



Measuring the Impact of IXL Math and IXL Language Arts in New York State Schools

Introduction

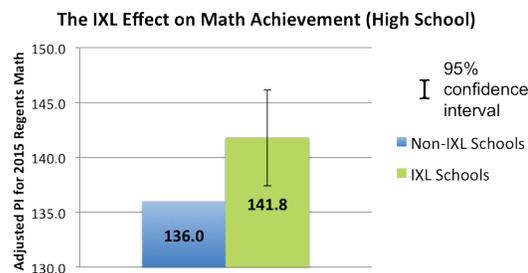
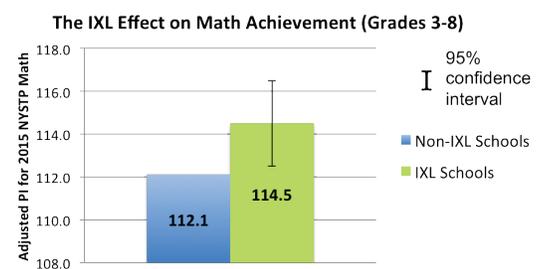
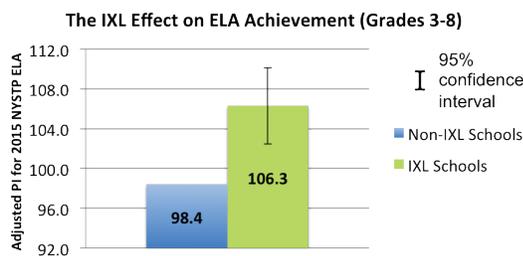
Research has shown that use of IXL can have a significant positive impact on student achievement for individual schools (Empirical Education, 2013). In this study, we compared state testing data from IXL schools and non-IXL schools across the entire state of New York. This approach allowed us to quantify the impact of IXL Math and IXL English Language Arts (ELA) on school performance and improvement as measured by state exams.

Abstract

This study investigated hundreds of public schools across New York State that used IXL Math and/or IXL ELA between 2012 and 2015. Using data from the New York State Testing Program (NYSTP) for elementary and middle schools and the Regents Exams for high schools, researchers examined student achievement and growth in both IXL schools and non-IXL schools. IXL usage by the schools in this study ranged from less than one minute per student, per week, to more than 30 minutes per student, per week. Even with the wide range in student usage, the study found statistically significant differences in both student achievement and growth, with IXL schools outperforming non-IXL schools on both measures. In addition, long-term use of IXL was shown to produce increasing gains over time.

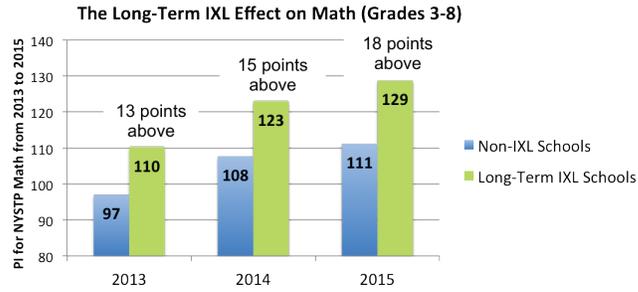
Key Findings

New York elementary and middle schools using IXL outperformed schools without IXL in both math and ELA. New York high schools using IXL Math also outperformed non-IXL schools on standardized tests for math.



Note: Since IXL ELA for high school students was not launched until 2015, our analysis does not include ELA at the high school level.

Schools using IXL Math for all three years demonstrated increasing gains over time.



SEPTEMBER 15, 2016

Study Design

Our researchers wanted to determine how using IXL impacts students’ academic achievement and academic growth at the school level. Achievement is measured by the students’ performance on the New York State standardized tests, while growth is measured by the change in performance on the standardized tests from one school year to another. To do this, we looked at state test results for schools before and after they implemented IXL. We used schools not implementing IXL as a control.

The study used a pretest-posttest control group design to measure the impact of IXL. This type of study evaluates the treatment effect by comparing the performance of the treatment group and the control group on the posttest, after adjusting for their performance on the pretest. The treatment group included schools that started using IXL for the first time in either the 2013-14 or 2014-15 school years (called “new IXL schools”). The control group did not use IXL during the 2012-13, 2013-14, or 2014-15 school years.

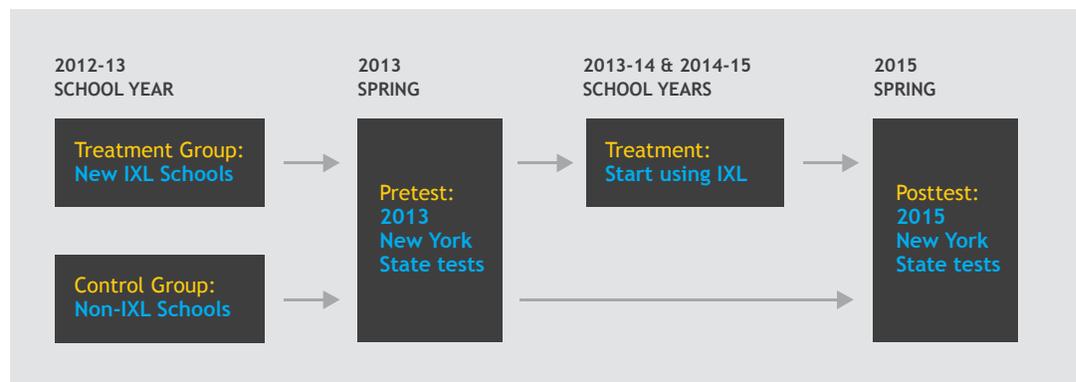


Figure 1. Pretest-Posttest Study Design

Schools that used IXL in the 2012-13, 2013-14, and 2014-15 school years were considered “long-term IXL schools.” As shown in Figure 2, the study used a longitudinal design to compare performance between long-term IXL schools and non-IXL schools on Test 1, Test 2, and Test 3 simultaneously, after controlling for school characteristics. The IXL effect is indicated by comparing the change in performance from Test 1 to Test 2 and from Test 2 to Test 3 in both long-term IXL schools and non-IXL schools.

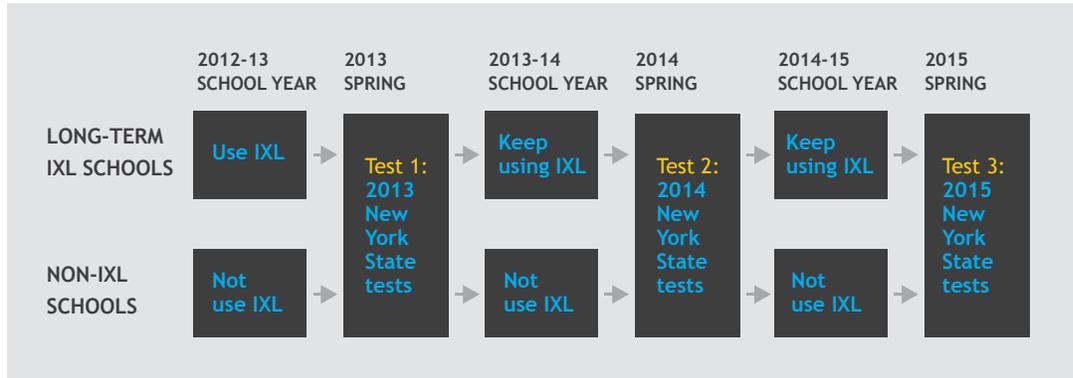


Figure 2. Longitudinal Study Design

Data for the study came from two New York State standardized tests: 1) the New York State Testing Program (NYSTP) for students in grades 3 through 8, and 2) the Regents Exams for high school students. NYSTP measures elementary and middle school students’ mastery of the Common Core State Standards (CCSS) in math and ELA. Regents Exams assess high school students’ mastery of New York State Learning Standards in math and ELA. Schools’ performance was measured using the Performance Index (PI) calculated by the New York State Department of Education. PI values range from 0 to 200.

Methodology

The study analyzed pretest and posttest results for 4,973 public schools, including both traditional public schools and charter schools within New York State. A total of 833 New York State public schools used IXL Math and/or IXL ELA between 2012 and 2015. As the number of students who practiced on IXL within a school ranged from one single classroom to the entire school, this study counted a school as an “IXL school” within a particular school year if the school had an active IXL account during this school year and at least half of the students enrolled at the school practiced on IXL. (See Appendix A for details on IXL school selection and classification.) As a result, the analysis included 198 elementary and middle schools and 26 high schools using IXL Math and 39 elementary and middle schools using IXL ELA.

Our researchers obtained school performance data from the New York State Department of Education and the Institute of Education Science. They then used a linear regression model to calculate the IXL effect on student achievement—i.e., the difference between IXL schools and non-IXL schools on the 2015 PI, after controlling for factors such as prior performance, school size, and location. The IXL effect on student growth was then evaluated by comparing the PI change from 2013 to 2015 between new IXL schools and non-IXL schools. To evaluate the IXL effect over time for long-term IXL schools, a linear mixed effect model was used to compare the performance of long-term IXL schools and non-IXL schools on the state tests in all three years, after controlling for factors such as school size and location. (See Appendix C for a detailed explanation of the analytical methods.)

This form of analysis allowed us to answer two key questions:

- For new IXL schools, what is the IXL effect on students' academic achievement and growth? In other words, how much did new IXL schools outperform non-IXL schools, and how much more did new IXL schools improve compared to non-IXL schools?
- For long-term IXL schools, what is the IXL effect on students' achievement over time? That is, did IXL schools continuously show more growth than non-IXL schools from year to year?

Results

Analysis of the data showed that IXL produced positive and statistically significant effects on student achievement and growth in both math and ELA for new IXL schools in New York State, indicating there is a high probability that similar schools using IXL would achieve similar results. In addition, for schools that used IXL for more than three years, our analysis found a significantly higher performance gain than in similar non-IXL schools.

The Effect of IXL ELA

The implementation of IXL ELA had a statistically significant effect on schools' achievement and growth in ELA across grades 3 to 8.

Researchers first looked at student achievement. After adjusting for prior ELA performance and school characteristics, new IXL schools had, on average, a PI 7.9 points higher than that of non-IXL schools. The 95% confidence interval in the figure below suggests that if an average non-IXL school (with an adjusted PI¹ of 98.4) had used IXL ELA for at least one school year, there is a 95% chance that the school would receive a PI between 102.5 and 110.1.

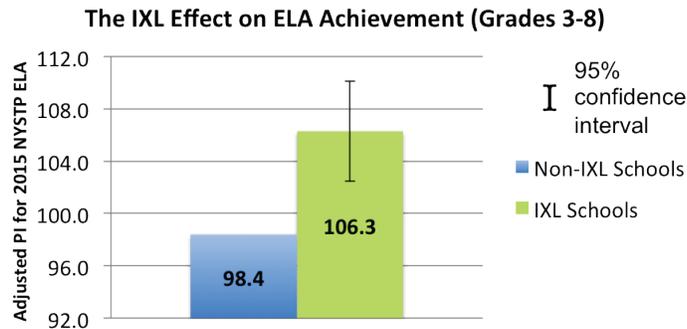


Figure 3. The Effect of IXL ELA on Student Achievement for Grades 3 to 8

Schools using IXL ELA also showed a greater improvement in PI from one year to another. New IXL schools increased their PI by an average of 4.6 points from 2013 to 2015, compared to an average 2.1 point decrease for non-IXL schools over the same time period. Considered another way, 69.2% of new IXL schools improved or maintained their ELA performance, compared to just 47.7% of non-IXL schools.

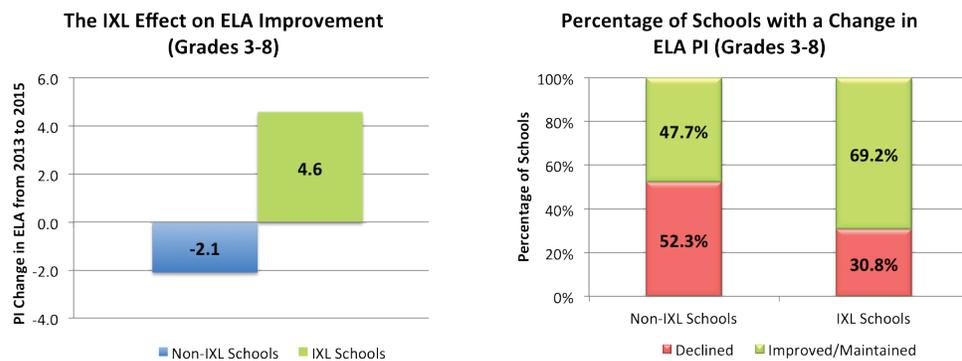


Figure 4. The Effect of IXL ELA on Student Growth for Grades 3 to 8

¹ Adjusted PI: the PI after adjusting for the differences in prior performance and school characteristics between new IXL schools and non-IXL schools.

The Efficacy of IXL Math in Elementary and Middle School

The use of IXL Math also showed a statistically significant effect on schools' achievement and growth in math across grades 3 to 8.

In terms of achievement, the average PI for new IXL schools was 2.4 points higher than the average PI for non-IXL schools, after adjusting for schools' prior performance and characteristics. The 95% confidence interval suggests that if an average non-IXL school (with an adjusted PI of 112.1) had used IXL Math for at least one school year, there is a 95% chance that the school would receive a PI between 112.5 and 116.6.

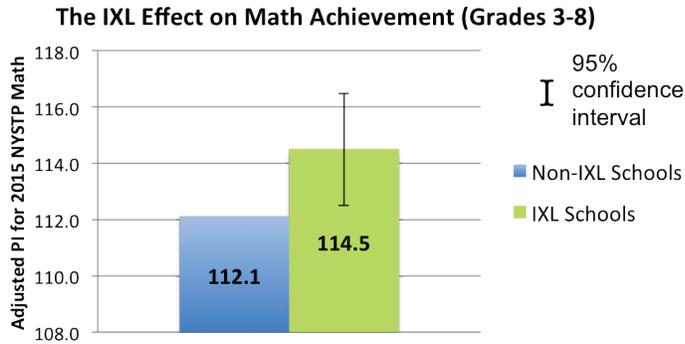


Figure 5. The Effect of IXL Math on Student Achievement for Grades 3 to 8

After analyzing the change in math PI from year to year for elementary and middle schools, the study showed that new IXL schools increased their PI by an average of 18.8 points from 2013 to 2015, compared to an average 14.1 point increase for non-IXL schools. The percentage of new IXL schools that improved or maintained their math performance was 87.4%, which is 1.9 percentage points higher than for non-IXL schools.

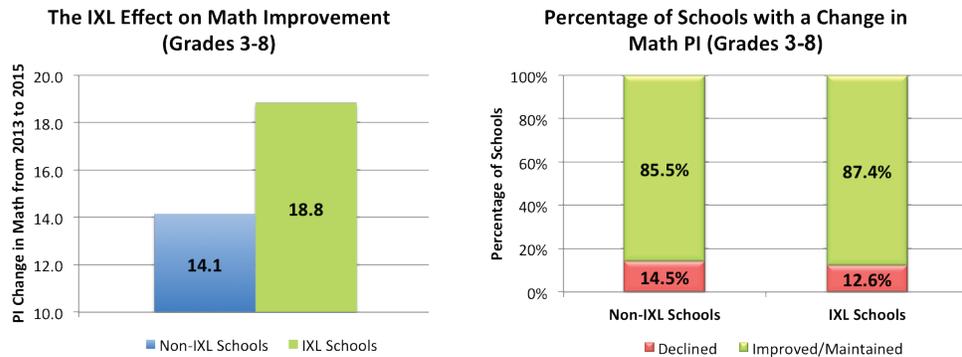


Figure 6. Effect of IXL Math on Student Growth for Grades 3 to 8

The Efficacy of IXL Math in High School

The use of IXL Math showed a statistically significant effect on math achievement and growth for high schools.

The PI for an average new IXL high school was 5.8 points higher than the PI for a non-IXL high school with similar prior performance and characteristics. The 95% confidence interval indicates that if an average non-IXL school with an adjusted PI of 136.0 had used IXL Math, there is a 95% chance that the school would receive a PI between 137.4 and 146.2.

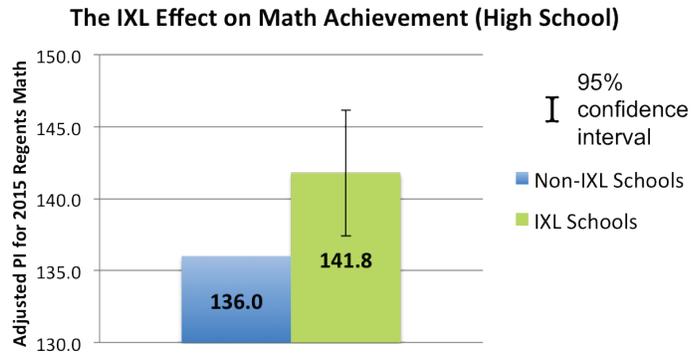


Figure 7. The Effect of IXL Math on Student Achievement for High Schools

In terms of improvement, new IXL high schools increased their PI, on average, 8.9 points from 2013 to 2015, which is significantly higher than the 3.3 point average increase for non-IXL schools. The percentage of new IXL schools that improved or maintained their math performance was 84.6%, compared to 64.6% of non-IXL schools.

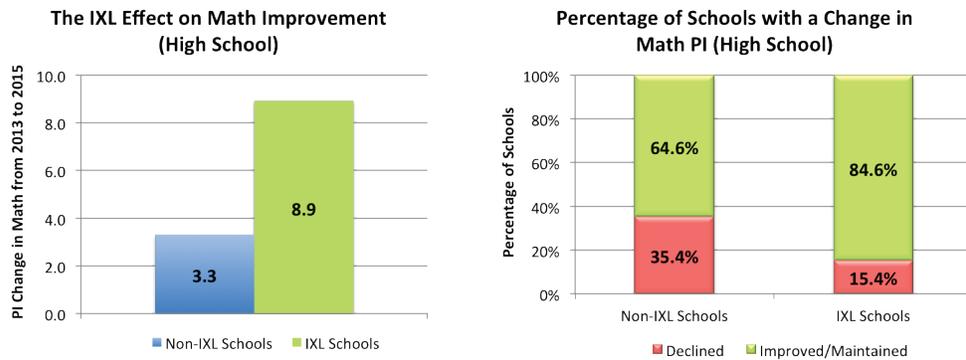


Figure 8. The Effect of IXL Math on Student Growth for High Schools

The Long-Term Effect of IXL Math in Elementary and Middle School

Researchers also looked at the long-term effect of IXL Math on IXL schools that have been using the program for at least three school years. In 2013, long-term IXL schools outperformed non-IXL schools by 13 points on PI. The performance gap increased to 15 points in 2014 and to 18 points in 2015. The analysis showed a statistically significant interaction effect between school and time, suggesting that the longer schools use IXL, the more they will benefit.

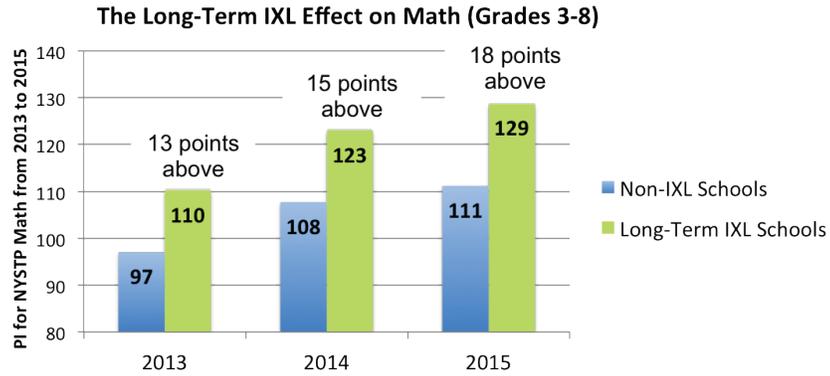


Figure 9. The Long-Term Effect of IXL Math for Grades 3 to 8

Reference

Empirical Education (2013). A Study of Student Achievement, Teacher Perceptions, and IXL Math. Retrieved from <https://www.ixl.com/research/IXL-Research-Study-2013.pdf>

What Works Clearinghouse (2014). What Works Clearinghouse procedures and standards handbook (Version 3.0). Retrieved from http://ies.ed.gov/ncee/wwc/pdf/reference_resources/wwc_procedures_v3_0_standards_handbook.pdf

Appendix A: IXL School Identification

This study determined if a school is an IXL school based only on the number of students using IXL. Because a school may choose to use one IXL subject (i.e., math or ELA) or both subjects for one year or longer, this study defined schools as IXL schools for each IXL subject and for each school year separately.

For each subject and each school year, a school is considered to be using IXL if: 1) the school has an active IXL account on this subject within this school year, and 2) at least 50% of the enrolled students have practiced on IXL within this school year.

For each subject, a school is identified as a *new IXL school* if the school: 1) used IXL for this subject within the 2013-14 school year and/or within the 2014-15 school year, and 2) did not use IXL for this subject within the 2012-13 school year.

For each subject, a school is identified as a *long-term IXL school* if the school used IXL for this subject within the 2012-13, 2013-14, and 2014-15 school years.

For each subject, a school is identified as a *non-IXL school* if the school did not use IXL for this subject within the 2012-13, 2013-14, or 2014-15 school years.

**Appendix B:
Schools'
Background
Information**

Table 1 shows the background information for all public schools in New York State and for IXL schools.

Table 1. Background Information for New York State and IXL Schools

	State	IXL ELA	IXL Math		
		New IXL Schools (E/M)	New IXL Schools (E/M)	New IXL Schools (H)	Long-Term IXL Schools (E/M)
# of schools	4,973	39	198	26	187
2013 PI: Grades 3-8 ELA	100	96	-	-	-
2013 PI: Grades 3-8 Math	99	-	108	-	110
2013 PI: High School Math	130	-	-	141	-
2015 PI: Grades 3-8 ELA	98	100	-	-	-
2015 PI: Grades 3-8 Math	114	-	127	-	129
2015 PI: High School Math	134	-	-	150	-
% of ELLs	8%	7%	6%	4%	5%
% of schools in cities	44%	28%	22%	23%	16%
% of schools in suburbs	32%	26%	46%	31%	38%
% of schools in towns	8%	5%	11%	4%	12%
% of schools in rural areas	16%	41%	21%	42%	34%
% of charter schools	5%	10%	7%	8%	3%

*Note: E/M = Elementary/Middle school level H = High school level PI = Performance Index
ELL = English Language Learner*

Appendix C: Analytical Methods

To estimate the IXL effect on student achievement for new IXL schools, a linear regression model was used to calculate the difference on 2015 PI between new IXL schools and non-IXL schools, after adjusting for schools' prior academic performance (i.e., 2013 PI), school size (i.e., the number of enrolled students), percentage of English Language Learners (ELLs), school type (i.e., charter school or traditional public school), and school location (i.e., city, suburb, town, or rural area). To assist in the interpretation of the IXL effect, we reported statistical significance, effect size, and percentile gain. Statistical significance, also referred to as *p*-value, is the probability that the IXL effect is zero. A small *p*-value (e.g., less than 0.05) indicates strong evidence that the IXL effect is not zero. Effect size is the mean difference in standard deviation units and is known as Hedges' *g*. In this study, effect size is computed using adjusted mean and unadjusted standard deviations. Percentile gain is the expected change in percentile rank for an average non-IXL school if the school had used IXL. It is calculated based on the effect size. More details about these analytical methods can be found in What Works Clearinghouse (2014).

The IXL effect on student growth for new IXL schools was evaluated by another linear regression model. The model regressed the PI change from 2013 to 2015 on the school group (i.e., new IXL schools or non-IXL schools). The statistical significance was reported to assist in the interpretation of the results.

To evaluate the IXL effect for long-term IXL schools, a linear mixed effect model was adopted to detect the performance difference (i.e., PI difference) between long-term IXL schools and non-IXL schools on the New York State tests in all three years, after controlling for school size (i.e., the number of enrolled students), percentage of ELLs, school type (i.e., charter school or traditional public school), and school location (i.e., city, suburb, town, or rural area). The statistical significance was also reported.

Appendix D:
Data Tables

Table D1. The Efficacy of IXL ELA and IXL Math on School Achievement

Values	ELA	Math	
	Grades 3-8	Grades 3-8	High School
Number of IXL Schools	39	198	26
Number of Non-IXL Schools	3,345	2,711	972
The IXL Effect	7.91***	2.38*	5.79*
Effect Size	0.24	0.06	0.18
Percentile Gain	9.48%	2.43%	7.15%
Adjusted Average 2015 PI for IXL Schools	106.30	114.49	141.79
Adjusted Average 2015 PI for Non-IXL Schools	98.38	112.11	136.00

Note: *: significant at .05 level. **: significant at .01 level. ***: significant at .001 level.

Table D2. The Efficacy of IXL ELA and IXL Math on School Improvement

Values	ELA		Math			
	Grades 3-8		Grades 3-8		High School	
	IXL Schools	Non-IXL Schools	IXL Schools	Non-IXL Schools	IXL Schools	Non-IXL Schools
Number of Schools	39	3,345	198	2,711	26	972
Average 2013 PI	95.90	100.55	108.09	97.05	141.46	132.46
Average 2015 PI	100.46	98.45	126.92	111.20	150.38	135.77
Average PI Change from 2013 to 2015	4.56	-2.10	18.83	14.15	8.92	3.31
p-value	0.00		0.02		0.01	

Table D3. The Long-Term Effect of IXL Math at Elementary/Middle School Level

Values	Number of Schools	2013 PI	2014 PI	2015 PI
IXL Schools	187	110.20	122.98	128.72
Non-IXL Schools	2,709	97.03	107.72	111.19
Year by Group Interaction	5.01***			

Note: ***: significant at .001 level.