A Study of the Impact of Apex Learning Tutorials on 12th Grade Student EOC Retake Tests
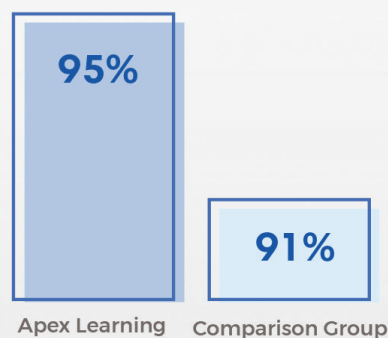
Westerville City School District, OH

95%

Apex Learning

91%

Comparison Group

Executive Summary

High school seniors in Westerville City School District, OH, used Apex Learning Tutorials over the course of one semester to prepare to retake the Ohio End-of-Course (EOC) tests. To determine the impact of Tutorials on the EOC tests, Apex Learning conducted a correlation study to investigate the relationship between Tutorials performance measures and EOC test performance. The achievement of seniors using Tutorials was compared to seniors who did not use Tutorials to prepare for the retake tests.
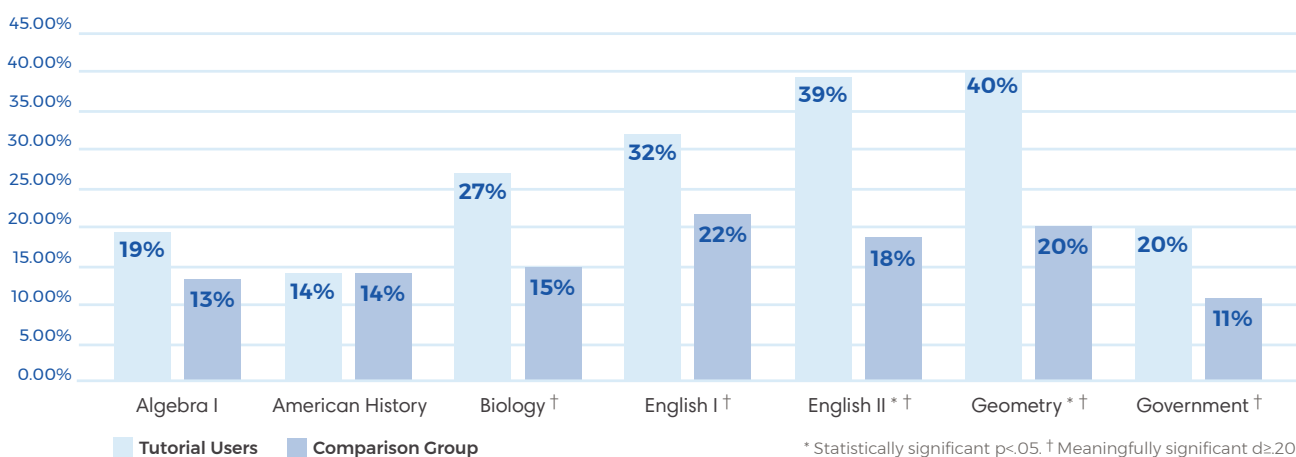
Students using Tutorials achieved similar or higher scores on EOC retake tests.

Figure 1.1

Adjusted Average EOC Scale Scores by Tutorials Use
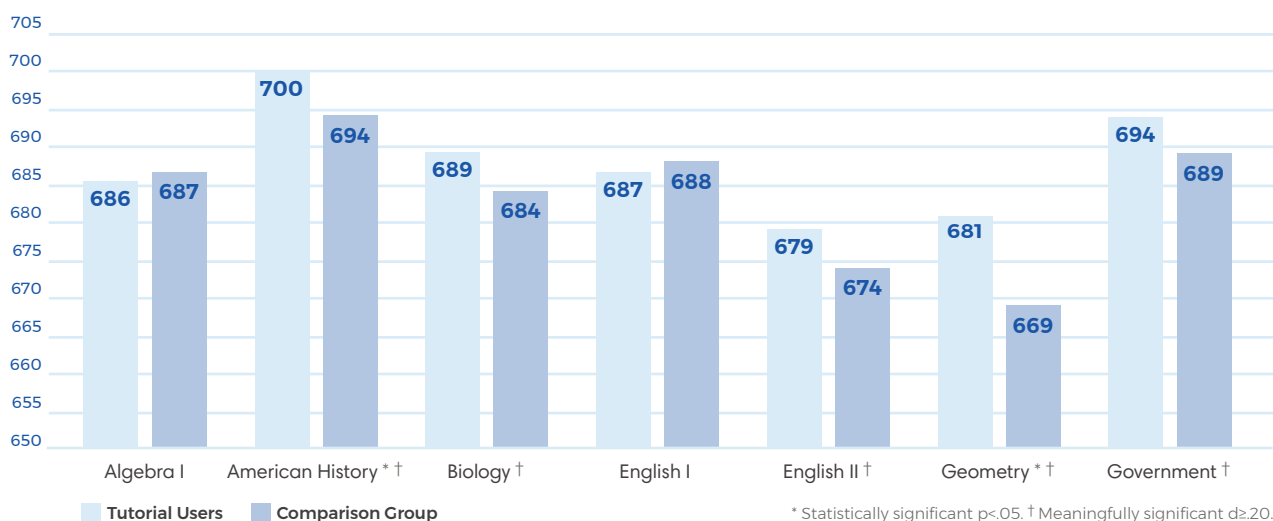
Tutorial Users   Comparison Group

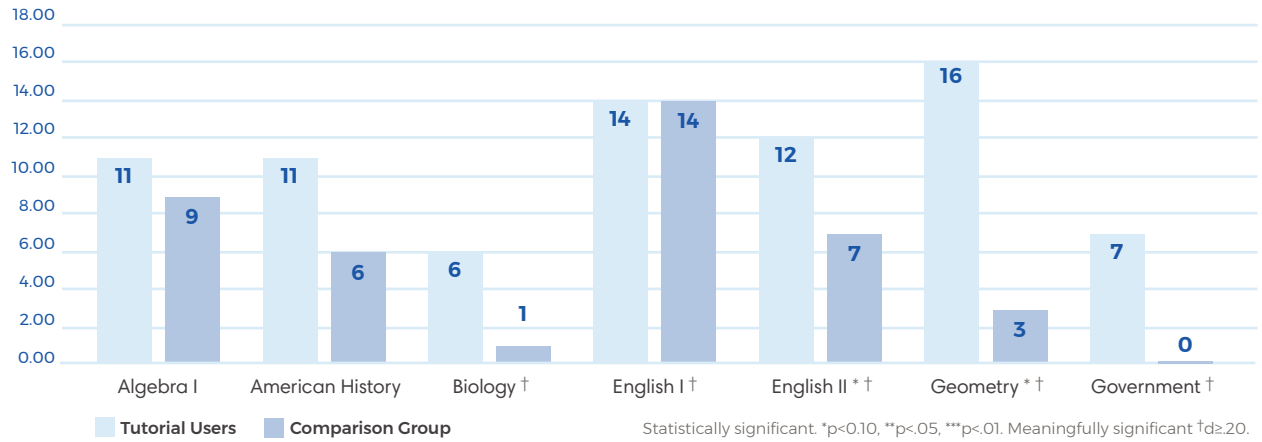* Statistically significant p<.05. † Meaningfully significant d≥.20.

Students using Tutorials were more likely to improve a performance level on EOC retake tests.

Figure 1.2

Percent Improving Performance Level

Tutorial Users   Comparison Group

* Statistically significant p<.05. † Meaningfully significant d≥.20.

Students using Tutorials achieved greater gains on EOC retake tests.

Figure 1.3

Average Gain from Prior EOC to December EOC Retake

Subject	Tutorial Users	Comparison Group
Algebra I	11	9
American History	11	6
Biology †	6	1
English I †	14	14
English II * †	12	7
Geometry * †	16	3
Government †	7	0

■ Tutorial Users ■ Comparison Group

Statistically significant. *$p<0.10$, **$p<.05$, ***$p<.01$. Meaningfully significant †$d≥.20$.

EOC test scores were significantly correlated with Tutorials performance measures.

The total hours of Tutorials use and quality of work scores were positively related to improved performance on the EOC retake tests overall.

Introduction

Westerville City School District (WCSD) uses Apex Learning Tutorials to support seniors who have not earned enough graduation points on one or more Ohio End-of-Course (EOC) tests.

In the fall of 2018, high school graduation coaches met with seniors at risk of not graduating on time due to their performance on previously taken EOC tests. Coaches advised students to use Tutorials to remediate skills assessed on the English language arts, mathematics, science, and social studies state assessments and to retake the EOC tests in December. Each student was given an individualized learning plan aligning Tutorials modules to specific skills needing remediation by test. Students used Tutorials at their own pace from school and home. In December, students retook one or more EOC tests.

This study examined the impact of Apex Learning Tutorials use and Ohio EOC test performance. The achievement of students using Tutorials was compared to students who did not use Tutorials prior to retaking an EOC test. Additionally, Tutorials use measures were correlated to achievement on the EOC test.

Two hundred twenty-eight (228) Tutorials enrollments used by 63 students were included in the study. In addition to the characteristics displayed in Figure 2.2, students in the study sample using Apex Learning Tutorials:

· Were eligible for free and/or reduced lunch (57%)

· Include students who were limited English proficient (19%)

Tables 3.1 through 3.3, located in the appendix, provide detailed demographic, academic, and Tutorials performance measures of students included in study sample.

Figure 2.1

2016–2017 District Demographic Characteristics

District PK–12 Enrollment 15,385
Urban Locale . . . . Urban Fringe of a Large City

American Indian/AK Native 0.11%
Asian 4.68%
Black /African American 25.31%
HI/Pacific Islander 0.06%
White 54.54%
Hispanic 7.00%
Multiracial 8.30%

Free/Reduced Meals 27.75%
Limited English Proficient 8.83%
Students with Disabilities. 13.90%

Figure 2.2
Demographic Characteristics
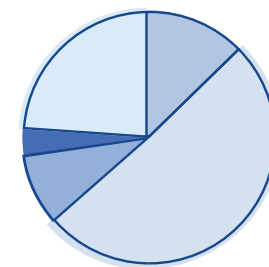
|		
▇ Asian	13%
▇ Hispanic	9%
▇ White	24%
▇ African American	51%
▇ Multiracial	3%

Results

Students using Tutorials outscored comparable students not using Tutorials on five out of seven EOC retake tests.

Students using Apex Learning Tutorials to prepare for EOC retake tests achieved greater average scores than similar students not using Tutorials on the American History, Biology, English II, Geometry, and Government EOC retake tests (Figure 3.4 located in the appendix). For Algebra I and English I, students using Tutorials achieved similar scores as students not using Tutorials.

Figure 2.3 below shows that students using Tutorials showed the greatest improvement on the Geometry test (11.5 points) followed by American History (6.4 points), English II (5.8 points), Government (5.2 points), and Biology (4.4 points). The magnitude of the effect of Tutorials on the EOC tests was significant ranging between .29 and .61 (Figure 3.4, appendix). For Algebra I and English I, students using Tutorials achieved similar improvement as students not using Tutorials for Algebra I and English I.

Figure 2.3
Adjusted Average EOC Scale Scores by Tutorials Use

* Statistically significant p<.05. † Meaningfully significant d≥.20.
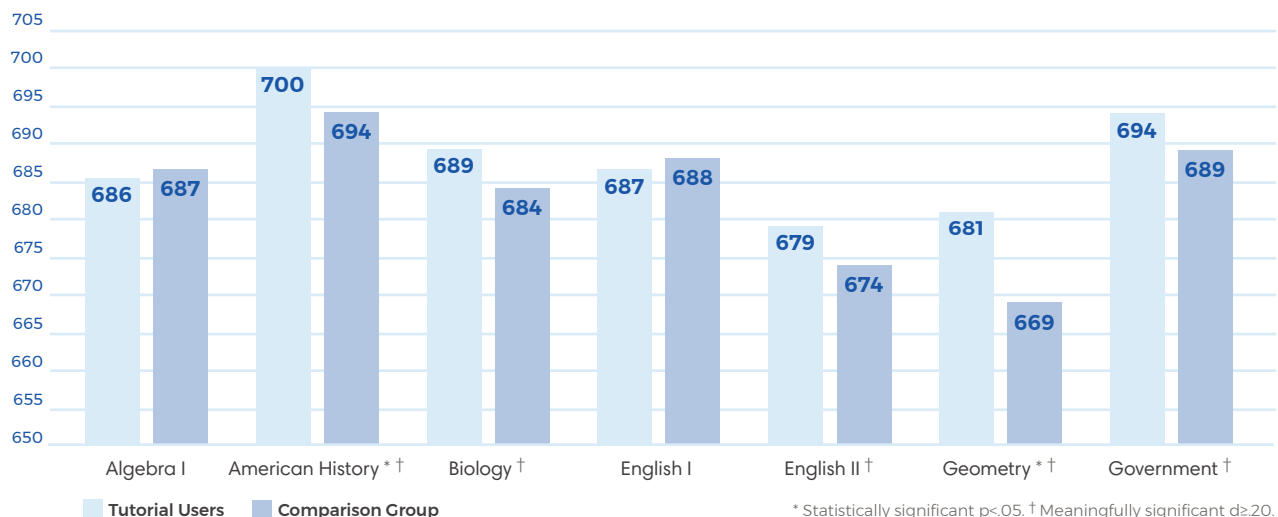
Students using Tutorials were more likely to improve a performance level than comparable students not using Tutorials on five out of seven EOC retake tests.

Compared to students not using Tutorials, students using Tutorials were more likely to improve a performance level on five out of seven tests (Figure 2.4). The percentage point difference between Tutorial users and the comparison group was greatest for English II at 21 percentage points (pp), followed by Geometry (20pp), Biology (12pp), English I (10pp), and Government (9pp). The magnitude of the difference was significant for Biology, English I, English II, Geometry, and Government (Figure 3.5, appendix). For Algebra I and American History, the percent of students improving a level was similar for students using Tutorials and students not using Tutorials.

Figure 2.4

Percent Overall Improving Performance Level

* Statistically significant p<.05. † Meaningfully significant d≥.20.
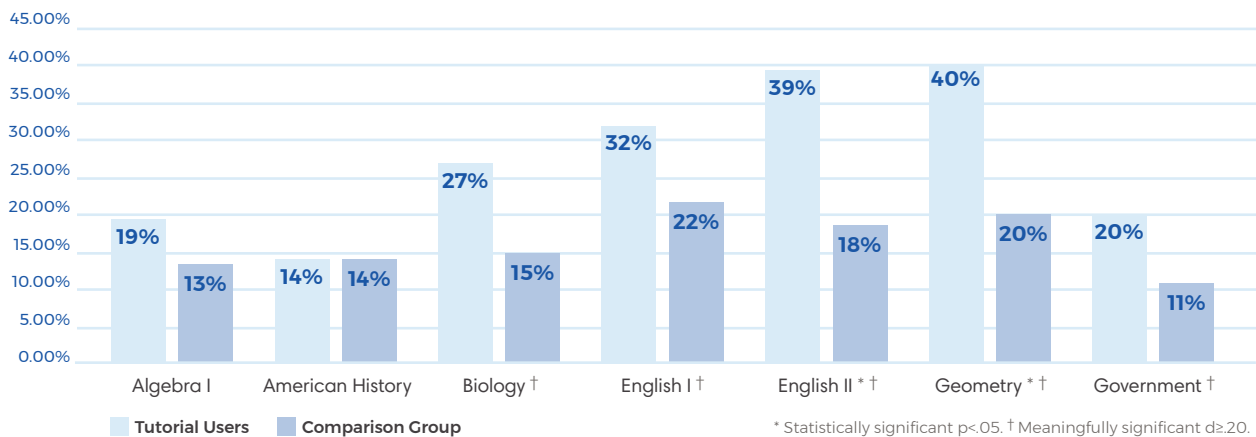
Students using Tutorials achieved greater gains than comparable students not using Tutorials on the EOC retake test.

The average gains from the last EOC and retake tests trended higher for students using Tutorials than for students not using Tutorials on all EOC tests. The magnitude of the difference was significant for American History, Biology, English II, Geometry, and Government (Figure 2.5). The difference between groups trended higher for students using Tutorials for Algebra I and English I.

Figure 2.5: Average Gain from Prior EOC to EOC Retake Test							
	Tutorial Users		Comparison Group		Difference between groups	Significance	Effect Size
	Count	Mean Gain	Count	Mean Gain		p	d
Algebra I	54	11.13	53	8.85	2.28	0.49	0.13
American History	29	10.90	43	6.09	4.81	0.07*	0.43†
Biology	33	5.67	47	1.36	4.31	0.22	0.28†
English I	37	13.95	59	13.75	0.20	0.96	0.01
English II	18	11.83	97	7.46	4.37	0.43	0.20†
Geometry	47	16.28	87	3.33	12.95	0.00***	0.69†
Government	10	6.70	37	0.14	6.56	0.07*	0.64†

*Statistically significant. *p<0.10, **p<.05, ***p<.01. Meaningfully significant †d≥.20.*

EOC retake test scores are significantly correlated with Tutorials performance measures.

The total hours of Tutorials use and quality of work scores were positively correlated to improved performance on the EOC retake tests overall. Figure 2.6 below shows the regression coefficients and correlation coefficients between EOC scores and Tutorials performance measures by test. Total hours used was significantly correlated with three EOC tests: Algebra I, Biology, and Government. Of these, the largest relationship was with Biology. The regression coefficient for total hours is 6.78. This suggests that on average, each additional hour of Biology Tutorials use was associated with 6.78 more points on the Biology EOC test.

Tutorials quality of work was also significantly correlated with Algebra I, English I, and English II EOC scores. The relationship was strongest for English II (r=.53). The regression coefficient suggests that each additional 10 points on the Tutorials quality of work score was associated with 3.2 more points on the English II EOC test.

Figure 2.6: EOC Test Score Statistics				
EOC Test		**Regression Coefficient B**	**Partial Correlation r**	**Sample Size n**
Algebra I	Total Hours	3.52*	0.24	54
	Quality of Work	0.35*	0.26	54
	Tutorials Sessions	-1.70**	-0.30	54
American History	No significant relationships	.	.	.
Biology	Total Hours	6.78***	0.48	33
	Posttests	8.45**	0.38	33
	TestIts	-2.94**	-0.37	33
	Tutorials Sessions	-3.09**	-0.35	33
English I	Quality of Work	0.38***	0.49	37
English II	Quality of Work	0.32**	0.53	18
Geometry	Posttests	44.21***	0.43	47
	Tutorials Sessions	-2.51**	-0.38	47
Government	Total Hours	5.94*	0.82	10
	Tutorials Sessions	-3.36**	-0.87	10
Overall	Total Hours	1.85***	0.18	228
	Quality of Work	0.24***	0.27	228
	Tutorials Sessions	-1.11***	-0.22	228

*Statistically significant *p<0.10, **p<.05, ***p<.01. Number of stars denote the statistical significance of the relationship between the EOC score and the corresponding variable for both the regression coefficient and the correlation coefficient.*

Conclusion

Westerville City School District uses Apex Learning Tutorials to support high school seniors needing to retake an EOC test needed for graduation.

This study compared the EOC achievement of students who used Tutorials to prepare for the retake test to similar students who did not use Tutorials to prepare for the test.

The findings suggest:

- **Students using Tutorials achieved greater average scores than similar students not using Tutorials on five out of seven EOC retake tests including American History, Biology, English II, Geometry, and Government. Students using Tutorials achieved similar scores as students not using Tutorials on the Algebra I and English I retake tests.**

- **Students using Tutorials were more likely to improve a performance level on five out of seven EOC retake tests Biology, English I, English II, Geometry, and Government. Students using Tutorials were just as likely to improve a performance level as students not using Tutorials on Algebra I and American History EOC retake tests.**

- **Students using Tutorials experienced meaningful gain on the EOC retake test for American History, Biology, English II, Geometry, and Government. Students using Tutorials achieved similar gain as students not using Tutorials on Algebra I and English I EOC retake tests.**

- **There was a significant positive relationship between the total hours Tutorials were used and quality of work score and achievement on the Algebra I EOC retake test.**

- **There was a significant positive relationship between Tutorials performance measures (total hours used and quality of work) and achievement on the EOC retake tests.**

Study Description

Study Design

This correlational study examined the effectiveness of Apex Learning Tutorials by comparing the achievement of high school seniors using Tutorials to prepare to retake the EOC tests to students not using Tutorials.

Sample Formation

Students in 12th grade who completed an Ohio EOC retake test in December of 2018 were included in the study. For each subject, the treatment group included students who used Apex Learning Tutorials for test preparation while all remaining students were included in the comparison group. Researchers controlled for demographic and prior ability characteristics to statistically control for differences that may have existed between groups. Variables used to control for demographic differences included gender, minority status, limited English proficiency status, special education status, free/reduced lunch status, and date of birth. Variables used to control for prior ability included the most recent EOC test score prior to December 2018 and the total number of EOC tests completed.

Students included in both the treatment and control groups attended the same three high schools and one alternative center.

Analysis

A binary general linear model was used to compare the average EOC achievement of students who used Tutorials to students in the comparison group. Tests of independent proportions were used to compare the percent of students increasing an achievement level for Tutorials users and the comparison group. A t-test was used to compare the average gains between the prior EOC test and the December EOC retake tests for Tutorials users and comparison groups. A binary linear regression was used to compute the correlation between Tutorials performance measures and EOC test scores.

Outcome Measures

Outcome measures used in this study included scale scores and proficiency levels from the December 2018 retake administration of the Ohio End-of-Course tests. Students included in the graduating classes of 2018 and beyond are required to take EOC tests in English Language Arts I and II, Algebra I, Geometry (or Integrated Mathematics I and II), Biology or Physical science (class of 2018 only), American History, and American Government. For each of the seven end-of-course state tests, a student earns one to five graduation points based on the performance level achieved: performance level one is worth one point, performance level two is worth two points, etc. Students have the potential to earn a total of 35 points. To meet the graduation requirements of the Ohio state tests graduation pathway, a student must earn a minimum of four points in math, four points in English language arts, and six points across science and

Appendix

Figure 3.1: Demographic Characteristics by Group					
		Comparison Group		Tutorial Users	
		Count	Percent	Count	Percent
Grade	12	118	100.00%	63	100.00%
Gender	F	60	50.80%	29	46.00%
	M	58	49.20%	34	54.00%
Race	Asian	5	4.20%	8	12.70%
	African-American	58	49.20%	32	50.80%
	Hispanic	11	9.30%	6	9.50%
	Multiracial	6	5.10%	2	3.20%
	Pacific Islander	1	0.80%	0	0.00%
	White	37	31.40%	15	23.80%
FRL	YES	62	52.50%	36	57.10%
LEP	YES	32	27.10%	12	19.00%
Special Ed	YES	16	13.60%	5	7.90%

Figure 3.2: Unadjusted EOC Test Statistics by Group

		Comparison Group			Tutorial Users		
		Count	Mean	Standard Deviation	Count	Mean	Standard Deviation
Retake EOC	Algebra I	53	686	12	54	680	15
	American History	43	687	10	29	687	11
	Biology	47	685	13	33	686	10
	English I	59	681	15	37	680	17
	English II	97	673	21	18	674	14
	Geometry	87	667	17	47	665	15
	Government	37	692	6	10	693	6
Prior EOC	Algebra I	53	695	16	54	691	20
	American History	43	693	12	29	698	15
	Biology	47	686	15	33	691	13
	English I	59	695	20	37	694	19
	English II	97	680	21	18	686	14
	Geometry	87	670	17	47	681	21
	Government	37	692	8	10	700	12

Figure 3.3: Average Apex Learning Tutorials Performance Measures by Title

	N	Number of Sessions	Avg Session Time (Min)	Total Time (Hours)	Quality of Work	Number of Pretests	Number of TestIts	Number of Posttests
		Mean	Mean	Mean	Mean	Mean	Mean	Mean
Algebra I Ohio	54	7.60	22.33	2.92	41	2	4	0
American History Ohio	29	6.40	19.79	2.42	32	2	7	0
Biology Ohio	33	5.40	21.12	2.32	35	2	4	1
Geometry Ohio	47	5.80	26.73	2.57	38	2	4	0
Integrated ELA I Ohio	37	6.30	25.83	2.84	59	2	12	2
Integrated ELA II Ohio	18	5.10	25.25	1.77	60	1	5	0
MS Civics	10	8.50	27.19	3.5	59	3	14	2
Total	**228**	**6.4**	**23.75**	**2.62**	**43**	**2**	**6**	**1**

Figure 3.4 Average Scale Score on EOC Retake Tests by Group						
EOC Test	**Group**	**N**	**Mean**	**Difference between groups**	**Significance** p	**Effect Size** d
Algebra I	Tutorial Users	61	685.77	-1.54	0.63	0.09
	Comparison Group	56	687.31	.	.	.
American History	Tutorial Users	34	700.27	6.40	0.02**	0.49†
	Comparison Group	66	693.88	.	.	.
Biology	Tutorial Users	38	688.65	4.44	0.13	0.30†
	Comparison Group	62	684.21	.	.	.
English I	Tutorial Users	39	687.39	-0.47	0.89	0.02
	Comparison Group	66	687.86	.	.	.
English II	Tutorial Users	29	679.50	5.75	0.17	0.29†
	Comparison Group	113	673.75	.	.	.
Geometry	Tutorial Users	68	680.63	11.50	0.00***	0.61†
	Comparison Group	106	669.13	.	.	.
Government	Tutorial Users	38	694.42	5.21	0.08**	0.52†
	Comparison Group	92	689.22	.	.	.

*Statistically significant difference between groups *p<0.10, **p<.05, ***p<.01. Meaningfully significant difference between groups †d≥.20.*

Figure 3.5: Percent Improving Performance Level on EOC Retake Tests								
	Tutorial Users			**Comparison Group**			**Difference between groups**	**Effect Size**
	Total N	Count	Percent	Total N	Count	Percent		p	d
Algebra I	54	10	18.50%	53	7	13.20%	5.30%	0.46	0.14
American History	29	4	13.80%	43	6	14.00%	-0.20%	0.99	-0.01
Biology	33	9	27.30%	47	7	14.90%	12.40%	0.18	0.31†
English I	37	12	32.40%	59	13	22.00%	10.40%	0.26	0.24†
English II	18	7	38.90%	97	17	17.50%	21.40%	0.04**	0.52†
Geometry	47	19	40.40%	87	17	19.50%	20.90%	0.01***	0.47†
Government	10	2	20.00%	37	4	10.80%	9.20%	0.45	0.27†

*Statistically significant difference between groups *p<0.10, **p<.05, ***p<.01. Meaningfully significant difference between groups †d≥.20.*

Figure 3.6: Average EOC Retake Score by Demographic Characteristic			Comparison Group		Tutorial Users	
			Count	Mean	Count	Mean
OST EOC Algebra I	Race	Asian	2	.	2	.
		African American	25	687	27	692
		Hispanic	5	699	6	671
		Multi-ethnicity	1	.	4	698
		Pacific Islander	1	.	0	.
		White	19	702	15	698
	FRL	NO	25	699	25	695
		YES	28	691	29	688
	LEP	NO	38	699	38	697
		YES	15	685	16	678
	Spec Ed	NO	45	695	51	692
		YES	8	690	3	685
OST EOC American History	Race	Asian	2	.	4	694
		African American	23	688	15	700
		Hispanic	5	692	4	682
		Multi-ethnicity	1	.	2	.
		Pacific Islander	1	.	0	.
		White	11	700	4	710
	FRL	NO	19	698	8	708
		YES	24	689	21	694
	LEP	NO	30	695	15	706
		YES	13	688	14	689
	Spec Ed	NO	39	692	28	698
		YES	4	706	1	.
OST EOC Biology	Race	Asian	4	681	2	.
		African American	25	684	18	690
		Hispanic	6	683	4	685
		Multi-ethnicity	2	.	2	.
		White	10	692	7	698
	FRL	NO	16	690	15	694
		YES	31	684	18	689
	LEP	NO	33	690	24	695
		YES	14	676	9	680
	Spec Ed	NO	43	685	31	690
		YES	4	692	2	.

Note: statistics not shown for groups containing fewer than 3 students.

			Comparison Group		Tutorial Users	
			Count	Mean	Count	Mean
OST EOC English I	Race	Asian	2	.	6	690
		African American	32	697	17	688
		Hispanic	6	693	4	685
		Multi-ethnicity	5	691	1	.
		White	14	698	9	711
	FRL	NO	26	700	14	707
		YES	33	691	23	685
	LEP	NO	41	701	25	699
		YES	18	680	12	683
	Spec Ed	NO	52	695	36	694
		YES	7	690	1	.
OST EOC English II	Race	Asian	10	682	1	.
		African American	48	678	11	681
		Hispanic	8	671	2	.
		Multi-ethnicity	5	682	0	.
		White	26	687	4	697
	FRL	NO	43	688	8	693
		YES	54	674	10	680
	LEP	NO	67	689	12	691
		YES	30	662	6	675
	Spec Ed	NO	88	680	15	686
		YES	9	680	3	685
OST EOC Geometry	Race	Asian	3	666	6	678
		African American	39	664	23	678
		Hispanic	11	667	5	677
		Multi-ethnicity	6	675	0	.
		Pacific Islander	1	.	0	.
		White	27	680	13	690
	FRL	NO	42	675	21	687
		YES	45	666	26	676
	LEP	NO	67	673	37	686
		YES	20	661	10	665
	Spec Ed	NO	77	670	44	681
		YES	10	669	3	687

Note: statistics not shown for groups containing fewer than 3 students.

			Comparison Group		Tutorial Users	
			Count	Mean	Count	Mean
OST EOC Government	Race	Asian	1	.	0	.
		African American	21	691	7	697
		Hispanic	6	690	1	.
		Multi-ethnicity	3	694	1	.
		White	6	696	1	.
	FRL	NO	14	696	3	704
		YES	23	690	7	697
	LEP	NO	21	695	8	703
		YES	16	688	2	.
	Spec Ed	NO	33	692	10	700
		YES	4	691	0	.

Note: statistics not shown for groups containing fewer than 3 students.

Where opportunity thrives™

An industry leader with deep expertise in digital curriculum, Apex Learning works closely with school districts across the country to implement proven solutions that increase on-time graduation rates and create opportunities for student success in school and beyond. The company is driven by the understanding that supporting the needs of all students – from struggling to accelerated – strengthens schools and creates stronger communities, brighter futures and a more equitable world. Apex Learning is accredited by AdvancED and its courses are approved for National Collegiate Athletic Association eligibility. Apex Learning, where opportunity thrives. For more information, visit http://www.apexlearning.com.

Contact

Apex Learning

1215 Fourth Ave., Suite 1500
Seattle, WA 98161
Phone: 1 (206) 381-5600
Fax: 1 (206) 381-5601
ApexLearning.com