials available to all high school teachers as a resource to provide targeted intervention and remediation to struggling students and to enhance initial instruction. In the first year, 19 teachers from three high schools used Tutorials in 37 classrooms. Teachers used Tutorials with individual students, small groups of students, or many students in each classroom. Students within a single classroom could complete Tutorials modules in a variety of ways depending on how the teacher implemented the resource. All students could complete the same modules and/or complete individually prescribed modules tailored to meet individual student needs. Table 1 located in the appendix shows the number of classrooms grouped by the total number of enrollments for each Tutorial. Table 2 located in the appendix shows the number of enrollments for each Tutorial and the average use.

In the 2014-2015 school year, the Maryland State Department of Education administered the Partnership for Assessment of Readiness for College and Careers (PARCC) end-of-course assessments for first time since adopting new state standards in 2013. Students completing Algebra I, Algebra II, and English 10 courses completed PARCC end-of-course assessments while students completing Biology and Government courses completed the High School Assessment (HSA) end-of-course exams.

This study addressed two research questions:

1. Have graduation and dropout rates improved since implementing Apex Learning Comprehensive Courses in the credit recovery program?
2. Is there a relationship between Tutorials use and end-of-course exam performance?

Four questions guided the analysis:

1. Has the graduation and dropout rate improved since adopting Apex Learning Comprehensive Courses for credit recovery?
2. Is there a relationship between Tutorials use and achievement on the PARCC ELA 10 end-of-course exam for struggling students?
3. Do students using Apex Learning Tutorials perform the same or better on PARCC ELA 10 end-of-course assessments as students with similar demographic characteristics not using Apex Learning digital curriculum?

A total of 119 high school students used 384 enrollments from eight Tutorials. One hundred thirteen (113) Tutorials users had prior ability and end-of-course exam scores from the PARCC ELA 10 assessment. A random sample of students not using Apex Learning with similar 8th grade prior ability and demographic characteristics was generated to compare the average achievement of Tutorials users and non-Tutorials users. Table 3 located in the appendix shows the average prior ability and demographic characteristics of students in each group. Students in the Apex Learning group were:

i. Enrolled in 10th grade

ii. 68% White

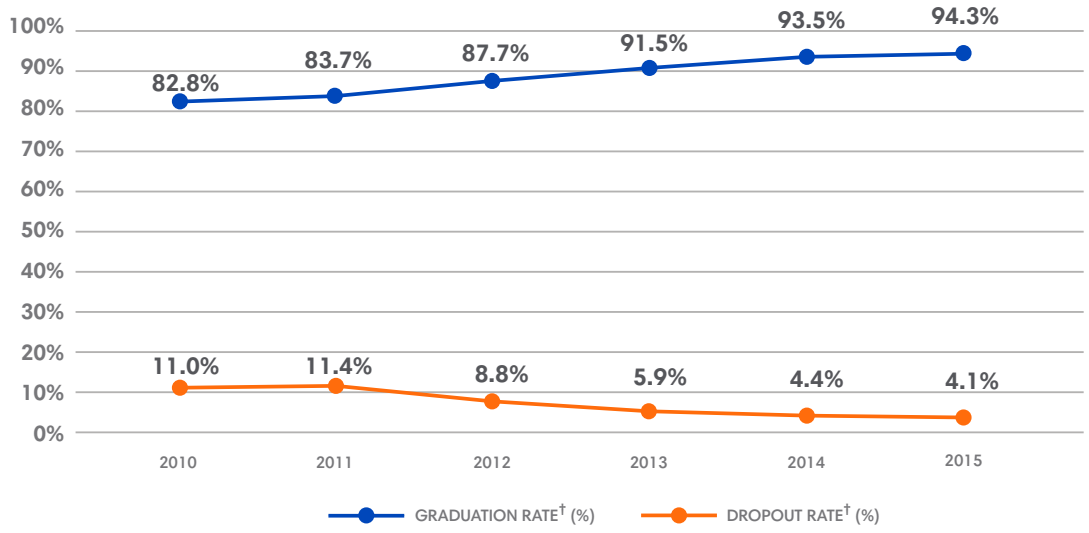
iii. 31% eligible for federal free/reduced cost meals

iv. 17% special education program participants

Results

Has the graduation rate improved since adopting Apex Learning Comprehensive Courses for credit recovery?

Since adopting Apex Learning Comprehensive Courses for use in the credit recovery program, the SMCPS graduation and dropout rates improved significantly, by 11.5 and 6.9 percentage points respectively. Figure 2 shows the four-year cohort graduation and dropout rates from the year prior to adopting Apex Learning Courses (2010) through 2015.



† Statistically significant, p ≤ .05

FIGURE 2:
St. Mary's County Public Schools Four-Year Cohort Graduation/Dropout Rates

Is there a relationship between Tutorials use and achievement on PARCC ELA 10 end-of-course exams?

English 10 Tutorials use is positively correlated with PARCC ELA 10 end-of-course achievement ($F(6,104)=64.84$, $p<.00$, $R^2=.78$). Specifically, increased number of posttests completed, Quality of Work, and total time spent using Tutorials was associated with higher end-of-course scores (Table 6, appendix).

Figure 3 illustrates the influence Tutorials use has on PARCC achievement for this sample of students controlling for prior ability and demographic characteristics.

Figure 3. Relationship between Tutorials Use and PARCC ELA 10 Achievement

English 10 Tutorials	Average Use	Increase by	Improve PARCC ELA 10 Score by
Number of Posttests Completed	1.6	1 posttest	6 percentile points
Quality of Work	63	5 points	3 percentile points
Total Time Used	2 h 27 m	1 hour	4 percentile points
PARCC ELA 10 Score	50th percentile	→	63rd percentile

Do students using Apex Learning Tutorials perform the same or better on the PARCC ELA 10 end-of-course assessment as students with similar demographic characteristics not using Apex Learning digital curriculum?

The average achievement of students using Apex Learning Tutorials on the PARCC ELA 10 end-of-course assessment was similar to the average achievement of a comparison group of students not using Apex Learning digital curriculum (Table 7, appendix). The difference between the average achievement of Tutorial users and the comparison group is not statistically significant (ES -.11, p=.20)controlling for prior ability and demographic characteristics.

Conclusion

Since adopting Apex Learning in 2010, the effectiveness of the credit recovery program has improved significantly. Outcomes include:

- The percent of students graduating on-time improved 11.5 percentage points.
- The percent of students dropping out high school decreased 6.9 percentage points.

The impact of Tutorials on the end-of-course exam achievement for students is promising. After the first year of implementation:

- English 10 Tutorials use is positively correlated with PARCC ELA 10 end-of-course achievement.
- Students using English 10 Tutorials achieved similar average scores on the PARCC ELA 10 as students with similar demographic characteristics not using Apex Learning digital curriculum.

Study Description

Study Design

A mixed method design was used to examine the effectiveness of Apex Learning digital curriculum as implemented in SMCPS. A correlational design was used to study the impact of Apex Learning Comprehensive Courses on the effectiveness of the credit recovery program. A quasi-experimental group design was used to study the impact of Tutorials on end-of-course exam achievement.

Participants

Students included in the analysis of the impact of Tutorials on end-of-course exam performance used Apex Learning Tutorials during the 2014-2015 school year and had both 8th grade prior ability measures and PARCC ELA10 exam scores.

Data Preparation

Individual datasets were created to address each question. The preparation of each dataset is described below.

Question 1: The 4 year adjusted graduation and dropout rates for each school year between 2010 and 2015 were retrieved from the Maryland State Department of Education website http://reportcard.msde.maryland.gov/.

Question 2: Multiple steps were completed to prepare the data needed to evaluate the relationship of Tutorials on end-of-course performance.

SMCPS provided five files (HSA, PARCC, MSA Grade 8 Reading, Science, and Math) containing a total of 21,916 records from students enrolled in grades 9-12 at SMCPS during the 2014-2015 school year. The HSA and PARCC files contained the results from each assessment completed during the 2014-2015 school year. The MSA files contained the results of end-of-year exam completed by students enrolled in 8th grade between the school years of 2009-2010 and 2013-2014. Each file contained demographic and academic data for students completing an assessment. Demographic data included: date of birth, grade, gender, race, and indicators identifying limited English proficiency, special education participation, and federal free/reduced cost meals participation. Academic data provided in the files included: test name, administration date and scaled score. Individual tests from each assessment were pooled by test name and administration school year and the scaled scores were transformed into standardized z-scores to allow test results to be combined and compared across assessments. In cases of duplicate test results, the most recent assessment result was kept and the remaining records were dropped from the file.

Apex Learning provided a file containing 384 Tutorials enrollments that were used between fall 2014 and summer 2015. The files included variables for school, Tutorials name, classroom name, number and percent of Tutorials modules completed, total session minutes, and quality of work metric.

Tutorials enrollment records were joined to the assessment files. A total of 113 Tutorials enrollments had matching assessment data.

Question 3: A random sample of students similar to Tutorials users was generated to compare the end-of-course achievement of Tutorials users to non-users. Propensity score matching and sampling with replacement was used to generate a sample of students not using Apex Learning digital curriculum with similar 8th grade prior ability and demographic characteristics as students using Tutorials.

Analysis

For each question, the following statistical tests were used to analyze the data.

Question 1: A chi-square test was used to analyze the graduation and dropout rates over time.

Question 2: An SPSS automated linear model was used to identify the best set of variables that predict end-of-course achievement. Variables entered into the model for consideration included demographic characteristics and Tutorials use variables. Demographic characteristic variables entered for analysis included: 8th grade prior ability, date of birth, grade, gender, minority flag, free/reduced lunch participation, special education participation, and limited English proficiency. Tutorials use variables entered for analysis included: progress completed; total number of modules completed; total number of pretests, Test Its, posttests, and assessments completed; scores generated by Tutorials assessments including pretest, Test It,

posttest, and quality of work. Six variables were determined to be the best predictors of end-of-course achievement including 8th grade prior ability, Tutorials pretest score, gender, Quality of Work score, number of posttests completed, and total time spent using Tutorials.

Question 3: An analysis of covariance was used to compare the average achievement of students using Tutorials to the average achievement of students not using Apex Learning controlling for race, gender, date of birth, limited English Proficiency, free/reduced cost lunch participation, special education participation, and grade.

Outcome Measures

The outcome measure for this study was the PARCC end-of-course assessment standardized z-score. The Maryland State Department of Education administered the PARCC end-of-course assessments in English 10, Algebra I and Algebra II for the first time during the 2014-2015 school year. Students taking the PARCC end-of-course assessments for the first time in 2014-2015 or 2015-2016 will not be required to pass the test in order to graduate.

References

Maryland State Department of Education. St. Mary County Public School Demographic Characteristics 2014. Retrieved 7/26/2016 from http://reportcard.msde.maryland.gov/

Maryland State Department of Education. St. Mary's County Four Year Cohort Graduation and Dropout Rates. Retrieved 4/6/2016 from http://reportcard.msde.maryland.gov/CohortGradRate.aspx?PV=160:12:18:AAAA:2:N:0:13:1:2:1:1:1:1:3

Preacher, K. J. (2001, April). Calculation for the chi-square test: An interactive calculation tool for chi-square tests of goodness of fit and independence [Computer software]. Available from http://quantpsy.org.

Appendix

Table 1. Number of Classrooms Using Tutorials by Total Enrollments

Total Enrollments	Mathematics II	Algebra I	Geometry	English 7	English 9	English 10	English 11	English 12	Total Classrooms
1	1	2	3	1	7	7	1	0	18
2-10	0	0	0	0	2	2	1	1	4
11-19	0	0	0	0	0	0	0	3	6
20-29	0	0	0	0	2	2	3	1	9
Total Classrooms	**1**	**2**	**3**	**1**	**11**	**11**	**5**	**5**	**37**

Table 2. Number of Enrollments and Average Apex Learning Use (Median) by Tutorials Subject

	Enrollments	Time Used	Progress Completed	Modules Completed	Pretests Completed	Test Its Completed	Posttests Completed	Quality of Work
Tutorials	N	Minutes	%	N	N	N	N	%
Algebra I	2	886.0	51.0	28.0	5.5	28.0	5.0	80
English 7	1	7.0	3.0	1.0	0.0	1.0	0.0	50
English 9	64	40.0	2.0	2.2	0.6	2.0	0.1	65
English 10	138	164	14.0	11.0	2.8	7.0	1.8	61
English 11	85	40	4.0	3.9	1.4	1.0	0.6	79
English 12	90	81	4.0	3.5	1.5	3.0	0.7	62
Geometry	3	513	11.0	5.3	2.0	4.0	0.7	55
Mathematics II	1	426.0	12.0	8.0	1.0	8.0	1.0	51

Table 3. Demographic Characteristics and Prior Ability by Group

		Group				
		Comparison		Tutorials Users		
Demographic Characteristics		N	Column N %	N	Column N %	Total
Enrollments		113	100.0	113	100.0	226
GRADE	10	111	98.2	110	97.3	221
	11	2	1.8	3	2.7	5
GENDER	F	63	55.8	63	55.8	126
	M	50	44.2	50	44.2	100
RACE	White	78	69.0	77	68.1	155
	Asian	2	1.8	3	2.7	5
	Multi-Racial	14	12.4	5	4.4	19
	Native American	0	0.0	1	0.9	1
	African American	19	16.8	27	23.9	46
Limited English Proficiency	Yes	0	0.0	2	1.8	2
Special Education Program	Yes	19	16.8	19	16.8	38
Federal Free/Reduced Cost Meals	Yes	24	21.2	35	31.0	59

Table 3. (Continued) Demographic Characteristics and Prior Ability by Group

		Group				
		Comparison		Tutorials Users		
Test Scores (z-scores) †		Count	Mean	Count	Mean	Total
Prior ability	MSA Reading Gr8	113	-0.04	113	-0.06	226
Outcome	PARCC ELA 10	113	0.14	113	0.01	226

† Unadjusted scores

Table 4. Four Year Adjusted Cohort Graduation Rate

			Number of Students Graduated		Chi-Square			
Class	4-Yr Adjusted Cohort Total Students	Graduation Rate (%)	Observed	Expected	χ^2	df	Sig. p	
2010	1311	82.76	1085	1165	160.38	5	0.00	†
2011	1267	83.66	1060	1126				
2012	1358	87.70	1191	1207				
2013	1236	91.50	1131	1098				
2014	1284	93.46	1200	1141				
2015	1306	94.26	1231	1161				

Table 5. Four Year Adjusted Cohort Dropout Rate

			Number of Students Dropped Out		Chi-Square			
Class	4-Yr Adjusted Cohort Total Students	Dropout Rate (%)	Observed	Expected	χ^2	df	Sig. p	
2010	1311	10.98	144	100	95.25	5	0.00	†
2011	1267	11.37	144	97				
2012	1358	8.84	120	104				
2013	1236	5.91	73	94				
2014	1284	4.44	57	98				
2015	1306	4.13	54	100				

Table 6. Model Estimates: Impact of Tutorial Use Characteristics on PARCC ELA 10

Model Term	B	Std. Error	t	Sig. p	
Intercept	-2.316	0.286	-8.087	0.00	†
Prior Ability Gr8	0.321	0.067	4.787	0.00	†
Tutorials Pretest Score	1.480	0.391	3.784	0.00	†
Tutorials Posttests Completed	0.157	0.042	3.685	0.00	†
Quality of Work	0.014	0.005	2.932	0.00	†
Total Time Used	0.002	0.001	2.517	0.01	†
Female	0.216	0.086	2.504	0.01	†

Dependent variable: PARCC ELA 10 z-score
† Statistically significant, p. ≤ .05

Table 7. Model Estimates: PARCC ELA 10 by Tutorials Use and Comparison Group

Model Term	B	Std. Error	t	Sig. p	
Intercept	-115.230	52.992	-2.174	0.00	†
[Comparison Group]	0.113	0.088	1.286	0.00	†
[Tutorials Users]	0a	.	.	0.00	†
Prior Ability Gr8	0.601	0.056	10.747	0.00	†
Date of Birth	0.000	0.000	2.230	0.00	†
Grade	-0.089	0.309	-0.287	0.01	†
Minority	0.102	0.119	0.854	0.01	†
Male	-0.217	0.090	-2.412	3	†
Free/Reduced Cost Lunch	-0.095	0.114	-0.835	3	†
Limited English Proficiency	0.337	0.484	0.697	79	†
Special Education Participation	-0.197	0.143	-1.380	51	†

Dependent variable: PARCC ELA 10 z-score
† Statistically significant, p. ≤ .05

More Learning Happens

Apex Learning puts rigorous, standard-based curriculum within reach for all students—from those struggling to those capable of acceleration—to prepare them for the next course, the next stage in their education, work and life. Schools use Apex Learning digital curriculum because it is proven that more learning happens with the powerful, actionable data that gives educators insight into student performance, and the personalization and engagement students need to succeed. During the 2015–2016 school year, there were more than three million enrollments in Apex Learning Comprehensive Courses for original credit and credit recovery and Adaptive Tutorials for intervention, remediation, and to prepare for high-stakes assessments. Headquartered in Seattle, Apex Learning is accredited by AdvancEd and its courses are approved for National Collegiate Athletic Association eligibility.

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