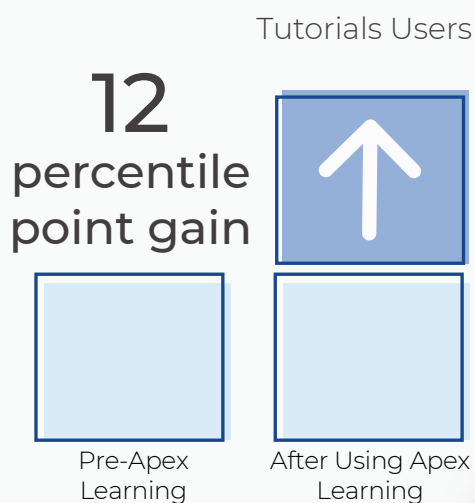




Apex Learning Tutorials and Ohio End-of-Course Student Achievement

Euclid City School District, OH

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Introduction

Euclid High School is a struggling school located in the Cleveland major metropolitan area of Ohio. In the summer of 2017, the district director of curriculum took over the role of principal and created a plan to improve student achievement. To provide increased coverage of the Ohio Learning Standards, the school administrator adopted Apex Learning Tutorials to support students enrolled in courses leading to an Ohio End-of-Course Test (EOC).

During the first year of implementation (2017-2018), Tutorials use was focused on students enrolled in 9th and 10th grades school-wide and on seniors who needed retake the Algebra I EOC. Teachers implemented Tutorials in ways that best supported their individual instructional goals. As a result, Tutorials implementation strategies and student use varied significantly across teachers, grade levels, and subject areas.

Study Purpose

Apex Learning partnered with Euclid High School to conduct a correlational study exploring the relationship between Tutorials use and achievement on the EOC tests following the first year of Tutorials implementation. In the study, researchers compared the EOC achievement of students who used Tutorials to that of students who did not use Tutorials for a sample of students with complete prior ability and demographic data and who were not retained in 8th grade or later. EOC and grade level combinations with 10 or more students in both the Apex Learning and comparison groups were selected for analysis. Statistical controls were used to account for differences in prior ability and demographic characteristics between groups.

Table 3.3, located in the appendix, shows the demographic characteristics of students included in the sample for the Apex Learning and comparison groups overall. Table 3.4 shows statistics describing Tutorials use for students in the Apex Learning group for each EOC and grade level combination.

Comparisons demonstrating a large positive or negative effect relative to standards appropriate for secondary student educational initiatives ($ES \geq .25$) are reported in the results section.

Figure 2.1

Demographic Characteristics: Euclid City School District

Student Enrollment.....	5,236
Urban Locale.....	Rural
American Indian/AK Native.....	0.1%
Asian.....	0.4%
Black /African American.....	84.8%
HI/Pacific Islander.....	0.0%
White.....	9.3%
Hispanic.....	0.9%
Multiracial.....	4.6%
Female.....	47.3%
Male.....	52.7%
Free/Reduced Meals.....	73.30%
Limited English Proficient.....	0.5%
Students with Disabilities (IDEA).....	19.6%
Students with Disabilities (Section 504 Only).....	3.6%

Source: 2015 Civil Rights Data Collection, Ed.gov

¹ The American Statistical Association recommends that researchers base the evaluation of a treatment's impact on effect size benchmarks specific to a given discipline instead of using statistical probability values alone. An empirical analysis of effect sizes for educational interventions suggests that effect sizes ranging from .05 to .20 are moderate and those exceeding .20 are large (Kraft, 2019). Conversely, What Works Clearing House reports that effect sizes equal to or greater .25 are substantially important regardless of p-value. For this study, the benchmark used by WWC ($ES \geq 0.25$ standard deviations) was used to identify substantially important treatment effects.

Results

Compared to non-users, Tutorials users in 10th grade achieved higher scores on the American History EOC while Tutorials users in 9th grade achieved higher scores on the ELA I EOC.

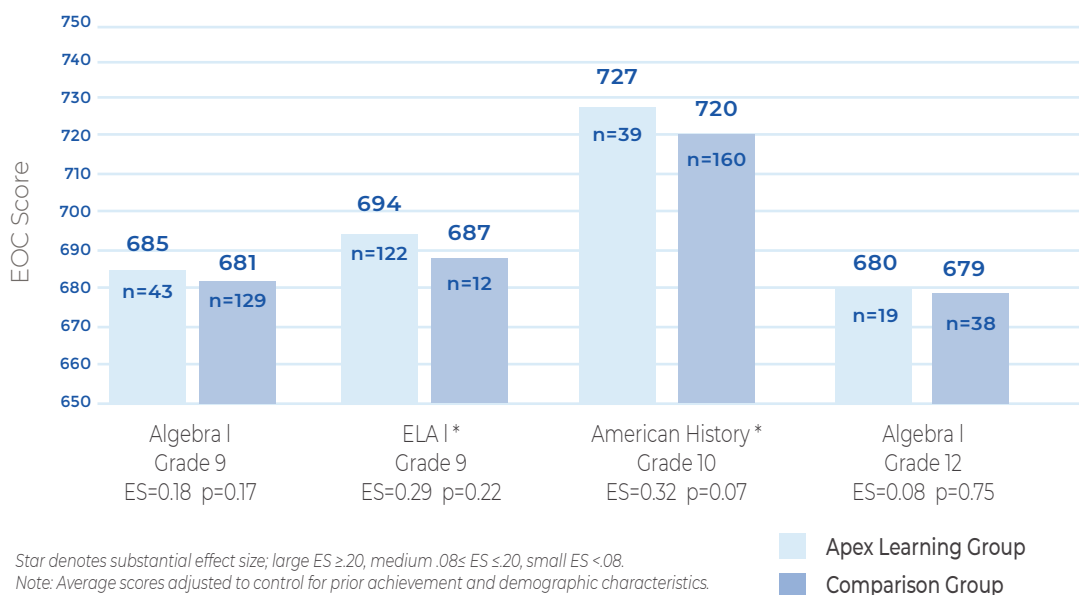
Students in 10th grade who used Tutorials gained an average of 6.8 scale score points on the American History EOC compared to students who did not use Tutorials. The effect size of the difference between groups is meaningful (ES=.32) and corresponds to a 12 percentile point improvement for Tutorials users.

For students in 9th grade, Tutorials users achieved an additional 6.3 scale score points compared to non-users on the ELA I EOC. The difference between groups is meaningful (ES=.29) and equivalent to an 11 percentile point gain for Tutorials users.

On the Algebra I test, the difference between Tutorials users and non-users was not meaningful for students in 9th and 12th grades.

Figure 2.2 below shows the average EOC scores by group. The results of the statistical tests, effect sizes, and p-values are presented in Table 3.5 located in the appendix.

Figure 2.2
Average adjusted EOC scores by group



The percent of students achieving proficiency or above was greater for students who used Tutorials than for students in the comparison group on the ELA I EOC (9th grade students), American History EOC (10th grade students), and Algebra I EOC (12th grade students).

The percent of Tutorials users achieving proficiency or above was 13 percentage points greater than that of students in the comparison group for 9th grade students on the ELA I EOC (ES=0.28). For 10th grade students, the percent students achieving proficiency or above was 25 percentage points greater for Tutorials users than for non-users on the American History EOC (ES=1.04). For students in 12th grade, the percent of Tutorials users who achieved proficiency or above was 11 percentage points greater than the non-users on the Algebra I EOC (ES=0.41).

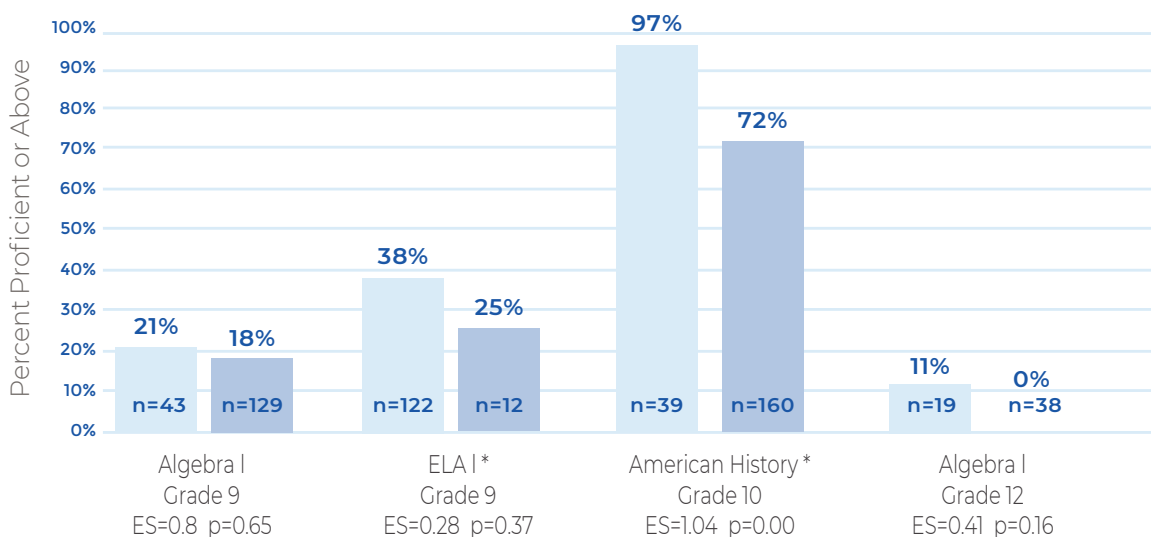
The effect size of the difference between groups for these comparisons was large.

For 9th grade students, the percent of students achieving proficiency or above for Tutorials users was similar to that of non-users on the Algebra I EOC (ES=0.08). The effect size of the difference between groups was not meaningful.

Figure 2.3 below shows the percent of students achieving proficiency or above by group and EOC. The results of the statistical tests, effect sizes, and p-values are presented in Table 3.6 located in the appendix.

Figure 2.3

Adjusted percent proficient or above by group



Star denotes substantial effect size; large ES ≥.20, medium .08 ≤ ES ≤.20, small ES <.08.
 Note: Average scores adjusted to control for prior achievement and demographic characteristics.

Apex Learning Group
 Comparison Group

Conclusion

As part of a school turn-around strategy, in 2018 administrators at Euclid High School implemented Tutorials to support coverage of the Ohio Learning Standards and to improve student achievement on Ohio end-of-course tests. A study comparing the achievement of students who used Tutorials to that of non-users was conducted after one year of Tutorials implementation.

Findings suggest:

- For students in 9th grade, Tutorials users demonstrated an 11 percentile point gain on the ELA I EOC compared to students in the comparison group. In addition, the percent of students achieving proficiency or above increased by 13 percentage points. On the Algebra I EOC, the performance of students who used Tutorials was similar to that of non-users.
- For students in 10th grade, the achievement of Tutorials users improved by 12 percentile points compared to students in the comparison group on the American History EOC. Additionally, the percent of students achieving proficiency or above improved by 25 percentage points.
- For students in 12th grade, Tutorials users achieved similar average achievement as the comparison group on the Algebra I EOC and the percent of students achieving proficiency or above increased by 11 percentage points.

Data and Methodology

DATA

Ohio End-of-Course Test Scores – Euclid City School District provided three sets of student-level data including:

- Demographic characteristics for all students enrolled during the 2017-2018 school year including free/reduced price lunch status, disability status, limited English proficiency status, race/ethnicity, and date of birth
- Ohio state EOC test scores for students who completed a test during the 2017-2018 school year
- Ohio Grade 8 end-of-grade test scores for students who completed an assessment between school years 2013-2014 and 2016-2017

Between school years 2014 and 2017, the Ohio State Department of Education administered four different 8th grade end-of-year tests to assess the Ohio Learning Standards including the Ohio Achievement Assessments (2014), the Partnership for Assessment of Readiness for College and Careers (PARCC) Next Generation Assessments (2015), the American Institutes for Research (AIR) Next Generation Assessments (2016), and the Ohio State Tests (2017). The scale scores from each of these tests were converted to standardized z-scores so that the results would be comparable across tests. Students included in the analytical sample had complete prior ability and demographic data and had not been retained in 8th grade or after.

Apex Learning Tutorials Data – Apex Learning provided student-level enrollment and performance data for Apex Learning Tutorials used during the 2017-2018 school year. Performance variables provided included: quality of work; number of pretests, posttests, and TestIts; number of sessions; and total session time. Tutorials users included in the sample completed one or more module level scored learning activities.

METHODOLOGY

A student-level analysis was conducted for all EOC tests with 10 or more students in both the Apex Learning and comparison groups. Researchers used a linear regression to evaluate the relationship between treatment (Tutorials use) and the average score for each EOC and grade level combination containing 10 or more students in both the Apex Learning and comparison groups controlling for prior ability and demographic characteristics as sample size allowed.

A t-test for independent proportions was used to compare the percent of students achieving proficiency or above for each EOC and grade level combination by treatment group after controlling for prior ability and demographic differences. The standard for proficiency was applied to EOC scores that were adjusted to control for prior ability and demographic characteristics.

References

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Appendix

Table 3.1: Spring 2018 Test Takers by Grade Level, EOC, and Tutorials Use							
Grade Level	EOC	Tutorials Non-Users		Tutorials Users		Total Test Takers	
		Count	Row N %	Count	Row N %	Count	Row N %
9	Algebra I	216	61%	138	39%	354	100%
	American History	21	100%	0	0%	21	100%
	Biology	12	9%	120	91%	132	100%
	ELA I	49	12%	349	88%	398	100%
	ELA II	14	61%	9	39%	23	100%
	Geometry	18	56%	14	44%	32	100%
	Total	330	34%	630	66%	960	100%
10	Algebra I	64	59%	45	41%	109	100%
	American Government	11	100%	0	0%	11	100%
	American History	273	85%	50	16%	323	100%
	Biology	60	22%	214	78%	274	100%
	ELA I	1	17%	5	83%	6	100%
	ELA II	219	64%	123	36%	342	100%
	Geometry	162	94%	11	6%	173	100%
Total	790	64%	448	36%	1238	100%	
11	Algebra I	29	100%	0	0%	29	100%
	American Government	226	100%	0	0%	226	100%
	American History	15	100%	0	0%	15	100%
	Biology	21	91%	2	9%	23	100%
	ELA I	33	100%	0	0%	33	100%
	ELA II	42	100%	0	0%	42	100%
	Geometry	146	99%	1	1%	147	100%
Total	512	99%	3	1%	515	100%	
12	Algebra I	9	82%	2	18%	11	100%
	American Government	12	100%	0	0%	12	100%
	American History	1	100%	0	0%	1	100%
	Biology	5	100%	0	0%	5	100%
	ELA I	7	78%	2	22%	9	100%
	ELA II	15	100%	0	0%	15	100%
	Geometry	26	87%	4	13%	30	100%
Total	75	90%	8	10%	83	100%	

Note: Tutorials users include students who launched a Tutorials title but did not complete a module learning activity. Counts include students with incomplete data.

Table 3.2: Number of Students Eligible for Inclusion in Sample by EOC and Group					
EOC	Group	Grade			
		9	10	11	12
Algebra I	Comparison Group	129	107	107	38
	Apex Learning Group	43	8	1	19
	Percent of Tutorials Users	25%	7%	1%	33%
American Government	Comparison Group	0	1	117	67
	Apex Learning Group	0	0	0	0
	Percent of Tutorials Users	.	0%	0%	0%
American History	Comparison Group	2	160	22	3
	Apex Learning Group	0	39	0	0
	Percent of Tutorials Users	0%	20%	0%	0%
Biology	Comparison Group	5	1	18	7
	Apex Learning Group	94	5	1	3
	Percent of Tutorials Users	95%	83%	5%	30%
ELA I	Comparison Group	12	4	11	3
	Apex Learning Group	122	4	0	3
	Percent of Tutorials Users	91%	50%	0%	50%
ELA II	Comparison Group	0	2	6	4
	Apex Learning Group	0	3	0	0
	Percent of Tutorials Users	.	60%	0%	0%
Geometry	Comparison Group	0	44	30	20
	Apex Learning Group	0	2	0	4
	Percent of Tutorials Users	.	4%	0%	17%

Note 1: Eligible students have complete prior ability and demographic data and were not retained in 8th grade or after.

Note 2: EOC subjects and grade levels with 10 or more Tutorials users and non-users included in analysis.

Table 3.3: Demographic Characteristics of Sample Students by Group				
	Comparison Group		Apex Learning Group	
	Count	Column N %	Count	Column N %
Sample Size	331	100.0%	195	100.0%
Female	153	46.2%	97	49.7%
Male	178	53.8%	98	50.3%
Asian	1	0.3%	0	0.0%
African-American	300	90.6%	175	89.7%
Hispanic	1	0.3%	1	0.5%
American Indian/Alaska Native	0	0.0%	1	0.5%
Two or More Races	9	2.7%	5	2.6%
White	20	6.0%	13	6.7%
Free/Reduced Price Lunch-YES	331	100.0%	195	100.0%
IEP-YES	66	19.9%	30	15.4%
Limited English Proficient-NO	328	99.1%	192	98.5%

Table 3.4: Tutorials Use Metrics by EOC and Grade Level for Sample Students

Grade Level	EOC	Tutorials Use Metric	N	Mean	SD	Min	Max
9	Algebra I	Total Time (Minutes)	43	168	125	21	444
		Tutorials Sessions	43	9	5	1	23
		TestIts	43	6	6	1	30
9	ELA I	Total Time (Minutes)	122	336	208	24	1140
		Tutorials Sessions	122	21	12	2	62
		TestIts	122	21	15	1	57
10	American History	Total Time (Minutes)	39	414	304	39	1519
		Tutorials Sessions	39	14	8	1	51
		TestIts	39	17	10	2	55
12	Algebra I	Total Time (Minutes)	19	582	347	91	1423
		Tutorials Sessions	19	28	12	8	49
		TestIts	19	25	28	1	92

Table 3.5: EOC Score Regression Results

Variable	Grade Level and EOC			
	Grade 9	Grade 9	Grade 10	Grade 12
	Algebra I	ELA I	American History	Algebra I
Tutorials Use Effect	4.0409	6.3108	8.5148*	1.3399
Effect Size (Hedge's g)	0.1796	0.2870 [†]	0.3173 [†]	0.0833
Number in Comparison Group	129	12	160	38

Stars denote statistical significance: * $p < 0.10$, ** $p < .05$, *** $p < .01$
 Dagger denotes substantial effect size: $g \geq 0.25$
 Note: Tutorials use effect controlled for student prior achievement and demographic characteristics.

Table 3.6: T-Test of Independent Proportions

Grade	EOC	% Proficient or Above			t-value	p-value	Effect Size
		Apex Learning Group	Comparison Group	Difference			
9	Algebra I	20.90%	17.80%	3.10%	0.45	0.65	0.08
	ELA I	37.70%	25.00%	12.70%	0.92	0.37	0.28
10	American History	97.40%	71.90%	25.50%	5.82	0.00	1.04
12	Algebra I	10.50%	0.00%	10.50%	1.46	0.16	0.41

Note: Standard for EOC proficient or above applied to EOC scores that have been adjusted to control for student prior ability and demographic characteristics.



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