



A Third-Party Study of Apex Learning Digital Curriculum's Effects on Student Achievement

Evansville Vanderburgh School Corporation

January 2014



District Characteristics

Evansville Vanderburgh School Corporation (EVSC) enrolls approximately 23,000 students in grades K-12, and has 39 schools, including 5 specialized high schools and a school of career and technical studies.

Overview of EVSC's Implementation of Apex Learning Digital Curriculum

During the 2011–2012 school year, EVSC utilized Apex Learning digital curriculum within their Virtual Academy to provide individualized self-paced courses, with teacher support to assist students seeking initial credit and those in need of credit recovery due to having failed a course or because they had not passed one or more end of course ISTEP+ high school exams. The EVSC Virtual Academy supports students from six high schools, offering online courses in English language arts, math, science, social studies, and a variety of electives.

When using Apex Learning digital curriculum, high school students progress at their own pace, taking the necessary time to master the material. Students seeking initial credit completed the entire course through the EVSC Virtual Academy, studying the full range of academic units. For credit recovery, students take the course until a satisfactory grade is received, focusing on the units or skills they need to strengthen in order to pass the course and/or the end of course exam. During the 2011–2012 school year some students used Apex Learning digital curriculum to retake an entire course, others tested out of a unit by successfully completing the unit test. Students using Apex Learning for initial credit and credit recovery receive varying degrees of teacher support based on their individual needs.

Study Purpose and Design

This study focused on examining data¹ on the effectiveness of Apex Learning digital curriculum and its impact on students' growth and academic achievement, as implemented in Evansville Vanderburgh School Corporation during the 2011–2012 school year. This study focuses on students participating in English 10 and Algebra 1 courses only.

Two analyses were conducted. The first employs a quasi-experimental design with matched comparison groups, in which the effectiveness of Apex Learning digital curriculum was examined by comparing academic gains made on two State of Indiana-administered standardized² assessments – the 8th grade ISTEP exam (math, ELA) formed the pre-test, and the post-test was the high school ISTEP+ End of Course Assessment (ECA) exam (Algebra 1, English 10). The gains made by students who used Apex Learning digital curriculum were compared to gains made by students who did not use Apex Learning digital curriculum.

The second analysis examines the relationship between the percent of Apex Learning digital curriculum activities completed and the pooled³ end of course assessment (ECA) results.

Sample Development

Of the 273 EVSC 9th-12th grade students who participated in Apex Learning English 10 or Algebra 1 courses in 2011–2012, 144 student files had complete Apex Learning data and EVSC pre-test and post-test scores and formed the Treatment group. To form a Comparison group, the Treatment students were tightly matched (98-100%) to non-Apex Learning students on four dimensions: 1) students' individual pre-test standardized scores (8th grade ISTEP reading and/or math z-scores), 2) socio-economic status⁴ (SES), 3) race/ethnicity, and 4) gender. The Treatment and Comparison group students had the same or similar pre-test z-scores on their 8th grade ISTEP tests for either English or Math. As a result, the Comparison and Treatment groups had the same pre-test z-score means for each subject (means=Algebra= -1.14, English= -0.88). The two groups were also equivalent in terms of SES, race/ethnicity, and gender. None of the Comparison group students used Apex Learning digital curriculum.

Table 1: Summary of Sample by Subject by Treatment Group

	N Students Treatment	N Students Comparison	N Students Total
Algebra	90	90	180
English	54	54	108
Pooled Algebra/English	144	144	288

¹Data were gathered by the Apex Learning digital curriculum computerized database, the State of Indiana Department of Education, and Evansville Vanderburgh School Corporation's Office for Performance, Assessment & Research.

²8th grade ISTEP pre-test and ISTEP+ End of Course Assessment post-test scores were converted to standardized z scores for comparability purposes.

³"Pooled ECA" scores represent the combined Algebra 1 and English 10 ECA z-scores pooled across subjects. See Technical Details.)

⁴Eligibility for Free and Reduced Meals (FARMS) served as a proxy for socio-economic status (SES).

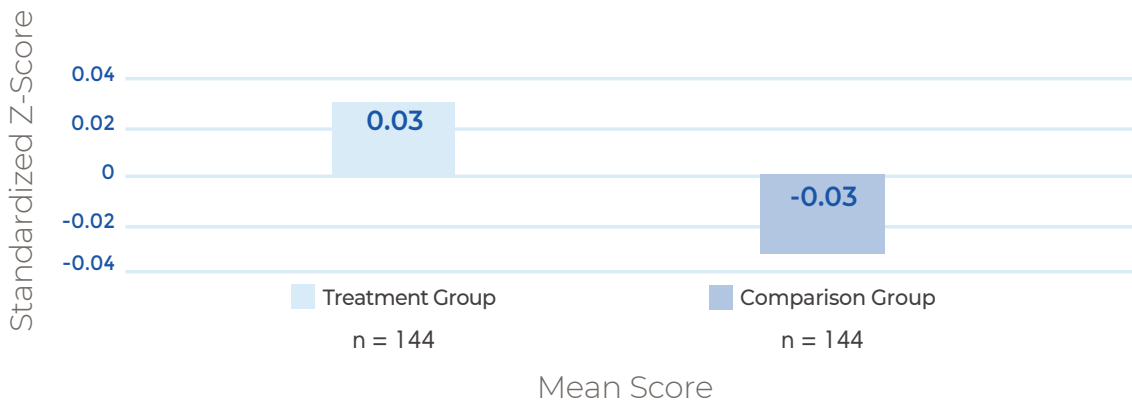
Results⁵

Summary: Overall, students using Apex Learning digital curriculum achieved similar academic gains as comparable students. The analysis suggests positive trends demonstrating that students using Apex Learning digital curriculum tend to perform higher on average on ECA post-tests for Algebra 1 and Pooled ECA scores than do a Comparison group of similar students. However, the trends did not achieve statistical significance ($p < 0.05$). Examination of Apex Learning student data show that "Percent of Activities Completed" is positively related to student gains on ECA test scores, and the relationship approaches statistical significance ($p < 0.06$, Graph 3).

Q1: How does the achievement of students using Apex Learning digital curriculum, as measured by 2011–2012 ECA z-scores, compare to the achievement of similar students not using Apex Learning digital curriculum?

Analysis of the Pooled Treatment group (Graph 1; Tables 2, 3) shows that students using Apex Learning digital curriculum had a higher mean standardized z-score (T6= 0.03) on the post-test, compared to the Pooled Comparison group students (C= -0.03); however, after applying a t-test, the difference between the two groups did not meet a level of statistical significance of $p < 0.05$. The Treatment and Comparison groups’ scores were also each analyzed by quartile, which further demonstrated there were no differences between the groups that were statistically significant, thereby indicating that both groups performed similarly across all abilities. Additional analyses were conducted by subject alone, but the difference between groups was not statistically significant.

Graph 2:
Mean Post-Test Pooled ECA Scores by Group



⁵ All statistical tests controlled for differences in student characteristics including ISTEP pre-test scores, grade, gender, race/ ethnicity, SES, disability, and additional Apex Learning usage metrics.

⁶ "T"= Treatment Group, "C" = Comparison Group

Q2: What is the percent of students performing proficient or above on ECAs for students using Apex Learning digital curriculum versus the Comparison group of similar students?

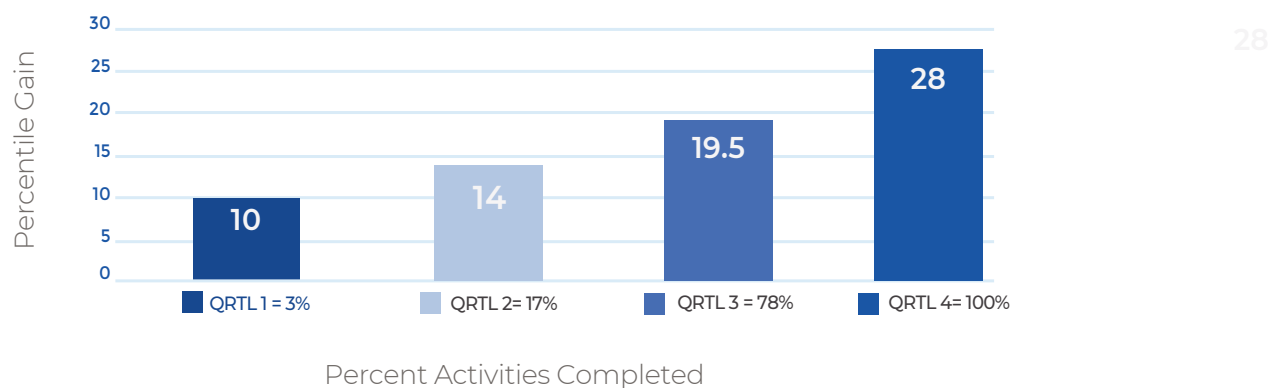
The data indicate that students using Apex Learning digital curriculum passed at rates similar to students not using Apex Learning digital curriculum. Analysis of the percent of students scoring proficient or above on the Pooled ECAs (T=39%, C=42%) indicates that both groups passed the ECAs at comparable rates. The difference between the Treatment and Comparison groups did not reach statistical significance.

Q3: For students using Apex Learning digital curriculum, how is their Percent of Activities Completed⁷ metric related to achievement gains on the ECA?

The regression analysis shows that there is a positive relationship between Percent of Activities Completed and students' pre- to post-test score gains for the Pooled Treatment group (Table 6). This result is approaching statistical significance at $p < 0.06$. Graph 2 illustrates the relationship between the average percentile score gains (pre- to post-test) and the Percent of Activities Completed metric by quartile. Additional regression analyses were also conducted by subject, but the results were not statistically significant.

Graph 2:

Student ECA Percentile Gain⁸ as Function of *Percent of Apex Learning Activities Completed*



⁷ The "Percent of Activities Completed" metric measures the percent of completed activities for each subject. The formula used for this calculation is Activity Count Completed divided by Activity Count Total.

⁸ Standardized z-score gain scores were converted to percentile scores.

Technical Detail

Data Preparation

Evansville Vanderburgh School Corporation (EVSC) provided more than 2,700 student records with 2011–2012 student-level data including identification numbers and demographics, school identifiers, ISTEP+ ECA scores for Algebra 1 and English 10 and 2008–2010 ISTEP scores for eighth grade Reading and Math.

Apex Learning provided student log data for the 2011–2012 school year from the Apex Learning system which included student identifiers, course indicators, teacher and classroom names, the number of activities completed, and more for 273 EVSC 9th–12 grade students who participated in Apex Learning digital curriculum for Algebra 1 and English 10.

The analytic sample was developed by merging student ID and demographic data with state assessment records and Apex Learning log data, including usage metrics. The analytic sample allowed for individual students to have one record for each subject, and assessments in math and English. Pre-test scores in reading and math came from the students' eighth grade ISTEP assessments. Post-test scores came from the students' English 10 and Algebra 1 End of Course Assessments.

Of the 273 EVSC 9th–12th grade students who participated in Apex Learning digital curriculum for Algebra 1 and English 10 in 2011–2012, 144 students files had complete Apex Learning and EVSC demographic, pre-test and post-test scores which formed the Treatment Group.

To form a Comparison group, the 144 Treatment students (90 Algebra 1; 54 English 10) were tightly matched (98–100%) to non-Apex Learning students on four dimensions: 1) students' individual pre-test standardized scores (8th grade ISTEP reading and/or math z-scores), 2) socio-economic status (SES), 3) race/ethnicity, and 4) gender. The Treatment and Comparison group students had the same or similar pre-test z-scores on their 8th grade ISTEP tests for either English or Math. As a result, the Comparison and Treatment groups had the same pre-test z-score means for each subject (Algebra = -1.14, English = -0.88). The two groups were also equivalent in terms of SES, race/ethnicity, and gender. None of the Comparison group students used Apex Learning digital

Statistical Analysis

In order to run statistical analyses, test scores were first converted to z-scores to make comparison across different test administrations and different disciplines. Appropriate statistical analyses were performed to examine each of the three research questions:

For Question 1, to examine the achievement of students using Apex Learning in relationship to similar Comparison students, t-tests were conducted to compare the pre- to post-test mean standardized score gains on outcomes measures for the Treatment and Comparison Groups (Graph 1).

For Question 2, to examine the percent of students performing proficient or above on ECAs, tests of independent proportions were conducted to evaluate the difference in the performance of students using Apex Learning digital curriculum versus Comparison Group students (Graph 2).

For Question 3, to examine how the “Percent of Activities Completed” metric relates to achievement gains on the ECA made by students using Apex Learning, regression analyses were conducted to determine the extent of the relationship between the calculated Apex Learning metric, “Percent of Activities Completed” and ECA scores. The regression analysis controlled for 8th grade ISTEP standardized scores, grade in school, gender, race/ethnicity, socio-economic status, disability, Total Minutes of Apex Learning Usage, and the Weighted Quality of Work⁹, and the Percent of Activities Completed (Graph 3).

Conclusion

Overall, students using Apex Learning digital curriculum achieved similar academic gains as comparable students. The analyses indicate positive trends that show that students using Apex Learning digital curriculum tend to perform higher on average on ECA post-tests for Algebra 1 and Pooled ECA scores than do a Comparison group of similar students. However, the trends did not achieve statistical significance ($p < 0.05$). Examination of Apex Learning student data show that Percent of Activities Completed is positively related to student gains on ECA test scores, and the relationship approaches statistical significance ($p < 0.06$, Graph 3).

Limitations

Due to the fact this study was not a Randomized Control Trial, the results of this study are not generalizable beyond Evansville Vanderburgh School Corporation.

⁹ The "Quality of Work" metric is derived from Apex Learning log data and measures an average score for completed and scored activities. The formula used for this calculation is Points Earned on Completed Activities divided by Points Possible on Completed Activities.

Table 2: Sample Breakdown by Demographic and Quartile *Apex Learning* Treatment Group Pooled Sample (Algebra and English)

Within quartile	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Total
Demographic Characteristics					
N Students	36	36	36	36	144
N Males	22	22	14	18	76
N Minorities	19	20	16	9	64
N Disabilities	12*	4*	2*	5*	23*
N FARMS/Socio-Economic Status	25*	22*	19*	19*	85*
N English Language Learners	1*	0*	0*	1*	2*
Test Results					
Pre-test - Mean Pooled z-score	-2.40	-1.27	-0.70	0.21	-1.04
Pre-test - Std. Dev. Pooled z-scores	0.48	0.21	0.24	0.77	1.06
Post-test - Mean Pooled z-score	-0.80	0.28	0.02	0.38	0.03
Post-test - Std. Dev. Pooled z-scores	0.78	0.73	1.08	0.88	0.95

* Indicates that student records had missing/incomplete data, therefore the denomination does not add up to the sample total of 144.

Table 3: Sample Breakdown by Demographic and Quartile Comparison Group Pooled Sample (Algebra and English)

Within quartile	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Total
Demographic Characteristics					
N Students	36	36	36	36	144
N Males	21	22	16	17	76
N Minorities	19	20	17	8	64
N Disabilities	19	11	4	0	34
N FARMS/Socio-Economic Status	31	25	22	20	98
N English Language Learners	0	0	3	0	3
Test Results					
Pre-test - Mean Pooled z-score	-2.40	-1.25	-0.70	0.18	-1.04
Pre-test - Std. Dev. Pooled z-scores	0.50	0.20	0.26	0.73	1.05
Post-test - Mean Pooled z-score	-0.76	0.22	-0.01	0.36	-0.03
Post-test - Std. Dev. Pooled z-scores	1.05	0.89	0.96	0.97	1.05

Table 4: Algebra Treatment vs. Comparison

Demographic Characteristics	N Apex Learning Treatment	% of Apex Learning Treatment	N Comparison	% of Comparison	N Total
Number of Students	90	100%	90	100%	180
9th Grade	48	53%	32	36%	80
10th Grade	18	20%	36	40%	54
11th Grade	18	20%	16	18%	34
12th Grade	6	7%	6	7%	12
Female	45	50%	45	50%	90
Male	45	50%	45	50%	90
Asian	0	0%	0	0%	0
African-American	28	31%	28	31%	56
Hispanic	5	6%	5	6%	10
Native American	0	0%	0	0%	0
White	53	59%	53	59%	106
Unclassified	4	4%	4	4%	8
English Language Learner	1	1%	2	2%	3
Students on FARM/SES	63	70%	63	70%	126
Disability	14	16%	19	21%	33
Test Results					
Pre-test - 8th grd. Math Mean z-score	-1.14	.	-1.14	.	-1.14
Pre-test - 8th grd. Math z-scores Std. Dev.	0.97	.	0.99	.	0.98
Post-test - Algebra 1 Mean z-scale score	0.06	.	-0.06	.	.
Post-test - Algebra 1 z-scale Std. Dev.	0.91	.	1.08	.	.
Post-test - Algebra 1 Mean scale score	528.21	.	525.52	.	521.87
Post-test - Algebra 1 Std. Dev.	91.09	.	108.43	.	100.06
ECA Proficient or Above	36	40.0%	38	42.2%	.

Table 5: English Treatment vs. Comparison

Demographic Characteristics	N Apex Learning Treatment	% of Apex Learning Treatment	N Comparison	% of Comparison	N Total
Number of Students	54	100%	54	54%	108
9th Grade	0	0%	0	0%	0
10th Grade	25*	46%	39	72%	64*
11th Grade	10*	19%	9	17%	19*
12th Grade	7*	13%	6	11%	13*
Female	23	43%	23	43%	46
Male	31	57%	31	57%	62
Asian	0	0%	0	0%	0
African-American	20	37%	20	37%	40
Hispanic	2	4%	2	4%	4
Native American	0	0%	0	0%	0
White	27	50%	27	50%	54
Unclassified	5	9%	5	9%	10
English Language Learner	1*	1%	0	0%	1*
Students on FARM	27*	31%	37	69%	64*
Disability	9*	31%	15	28%	24*
Test Results					
Pre-test - Reading Mean z-score	-0.88	.	-0.88	.	-0.88
Pre-test - Reading z-scores Std. Dev.	1.20	.	1.15	.	1.17
Post-test - English 10 Mean z-scale score	-0.04	.	0.04	.	.
Post-test - English 10 z-scale Std. Dev.	1.01	.	0.99	.	.
Post-test - English 10 Mean scale score	331.7	.	338.88	.	335.27
Post-test - English 10 scale score-Std. Dev.	102	.	100.05	.	100.6
ECA Proficient or Above	20	37.0%	23	42.6%	.

* Indicates that student records had missing data, therefore the denominator does not add up to the sample total of 54.

Table 5: English Treatment vs. Comparison

Fixed Effects	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		P < =0.05
Percent of Activities Completed	0.369	0.198	0.192	1.863	0.65



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