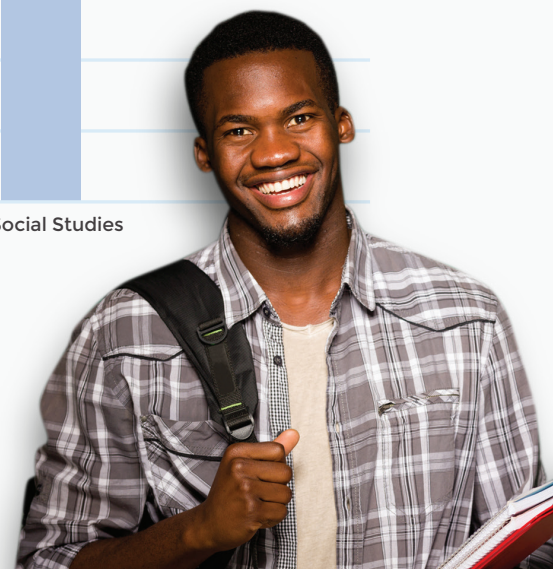
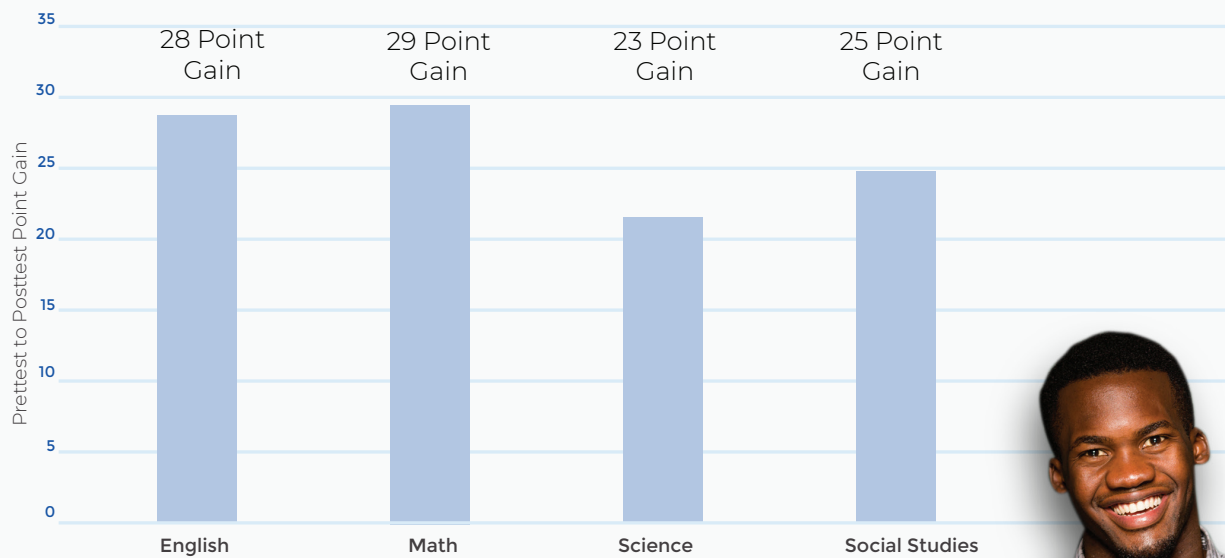




Three Years of Gain: The Impact of Apex Learning Tutorials on Middle School Student Achievement

School Years 2016-2017 through 2018-2019

October 2019



Introduction: Apex Learning Tutorials

Apex Learning Tutorials provide standards-based instruction and support to prepare middle school students who struggle with on-grade instruction to master grade-level content.

Instruction is delivered in discrete modules addressing specific concepts, and modules are grouped into units of related concepts. Students may complete only those modules that address one or more specific standards or complete all modules in Tutorials for a subject area.

Tutorials provide a personalized learning path for each student. Unit-level pretests prescribe a plan of instruction to meet students' individual learning needs, and students struggling with grade-level concepts are prescribed remedial instruction of skills down to the third-grade level. The learning path continually adapts as each student progresses through each module.

Embedded pretest, Test It, and posttest assessments provide performance data by module, unit, or standard, quickly identifying where students have demonstrated content mastery and where they still need to focus their learning.

Purpose of Study

The purpose of this study is to investigate the impact of Apex Learning middle school Tutorials on student learning over the course of three school years. The analysis addresses two questions:

- What impact does Tutorials use make on achievement gain from pretest to posttest?
- Are achievement gains consistent across years?

The results of 372,869 Tutorials modules with pretest, Test It, and posttest scores across three school years were included in the analytical dataset. Analysts addressed each question by subject and school year and reported the findings by subject. Tables showing descriptive statistics and the results for all statistical tests are located in the appendix.

Key Findings

Apex Learning Tutorials significantly improved student performance on Tutorials posttest assessments across English, math, science, and social studies for three straight years.

Tutorials had a statistically significant impact on student posttest achievement compared to pretest performance for all school years by subject. Results of paired-samples t-tests (Table 2, appendix) suggested that by subject, the average gain across school years for English was 75%, followed by math at 66%, science at 56%, and social studies at 63%.

The average gain by subject was consistent across years fluctuating between +/- .28 and +/- 2.21 percentage points. For English and math, the results of one-way ANOVAs (Table 3 appendix) suggested that gains made in the 2017-2018 and 2018-2019 school years were greater than gains made in 2016-2017. For science and social studies, the average gain made in 2018-2019 was not significantly different than the gain made in 2017-2018¹.

¹ Science and social studies Tutorials were not available prior to 2017-2018.

The average pretest, posttest, and percentage point gain by subject and school year are reported by subject under each heading.

English Tutorials

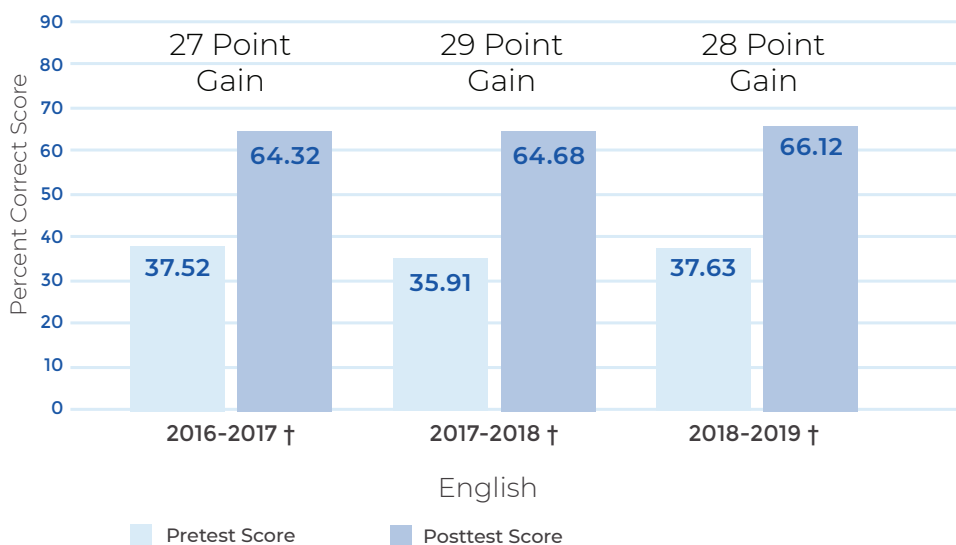
Following the use of English Tutorials:

- Tutorials gains from pretest and posttest score ranged from 27 to 29 points over three years. Relative to pretest performance, the gains are equal to a 71%, 80%, and 76% improvement for 2016-2017, 2017-2018, and 2018-2019 respectively. Over the three-year span, the average gain was 75%.
- The magnitude of the effect of Tutorials use on posttest achievement was large for all three school years ($d=.92, .98, .97$ respectively).
- Over the course of three years, the average gain between pretest and posttest was significantly greater in the last two school years (2017-2018 and 2018-2019) than in the first school year. The average gain between pre- and posttest in school years 2017-2018 (29 points) and 2018-2019 (28 points) was greater than the gain made in 2016-2017 (27 points).

Figure 1 shows the average pretest score, posttest score, and gain following use of English Tutorials.

Figure 1

Average Pretest, Posttest, and Percentage Point Gain: English



†Differences between pre- and posttest for each school year are statistically significant. (Sig. $p<.001$).

††Gains made from 2017-2018 and 2018-2019 are significantly greater than those made in 2016-2017 (Sig. $p<.05$).

Note: The number of modules included in the analysis ranges from 40,272 to 65,482 by school year.

Math Tutorials

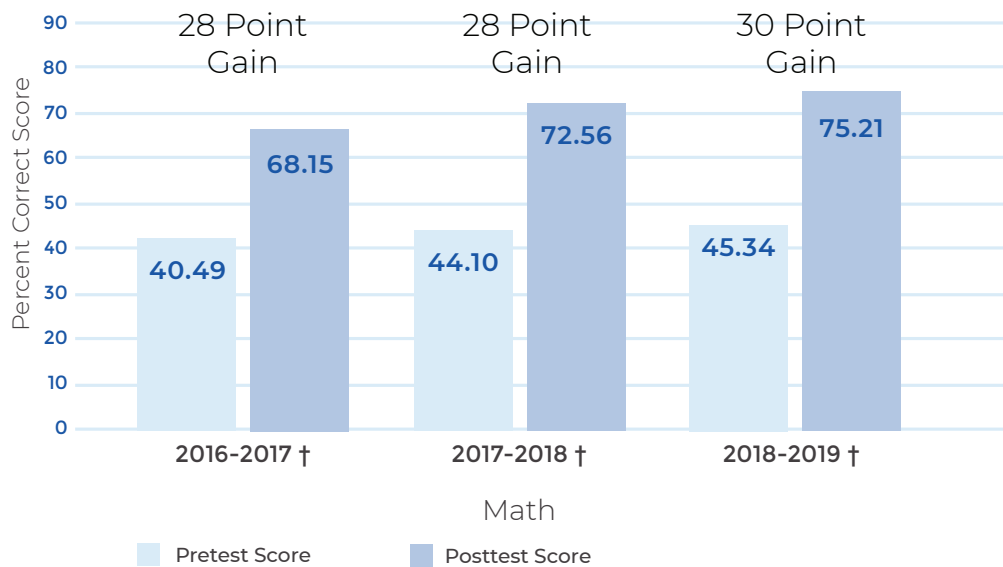
Following the use of math Tutorials:

- Tutorials gains from pretest and posttest score ranged from 28 to 30 points over three years. Relative to pretest performance, the gains are equal to a 68%, 65%, and 66% improvement for 2016-2017, 2017-2018, and 2018-2019 respectively. Over the three-year span, the average gain was 66%.
- The magnitude of the effect of Tutorials use on posttest achievement was large each school year ($d=1.00, 1.00, 1.06$ respectively).
- Over the course of three years, the average gain between pretest and posttest was significantly greater in 2018-2019 than in 2016-2017 and 2017-2018. The average gain between pre- and posttest in school years 2018-2019 was 30 compared to 28 points in 2016-2017 and 2018-2019.

Figure 2 shows average pretest and posttest achievement scores and gain following use of math Tutorials.

Figure 2

Average Pretest, Posttest, and Percentage Point Gain: Math



†Differences between pre- and posttest for each school year are statistically significant. (Sig. $p<.001$).

††Gains made in 2018-2019 are significantly greater than those made in 2016-2017 and 2017-2018 (Sig. $p<.05$).

Note: The number of modules included in the analysis ranges from 49,142 to 64,935 by school year.

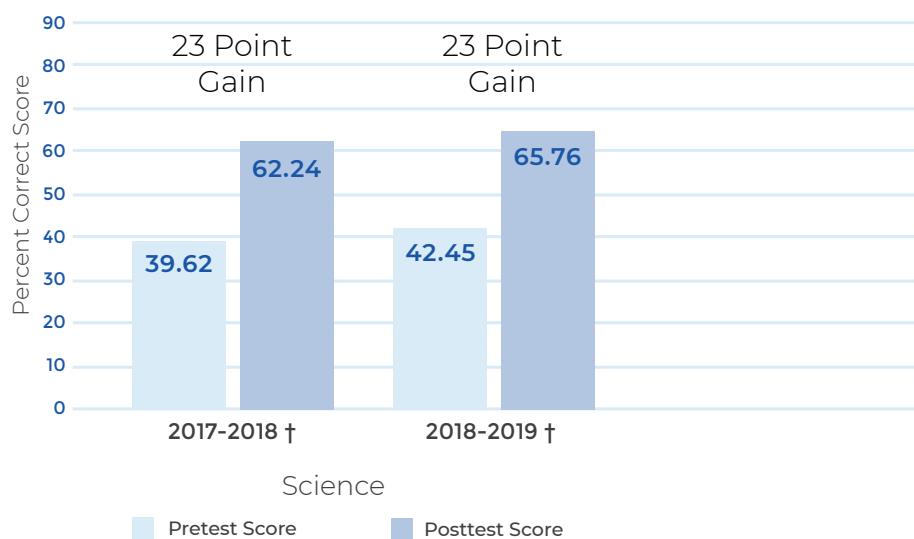
Science Tutorials

Following the use of science Tutorials:

- Tutorials gains from pretest and posttest score ranged from 22.6 to 23.3 across years. Relative to pretest performance, the gains are equal to a 57% and 55% improvement for 2017-2018 and 2018-2019, respectively. Over the two-year span, the average gain was 56%.
- The magnitude of the effect of Tutorials use on posttest achievement was large for both years ($d=.84$ and $.87$ respectively).
- Over the course of two years, the average gain between pretest and posttest was similar. The difference between years was not statistically significant.

Figure 3 shows the average pretest score, posttest score, and gain following use of science Tutorials.

Figure 3
Average Pretest, Posttest, and Percentage Point Gain: Science



†Differences between pre- and posttest for each school year are statistically significant. (Sig. $p<.001$)

‡Gains made in 2018-2019 are not significantly different than those made in 2017-2018 (Sig. $p>.05$).

Note: The number of modules included in the analysis ranges from 8,319 to 20,237 by school year.

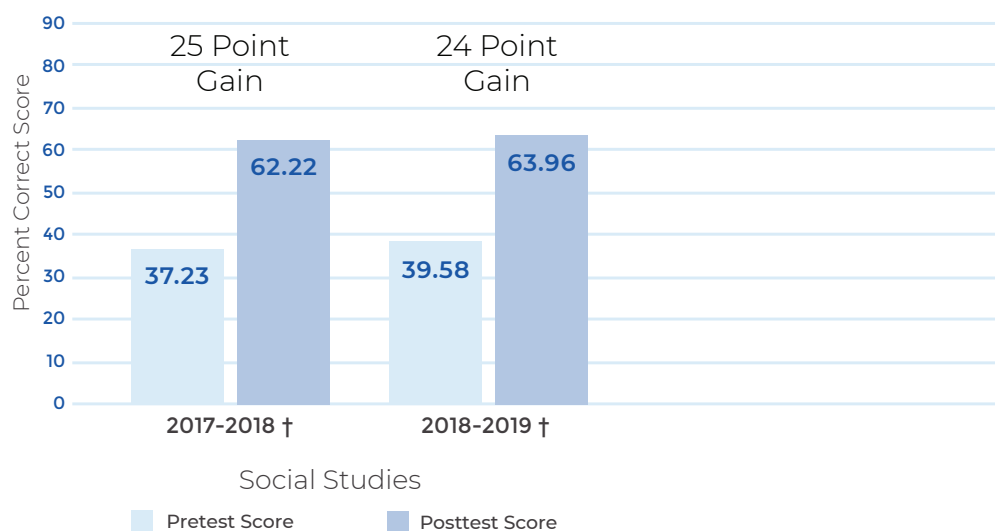
Social Studies Tutorials

Following the use of social studies Tutorials:

- Tutorials gain from pretest and posttest score ranged from 24 to 25 points across years. Relative to pretest performance, the gains are equal to a 67% and 62% improvement for 2017-2018 and 2018-2019, respectively. Over the two-year span, the average gain was 63%.
- The magnitude of the effect of Tutorials use on posttest achievement was large for both years ($d=.93$ and $.90$ respectively).
- Over the course of two years, the average gain between pretest and posttest was similar. The difference between years was not statistically significant.

Figure 4 shows the average pretest score, posttest score, and gain following use of social studies Tutorials.

Figure 4
Average Pretest, Posttest, and Percentage Point Gain: Social Studies



†Differences between pre- and posttest for each school year are statistically significant. (Sig. $p<.001$)

††Gain made in 2017-2018 is significantly greater than gain made in 2016-2017 and 2018-2019 (Sig. $p<.05$).

Note: The number of modules included in the analysis ranges from 12,560 to 22,607 by school year.

Study Description

Study Design

A pretest/posttest single group design was used to evaluate the impact of Tutorials use on posttest performance.

Participants

Students from across the nation used over one million middle school Tutorials modules. Student enrollments with completed unit pretests, 100% of unit modules, and unit posttests were included in analytical dataset.

Data Preparation

Apex Learning provided 1,791,399 records of student level module data including enrollment ID number, subject, Tutorials name, unit name, module name, and pretest, Test It, and posttest scores. Unit level pretest and posttest scores were distributed across modules by corresponding objectives. Twenty-one percent (21%) of modules containing pretest, Test It, and posttest scores were included in the analytical dataset.

Analysis

A paired-samples t-test was used to determine if the average module posttest score was significantly greater than the average module pretest score by year for each subject. Cohen's d was used as a measure of effect size.

A one-way ANOVA was used by subject to determine if achievement gains were significantly different between years, and post-hoc Scheffé tests were used to identify school years that differed significantly among years.

Limitations

A single group design was used to analyze the impact of Tutorials use on pretest to posttest gain. Single group design studies are limited by not having a comparison group to control for events unrelated to the intervention that could impact posttest performance. Events unrelated to the intervention include participant maturation, testing, instrument decay, and regression to the mean.

Outcome Measures

The outcome measure used in this study is the Tutorials posttest score reported at the module level.

Appendix

Table 1. Module Level Descriptive Statistics								
School Year	Subject	Modules	Pretest Score		Test It Score		Posttest Score	
		N	Mean	SD	Mean	SD	Mean	SD
2016-2017	English	65,482	37.52	29.25	72.96	29.29	64.32	32.43
	Math	57,452	40.49	27.72	72.81	27.24	68.15	29.87
	Science	.	.	.	.	.	.	.
	Social Studies	.	.	.	.	.	.	.
	Total	122,934	38.91	28.58	72.89	28.35	66.11	31.32
2017-2018	English	40,272	35.91	29.38	73.80	29.37	64.68	32.79
	Math	49,142	44.10	28.52	77.08	26.23	72.56	29.19
	Science	8,319	39.62	26.89	70.29	26.32	62.24	29.08
	Social Studies	5,427	37.23	26.99	73.99	27.62	62.22	30.30
	Total	103,160	40.18	28.92	75.09	27.66	68.11	31.00
2018-2019	English	50,078	37.63	29.31	74.47	29.02	66.12	32.21
	Math	64,935	45.34	28.31	78.36	25.57	75.21	27.77
	Science	20,237	42.45	26.89	73.49	26.60	65.76	29.10
	Social Studies	11,525	39.58	27.14	72.92	27.31	63.96	30.96
	Total	146,775	41.86	28.59	75.94	27.16	69.92	30.16
Total	English	155,832	37.14	29.31	73.66	29.23	64.99	32.46
	Math	171,529	43.36	28.26	76.14	26.44	72.09	29.05
	Science	28,556	41.63	26.92	72.55	26.56	64.74	29.14
	Social Studies	16,952	38.83	27.11	73.26	27.41	63.40	30.76
	Total	372,869	40.42	28.70	74.70	27.72	68.16	30.82

Table 2. Paired-Samples T-Test Results										
Subject	School Year	Pretest Score Mean	Posttest Score Mean	Paired Differences	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Effect Size d
English	2016-2017	37.52	64.32	26.80	38.45	0.15	178.32	65481	0.00†	0.92
	2017-2018	35.91	64.68	28.77	39.46	0.20	146.30	40271	0.00†	0.98
	2018-2019	37.63	66.12	28.49	38.52	0.17	165.51	50077	0.00†	0.97
Math	2016-2017	40.49	68.15	27.66	31.43	0.13	211.00	57451	0.00†	1.00
	2017-2018	44.10	72.56	28.46	30.47	0.14	207.02	49141	0.00†	1.00
	2018-2019	45.34	75.21	29.87	30.18	0.12	252.24	64934	0.00†	1.06
Science	2017-2018	39.62	62.24	22.62	33.97	0.37	60.74	8318	0.00†	0.84
	2018-2019	42.45	65.76	23.31	33.19	0.23	99.93	20236	0.00†	0.87
Social Studies	2017-2018	37.23	62.22	24.99	34.84	0.47	52.83	5426	0.00†	0.93
	2018-2019	39.58	63.96	24.38	34.53	0.32	75.81	11524	0.00†	0.90
Total	English	37.14	64.99	27.85	38.75	0.10	283.73	155831	0.00†	0.95
	Math	43.36	72.09	28.73	30.70	0.07	387.55	171528	0.00†	1.02
	Science	41.63	64.74	23.11	33.42	0.20	116.87	28555	0.00†	0.86
	Social Studies	38.83	63.40	24.58	34.63	0.27	92.40	16951	0.00†	0.91

† Statistically significant, $p < .05$

Table 3. One-way ANOVA Results						
Subject		Sum of Squares	df	Mean Square	F	Sig.
English	Between Groups	127095.629	2	63547.814	42.349	0.00†
	Within Groups	233833413.757	155829	1500.577		
	Total	233960509.385	155831			
Math	Between Groups	153485.686	2	76742.843	81.508	0.00†
	Within Groups	161498060.046	171526	941.537		
	Total	161651545.732	171528			

Table 4. Scheffé Test Results							
Subject	(I) School Year	(J) School Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
English	2016-2017	2017-2018	-1.97191	.24531	0.00†	-2.5724	-1.3715
		2018-2019	-1.69255	.22996	0.00†	-2.2554	-1.1297
	2017-2018	2016-2017	1.97191	.24531	0.00†	1.3715	2.5724
		2018-2019	.27937	.25928	.560	-.3553	.9140
	2018-2019	2016-2017	1.69255	.22996	0.00†	1.1297	2.2554
		2017-2018	-.27937	.25928	.560	-.9140	.3553
Math	2016-2017	2017-2018	-.79470	.18854	0.00†	-1.2562	-.3332
		2018-2019	-2.20731	.17575	0.00†	-2.6375	-1.7771
	2017-2018	2016-2017	.79470	.18854	0.00†	.3332	1.2562
		2018-2019	-1.41262	.18346	0.00†	-1.8617	-.9635
	2018-2019	2016-2017	2.20731	.17575	0.00†	1.7771	2.6375
		2017-2018	1.41262	.18346	0.00†	.9635	1.8617

† Statistically significant, $p < .05$



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