

EFFICACY STUDY

A Study of the Impact of Apex Learning Tutorials on Student Achievement

School Year 2015–2016

October 2016





Table of Contents

04	Introduction
04	Findings
07	Study Description
08	References
09	Appendix

Introduction

Apex Learning Tutorials were developed to improve student mastery of the content and skills established by the new state standards and offer capabilities to report on these standards. Tutorials engage students in active learning and provide opt-in supports through a combination of direct instruction, practice, review, and assessment. Pretests and posttests facilitate understanding of a student's strengths and areas of focus for teachers and students.

Students use state-specific Tutorials for targeted remediation, test preparation, and instruction enhancement. Tutorials improve student mastery of specific concepts in discrete modules. Students may complete only those modules that address a particular standard or standards, or complete all modules in a Tutorial.

The purpose of this annual report is to summarize the impact of Tutorials on student achievement during the 2015–2016 school year.

Two questions guided the analysis:

1. What impact does Tutorials use make on achievement gains from pretest to posttest?
2. Does Tutorials use impact student achievement on state and local standardized assessments?

Multiple sources of data were examined to determine the impact of Tutorials on student achievement. To examine the impact of Tutorials on academic gains, results from 191,415 modules with pretest, Test It, and posttest scores across Tutorials were evaluated using paired t-tests. The results are reported by subject, state, and district urban local descriptor.

Two approaches were taken to examine the impact of Tutorials on state and local standardized assessments. The first approach used a cumulative meta-analysis to summarize the overall effect of Tutorials use reported in two studies conducted during the 2015–2016 school year. The second approach reported the impact of Tutorials by implementation model. Both approaches compared the state and local standardized end-of-course exams achievement of Tutorials users to comparison groups of students not using Tutorials.

Descriptive statistics and statistical test results are located in the appendix.

Findings

Tutorials improved student performance on Tutorials measures of posttest achievement.

Students using Tutorials achieved a 19 percentile point gain on average from pre-test to posttest following use of the Learn It, Review It, and Try it instructional activities contained in each module. Achievement gains ranged from 15 to 21 percentile points by subject. Figure 1 shows the average Tutorials pre-test and posttest percentile scores for modules combined and by subject. Figure 2 shows the average Tutorials gain in 2015–2016 and 2014–2015.

A Study of the Impact of Apex Learning Tutorials on Student Achievement

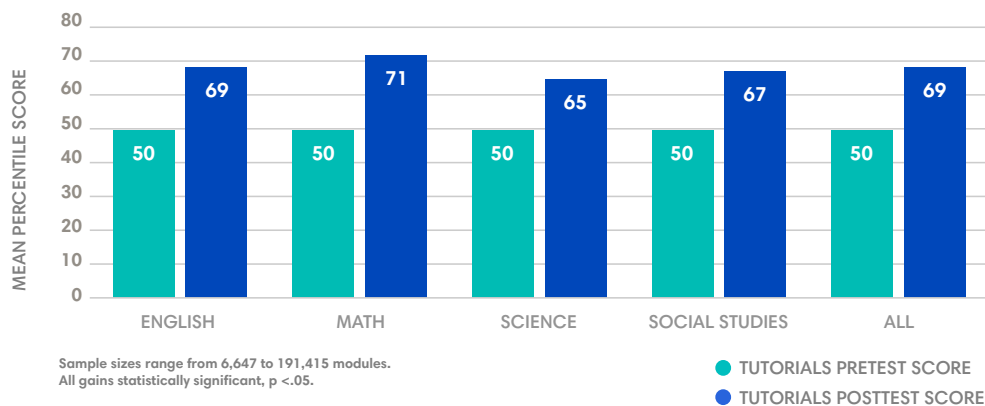


Figure 1:
2015–2016 Average Tutorials Score by Subject and Combined

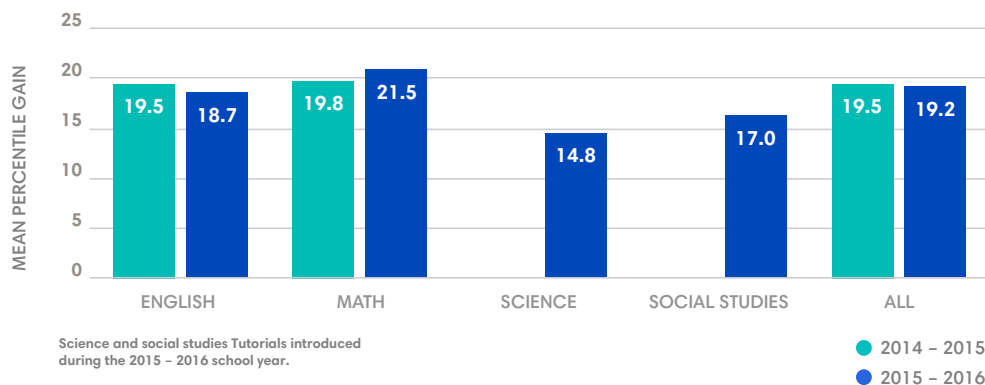


Figure 2:
Average Tutorials Gain by Subject and School Year

Table 2 located in the appendix shows the descriptive statistics for modules having a pretest, Test It, and posttest score. Table 3 shows the paired t-test statistics and average difference between pretest and posttest scores.

Additional tables located in the appendix show the average difference between pretest to posttest percent correct score and paired t-test statistics for modules combined by state (Table 4) and National Center for Educational Statistics Urban Locale descriptor (Table 5).

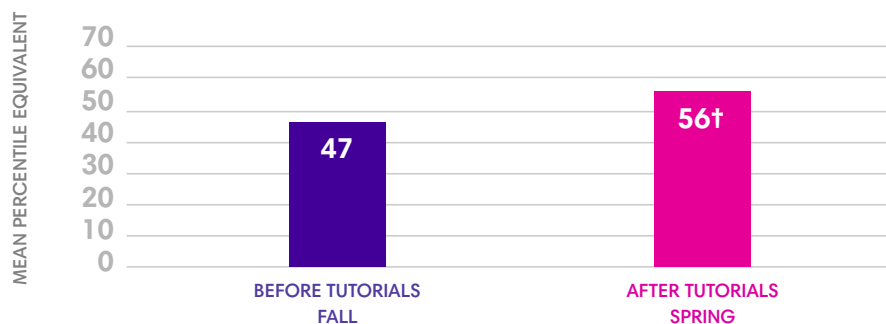
Tutorials improved student performance on state and local standardized end-of-course exams.

Students using Tutorials achieved higher average scores on standardized end-of-course achievement tests than a comparison group of students not using Tutorials. Table 6 in the appendix shows the results of a meta-analysis conducted on the results of two efficacy studies comparing the standardized end-of-course exam achievement of Tutorials users and non-users. Across studies, the average effect of Tutorials (ES=.08) was 2.5 times greater than the average effect of interventions designed to impact high school students' performance on similar achievement tests (ES=.03) (Figure 3) (Lipsey, et al., 2012).

Meta-Analysis	Type of Test	Grade Level of Students	N of Studies Included in Summary Effect Size	Summary Effect Size Mean
				Unweighted Effect Size
Tutorials	Standardized End-of-Course Exam	Grade 10-11	2	.08
Benchmark	Standardized Test, Narrow Scope	High School	22	.03

FIGURE 3:
Impact of Tutorials Compared to Benchmark

By implementation model, students using Tutorials for *test preparation* in one Dallas high school gained on average the equivalent of 9 percentile points on the spring end-of-course exam after using Tutorials compared to the fall semester exam completed without using Tutorials (Figure 4) (Impact Study: One Dallas High School, 2016).

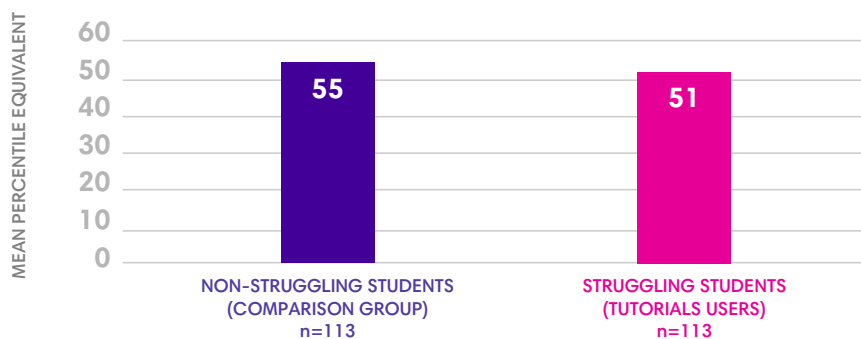


†Statistically significant. Sig. p<.01, ES=.24, n=69

FIGURE 4:
Average Dallas ISD Assessment of Course Progress (ACP) Algebra II Standardized Scores Before and After Using Tutorials

Struggling students using Tutorials for *just-in-time support and remediation* in St. Mary's County Public Schools performed as well as non-struggling students on the PARCC ELA 10 end-of-course exam (Figure 5) (Impact Study: St. Mary's County Public Schools, 2016). Figure 5 shows struggling students using Tutorials for just-in-time support and remediation in St. Mary's County Public Schools achieved similar scores on the PARCC ELA 10 end-of-course exam as non-struggling students enrolled in the same classes.

A Study of the Impact of Apex Learning Tutorials on Student Achievement



*Means adjusted to control for prior ability, age, grade, gender, free/reduced lunch participation, limited English proficiency, and special education program participation. Significant $p = .20$.

FIGURE 5:

Average Adjusted PARCC ELA 10 End-of-Course Score by Tutorials Use

Study Description

Study Design

Two designs were used to conduct this investigation. To address the first question, a pretest posttest single group design was used to evaluate the impact of Tutorials use on Tutorials posttest performance. A meta-analysis of Tutorials efficacy studies completed during the 2015–2016 school year was used to address the second question.

Participants

Students included in the analysis of the impact of Tutorials on posttest performance were enrolled in secondary school and used Tutorials during the 2015–2016 school year. Participants who completed unit pretests, 80% or more of unit modules, and unit posttests were included in the analytic sample.

Students included in the Tutorials efficacy studies reported in the meta-analysis used Tutorials in the 2014–2015 school year and had both measures of ability prior to using Tutorials and standardized end-of-course assessment scores.

Data Preparation

Two datasets were used to complete this study. The first dataset included 685,695 records of student level data containing module level results from Tutorials enrollments used between August 2015 and July 2016. Variables provided included district name, Tutorials name, number and percent of modules completed, total session minutes, quality of work metric, and Tutorials pretest, Test It, and posttest scores reported by module.

The second dataset included statistics reported in Tutorials efficacy studies completed during the 2015–2016 school year. The file included standardized pretest and posttest means and standard deviations generated from state and local standardized assessments, and sample sizes for students by Tutorials use.

Analysis

To address the first question, a paired t-test was used to compare the Tutorials pretest and posttest score reported at the module level.

To address the second question, a meta-analysis was conducted on the results of Tutorials efficacy studies completed during the 2015–2016 school year. Because Tutorials implementation differed across studies, a random-effect model was used to calculate the summary effect size statistic. In the random-effect model the pooled variance of each study is increased to account for the variance between studies. The resulting summary effect is the mean effect of the studies included in the sample.

Limitations

A single group design was used to analyze the impact of Tutorials use on pretest to posttest gain. The results of studies using this design are limited due to not having a comparison group to control for events that could impact posttest performance that are not attributable to an intervention including participant maturation, testing, instrument decay, and regression to the mean.

The summary effect size was calculated on a small number of studies. As more studies are added to the meta-analysis, the summary statistic will change and become more reliable.

Outcome Measures

The outcome measure reported in the analysis of the impact of Tutorials use on achievement gains is the paired difference between the Tutorials pretest and posttest score reported at the module level. The outcome measure reported in the meta-analysis is the summary effect size (Hedge's g).

References

A Study of the Impact of Apex Learning Digital Curriculum in St. Mary's County Public Schools (2016). Seattle, WA: Apex Learning, Inc.

A Study of the Impact of Apex Learning Digital Curriculum on Original Credit Student Achievement in One Dallas ISD High School (2016). Seattle, WA: Apex Learning, Inc.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. West Sussex, United Kingdom: John Wiley & Sons.

Lipsey, M. W., Puzio, K., Yun, C., Hebert, M. A., Steinka-Fry, K., Cole, M. W., Roberts, M., Anthony, K. S., Busick, M. D. (2012). *Translating the Statistical Representation of the Effects of Education Interventions into More Readily Interpretable Forms*. (NCSE 2013-3000). Washington, DC: National Center for Special Education Research, Institute of Education Sciences, U.S. Department of Education.

Appendix

Table 1. 2015–2016 Module Usage Characteristics: All Enrollments

Module use	N	Percent
Pretest Only	248,403	36.2
Test It Only	83,421	12.2
Pretest and Test It Only	94,921	13.8
Posttest Only	86	0.0
Pretest and Posttest Only	34,761	5.1
Test It and Posttest Only	32,688	4.8
Pretest, Test It, Posttest	191,415	27.9
Total	685,695	100.0

Table 2. 2015–2016 Descriptive Statistics by Subject

Subject	Pretest			Test It			Posttest		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
English	107,936	0.38	0.29	107,936	0.63	0.35	107,936	0.54	0.36
Math	61,027	0.39	0.27	61,027	0.62	0.32	61,027	0.56	0.33
Science	15,805	0.35	0.26	15,805	0.53	0.32	15,805	0.46	0.30
Social Studies	6,647	0.37	0.26	6,647	0.58	0.32	6,647	0.50	0.31
All Subjects	191,415	0.38	0.28	191,415	0.62	0.34	191,415	0.54	0.34

Table 3. Average Tutorials Pretest to Posttest Gain by Subject

Subject	Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. p	Effect Size <i>d</i>
	Mean	Std. Dev.	Std. Error Mean	Lower	Upper				
English	0.16	0.41	0.00	0.16	0.16	129.49	107,935	0.00†	0.49
Math	0.17	0.33	0.00	0.17	0.18	128.95	61,026	0.00†	0.57
Science	0.11	0.32	0.00	0.10	0.11	42.30	15,804	0.00†	0.38
Social Studies	0.13	0.34	0.00	0.12	0.14	30.68	6,646	0.00†	0.44
All Subjects	0.16	0.38	0.00	0.16	0.16	185.02	191,414	0.00†	0.50

†Statistically significant, $p < .000$

t = Paired samples t-test

Table 4. Average Tutorials Pretest to Posttest Gain by State

State	N	Paired Differences			95% Confidence Interval of the Difference		t	Sig. p	Effect Size d
		Mean	Std. Dev.	Std. Error Mean	Lower	Upper			
Alabama	719	0.17	0.36	0.01	0.14	0.19	12.23	0.00†	0.56
Alaska	848	0.22	0.32	0.01	0.20	0.24	19.72	0.00†	0.76
Arizona	643	0.12	0.33	0.01	0.10	0.15	9.48	0.00†	0.41
Arkansas	5,753	0.17	0.37	0.00	0.16	0.18	34.64	0.00†	0.54
California	21,350	0.13	0.36	0.00	0.13	0.14	54.13	0.00†	0.42
Colorado	1,497	0.16	0.41	0.01	0.14	0.18	15.56	0.00†	0.49
Connecticut	401	0.12	0.38	0.02	0.08	0.15	6.23	0.00†	0.39
Delaware	267	0.36	0.36	0.02	0.32	0.41	16.61	0.00†	1.28
Florida	6,128	0.20	0.37	0.00	0.19	0.21	41.97	0.00†	0.66
Georgia	735	0.16	0.38	0.01	0.13	0.18	11.04	0.00†	0.51
Illinois	2,711	0.15	0.35	0.01	0.14	0.16	22.81	0.00†	0.49
Indiana	2,997	0.14	0.36	0.01	0.12	0.15	20.96	0.00†	0.43
Kansas	2,100	0.16	0.39	0.01	0.14	0.17	18.78	0.00†	0.50
Kentucky	3,549	0.23	0.33	0.01	0.22	0.24	42.00	0.00†	0.81
Maine	116	0.19	0.34	0.03	0.13	0.26	6.16	0.00†	0.65
Maryland	8,103	0.23	0.36	0.00	0.22	0.23	56.76	0.00†	0.76
Massachusetts	355	0.17	0.36	0.02	0.14	0.21	9.19	0.00†	0.59
Nebraska	129	0.27	0.38	0.03	0.20	0.33	7.99	0.00†	0.91
Nevada	3,489	0.19	0.40	0.01	0.17	0.20	27.38	0.00†	0.58
New Jersey	4,134	0.22	0.38	0.01	0.21	0.23	38.13	0.00†	0.72
New Mexico	1,481	0.12	0.36	0.01	0.11	0.14	13.35	0.00†	0.40
New York	6,202	0.17	0.40	0.00	0.16	0.18	36.72	0.00†	0.55
North Carolina	21,101	0.16	0.36	0.00	0.15	0.16	62.09	0.00†	0.50
Ohio	12,819	0.23	0.35	0.00	0.23	0.24	74.83	0.00†	0.78
Oregon	482	0.20	0.32	0.01	0.17	0.22	13.22	0.00†	0.67
Pennsylvania	16,660	0.11	0.36	0.00	0.10	0.12	39.35	0.00†	0.36
South Carolina	17,246	0.13	0.38	0.00	0.13	0.14	45.50	0.00†	0.41
Texas	40,265	0.13	0.40	0.00	0.13	0.14	66.27	0.00†	0.41
Virginia	2,503	0.18	0.38	0.01	0.16	0.19	23.22	0.00†	0.56
Washington	3,934	0.15	0.39	0.01	0.14	0.16	24.64	0.00†	0.47
Wisconsin	2,040	0.41	0.39	0.01	0.39	0.43	47.65	0.00†	1.44
Wyoming	436	0.21	0.32	0.02	0.18	0.24	13.37	0.00†	0.72

Note: States with more than 100 modules with pretest, Test It, and posttest scores shown.

†Statistically significant, p < .05

t = Paired samples t-test

Table 5. Average Tutorials Pretest to Posttest Gain by National Center for Educational Statistics Urban Locale

Urban Locale	N	Paired Differences			95% Confidence Interval of the Difference		t	Sig. p	Effect Size d
		Mean	Std. Dev.	Std. Error Mean	Lower	Upper			
Large city	19,486	0.12	0.37	0.00	0.12	0.13	46.16	0.00†	0.39
Mid-size city (100,000 < population < 250,000)	21,808	0.13	0.36	0.00	0.12	0.13	51.68	0.00†	0.41
Small city (population of 100,000 or less)	10,085	0.21	0.37	0.00	0.20	0.21	57.04	0.00†	0.67
Suburb, large urbanized area	59,484	0.17	0.38	0.00	0.17	0.18	110.86	0.00†	0.54
Suburb, mid-size urbanized area	4,785	0.21	0.37	0.01	0.20	0.22	38.35	0.00†	0.69
Suburb, small urbanized area	2,898	0.17	0.38	0.01	0.16	0.18	24.19	0.00†	0.55
Town, fringe territory inside an urban cluster	2,360	0.11	0.40	0.01	0.09	0.13	13.22	0.00†	0.35
Town, distant territory inside an urban cluster	12,520	0.12	0.36	0.00	0.11	0.13	36.75	0.00†	0.39
Town, remote territory inside an urban cluster	5,419	0.16	0.36	0.00	0.15	0.16	31.33	0.00†	0.49
Rural, fringe	27,917	0.16	0.37	0.00	0.16	0.16	71.24	0.00†	0.51
Rural, distant	12,886	0.20	0.39	0.00	0.20	0.21	59.62	0.00†	0.65
Rural, remote	2,478	0.11	0.37	0.01	0.10	0.13	15.28	0.00†	0.37

†Statistically significant, p < .00
 t = Paired samples t-test

Table 6. Tutorials Meta-Analysis: Average Effect Size Parameter Statistics

Tutorials Implementation Model	Study Name	N	Effect Size Hedge's g	V _Y	SE _Y	Sig. p*
Test Preparation	Dallas ISD HS	69	0.24	0.008	0.089	.00
Just in Time Remediation	St. Mary's County	113	-0.11	0.018	0.133	.20
Mean Effect Size		2	0.08	0.030	0.174	.17

Note: Non-weighted random-effect model calculated
 *p-value < .05 strong confidence of significant difference; .05 > p-value < .20 some confidence of significant difference; p-value > .20 no confidence of significant difference.



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.

Contact

Apex Learning

1215 Fourth Ave., Suite 1500

Seattle, WA 98161

Phone: 1 (206) 381-5600

Fax: 1 (206) 381-5601

ApexLearning.com