



# Measuring the Impact of IXL Math and IXL Language Arts in Illinois Schools

## Peer Review

This study was peer reviewed and presented at the 2017 Annual Meeting of the American Educational Research Association in San Antonio, TX.

## Introduction

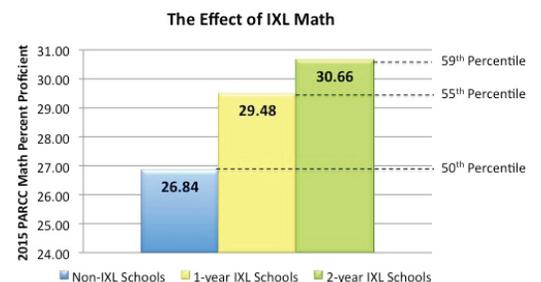
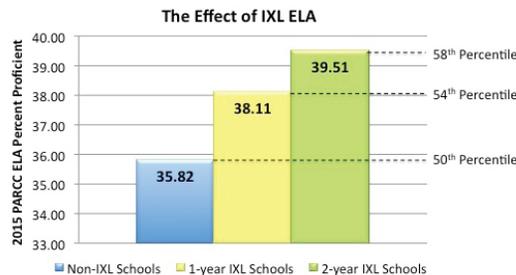
Previous research has shown that IXL can have significant impact at an individual school or district (Empirical Education, 2013). In this particular study, we examine the effect of IXL on a broader scale, namely, the entire state of Illinois. Investigating such a large group of schools allows us to measure whether IXL schools perform better than non-IXL schools, as well as understand how usage of IXL can improve students' proficiency on state exams.

## Abstract

This study investigated hundreds of public schools in the state of Illinois that used IXL Math or English Language Arts (ELA) between 2013 and 2015. We measured the impact of IXL Math and IXL ELA based on scores from the 2015 Partnership for Assessment of Readiness for College and Careers (PARCC). Scores from the 2013 Illinois Standards Achievement Test (ISAT) were used to control for schools' performance prior to using IXL. IXL usage by the schools in this study ranged from one minute per student, per week, to over 45 minutes per student, per week. Even with the wide range in usage, our researchers found strong positive correlation between IXL usage and schools' performance on the PARCC tests in both math and ELA. These results are statistically significant.

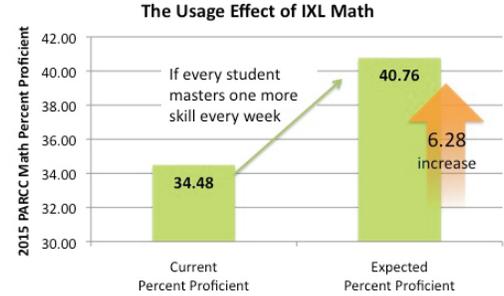
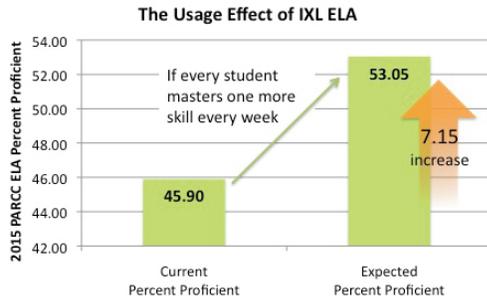
## Key Findings

IXL schools performed better than non-IXL schools in both math and ELA. The longer a school used IXL, the better they performed.

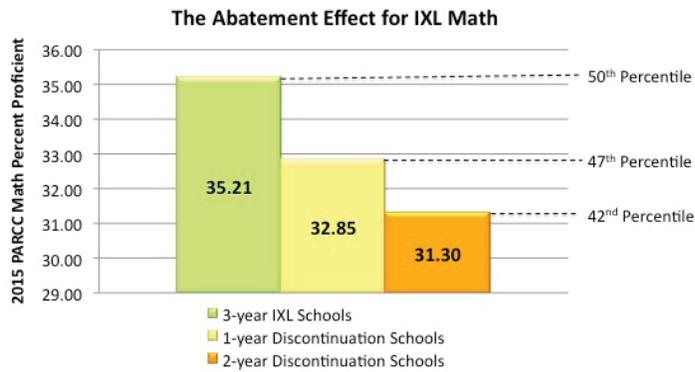


## The IXL Effect

A little practice goes a long way. If every student at a school completed just one more IXL skill per week during the school year, the school's proficiency rate on the PARCC tests would increase by 7 percent in ELA and by 6 percent in math.



Schools that discontinued IXL usage showed a statistically significant performance drop on the PARCC tests after they had ceased using IXL for two school years.



MAY 30, 2016

## Study Design

Our researchers wanted to determine the effect of IXL on student achievement at the school level, as measured by the percentage of students in the school meeting proficiency goals set by the state. To do this, we looked at state test results for schools before and after implementing IXL. We used schools not implementing IXL as a control.

This study adopted a pretest-posttest control group design (see Figure 1a), which 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 in the 2013-14 or 2014-15 school years. The control group consisted of schools that did not use IXL in the 2012-13, 2013-14, or 2014-15 school years.

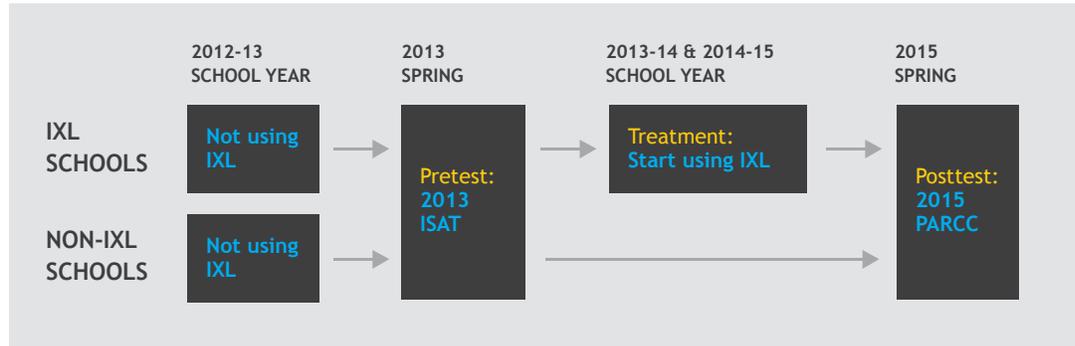


Figure 1a. Study Design for IXL Effect

Another pretest-posttest control group design (see Figure 1b) was used to calculate the abatement effect of IXL. The abatement effect is the performance difference on the posttest between schools that used IXL for at least three school years and schools that used IXL in the 2012-13 school year but discontinued IXL usage in the 2013-14 or 2014-15 school years, after adjusting for schools' performance on the pretest.

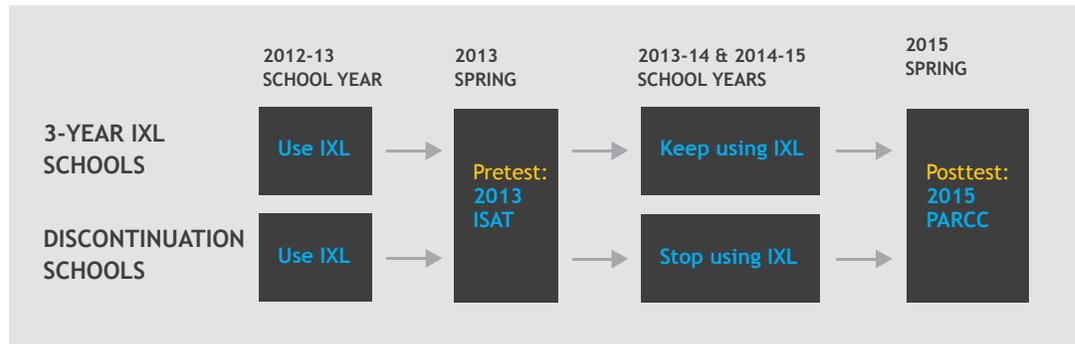


Figure 1b. Study Design for Abatement Effect

The 2013 Illinois Standards Achievement Test (ISAT) was used as a pretest to determine the baseline performance for all schools. ISAT was the Illinois state standardized test for elementary and middle school students from 1999 to 2014. It was developed specifically to assess students' knowledge of the Illinois content standards in mathematics, ELA, and science.

In spring 2015, PARCC replaced ISAT as Illinois's new state standardized test and was used as the posttest in this study. PARCC assesses student achievement on the New Illinois Learning Standards, incorporating the Common Core State Standards for math and ELA. It is administered to students in grades 3 through 8.

## Methodology

This study analyzed data from 3,764 Illinois public schools, among which, 817 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 a single classroom to the entire school and from one school year to multiple years, this study defined a school as an “IXL school” if the school started to use IXL in the 2013-14 or 2014-15 school years and if at least 50% of the students enrolled at the school practiced on IXL (see Appendix A for details on the definitions of IXL school, non-IXL school, 3-year IXL school, and discontinuation school). Based on these criteria, the analysis included 268 schools using IXL Math and 164 schools using IXL ELA. (See Appendix B for demographic information on IXL schools.)

Two sets of data were used in this study: school performance data and IXL usage data. School performance data was obtained from the Illinois State Board of Education and the Institute of Education Science.

Our researchers used a linear regression model to calculate the IXL effect—i.e., the performance difference between IXL schools and non-IXL schools on the 2015 PARCC tests, after controlling for factors such as prior performance, school size, and location. We used another linear regression model to estimate the strength of association between IXL usage and school performance. A third linear regression model was used to calculate the abatement effect of IXL, which is the performance difference between 3-year IXL schools and discontinuation schools, after controlling for factors such as prior performance, school size, and location. (See Appendix C for a detailed explanation of the analytical methods.)

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

1. Did schools that used IXL perform better on the 2015 PARCC tests than schools that did not use IXL?
2. Is IXL usage associated with school performance? That is, if a school had increased IXL usage, how much improvement would be expected for the school?
3. Did schools that discontinued IXL usage show a performance drop on the 2015 PARCC tests?

## Results

Results showed that IXL produced positive and statistically significant effects on student performance in both math and ELA across grades 3 through 8, indicating there is a high probability that similar schools using IXL would achieve similar results. The effect of IXL was even larger when schools used IXL for two years as opposed to just one year. A positive association was also found between IXL usage and school performance. In particular, one additional skill mastered per student, per week, was associated with an expected 7.15 percent increase on a school’s percent proficient in ELA and a 6.28 percent increase in math on the 2015 PARCC tests. In addition, schools that discontinued IXL usage showed a statistically significant performance drop after they had ceased to use IXL for two school years.

## The Efficacy of IXL ELA

The use of IXL ELA had a statistically significant effect on schools’ performance on the 2015 PARCC ELA tests across grades 3 through 8, after adjusting for schools’ prior performance and characteristics (see Appendix D, Table 2 for details).

As shown in Figure 2, the adjusted percent proficient<sup>1</sup> for 2-year IXL schools, 1-year IXL schools, and non-IXL schools was 39.51, 38.11, and 35.82, respectively, on the 2015 PARCC ELA tests. At 1-year IXL schools, on average, 2.29 percent more students met or exceeded expectations on the 2015 PARCC ELA tests than similar non-IXL schools. The 2.29 percent difference corresponds to a percentile gain of 4 points in school rankings. At 2-year IXL schools, on average, 3.69 percent more students met or exceeded expectations than similar non-IXL schools. The 3.69 percent difference corresponds to a percentile gain of 8 points. That is, if an average non-IXL school (at the 50th percentile) had used IXL ELA for two school years, the school’s percent proficient would be expected to increase 3.69 percent and rank at the 58th percentile.

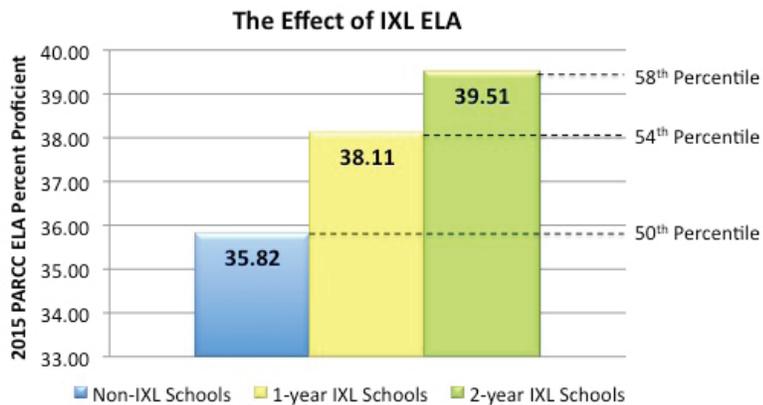


Figure 2. The Overall Effect of IXL ELA

<sup>1</sup> Adjusted percent proficient: the percentage of students that met or exceeded expectations after adjusting for the differences in prior performance and school characteristics between IXL schools and non-IXL schools.

Figure 3 shows a positive and statistically significant association between the usage of IXL ELA and 2015 PARCC ELA test performance. In this study, the usage of IXL ELA was measured by the average number of ELA skills mastered by each student within a week. The results suggest that, for an average IXL school, if every student mastered one more IXL ELA skill every week, the school could expect 7.15 percent more students to meet or exceed expectations on the 2015 PARCC ELA tests.

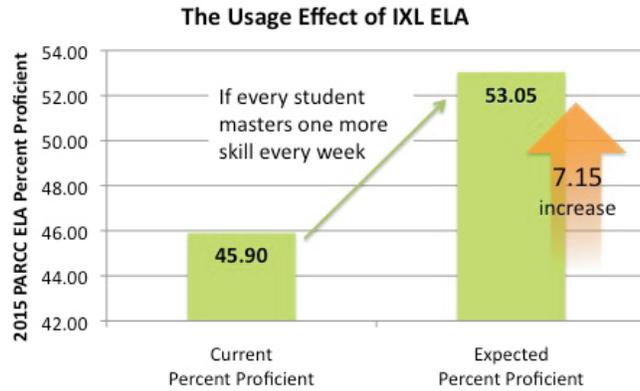


Figure 3. The Usage Effect of IXL ELA

### The Efficacy of IXL Math

IXL Math also had a statistically significant effect on schools' 2015 PARCC performance in math across grades 3 through 8, after adjusting for schools' prior performance and characteristics (see Appendix D, Table 2 for details).

As shown in Figure 4, the adjusted percent proficient for 2-year IXL schools, 1-year IXL schools, and non-IXL schools was 30.66, 29.48, and 26.84, respectively, on the 2015 PARCC math tests. At 1-year IXL schools, on average, 2.64 percent more students met or exceeded expectations on the 2015 PARCC math tests than similar non-IXL schools. The 2.64 percent difference corresponds to a percentile gain of 5 points. At 2-year IXL schools, on average, 3.82 percent more students met or exceeded expectations than similar non-IXL schools. The percentile gain is 9 points. That is, if an average non-IXL school (at the 50th percentile) had used IXL Math for two school years, the school's percent proficient would be expected to increase 3.82 percent and rank at the 59th percentile.

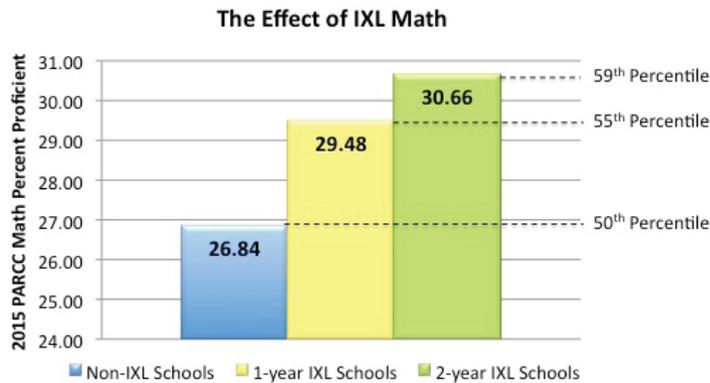


Figure 4. The Overall Effect of IXL Math

Figure 5 shows a positive and statistically significant association between the usage of IXL and 2015 PARCC math test performance. In this study, the usage of IXL Math was measured by the average number of math skills mastered by each student within a week. The results suggest that, for an average IXL school, if every student mastered one more IXL Math skill every week, the school could expect 6.28 percent more students to meet or exceed expectations on the 2015 PARCC math tests.

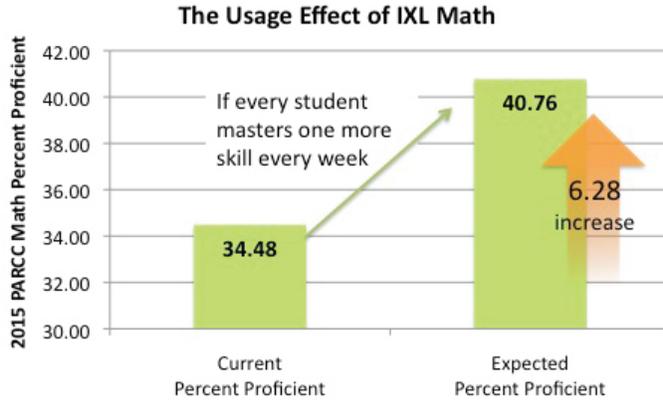


Figure 5. The Usage Effect of IXL Math

### The Abatement Effect for IXL Math

As presented in Figure 6, discontinuation schools showed a lower performance on the 2015 PARCC math tests than similar 3-year IXL schools across grades 3 through 8, after adjusting for schools' prior performance and characteristics (see Appendix D, Table 3 for details).

For schools that discontinued IXL Math usage for one school year, the performance drop was not statistically significant. However, for schools that discontinued IXL Math usage for two school years, the drop became statistically significant. After adjusting for schools' prior performance and characteristics, 2-year discontinuation schools, on average, had 3.91 percent fewer students meet or exceed expectations on the 2015 PARCC math tests. The percentile rank decrease is 8 points. That is, if an average 3-year IXL school (at the 50th percentile) had discontinued IXL Math usage for two school years, the school's percent proficient is expected to drop 3.91 percent and rank at the 42nd percentile.

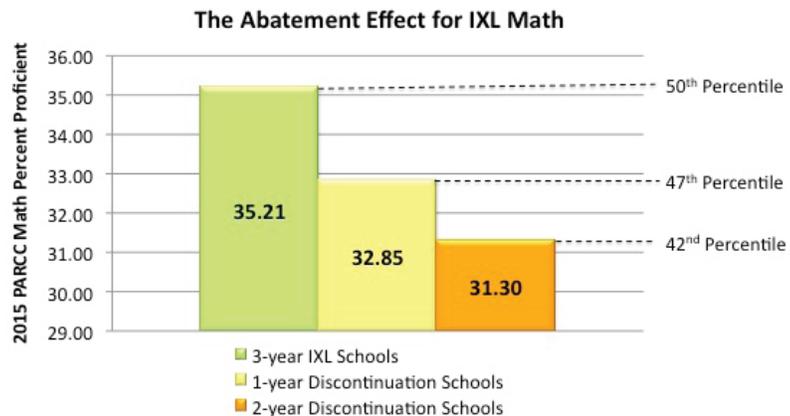


Figure 6. The Abatement Effect for IXL Math

## Conclusion

IXL Math and IXL ELA produced measurable benefit for schools at all grade levels tested (see Appendix D, Table 4 for details). As shown in Figures 7 and 8, the effect is statistically significant at most grade levels. And the results appear to be “dose dependent”; that is, the more students use IXL, the greater the benefit seen. In addition, schools that discontinued IXL usage showed a drop in performance after they had ceased to use IXL for two school years.

These results indicate that IXL is a highly effective program for schools seeking to increase student achievement in math and ELA.

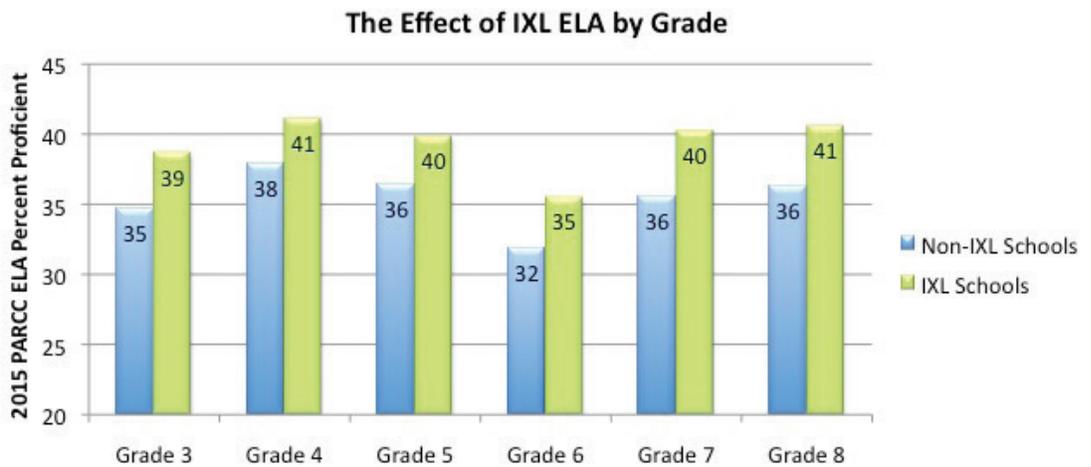


Figure 7. The Effect of IXL ELA by Grade

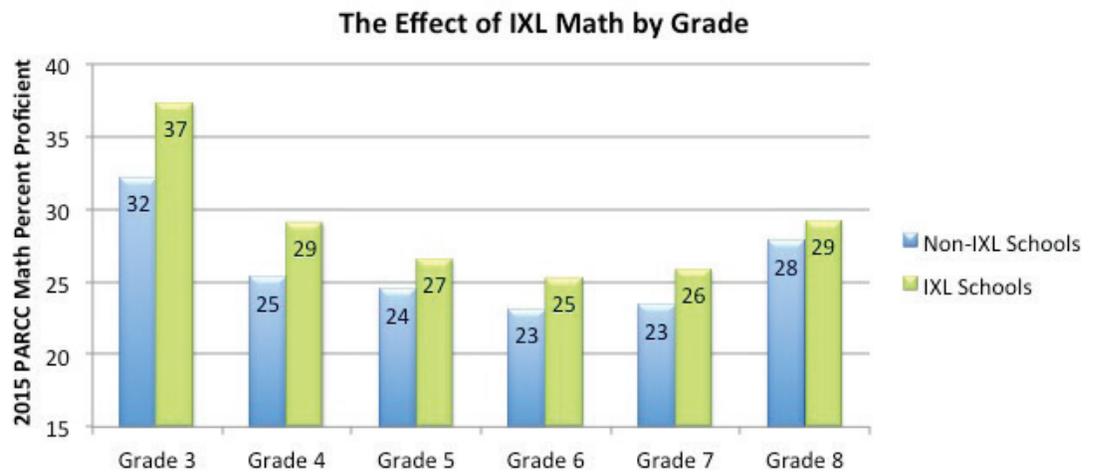


Figure 8. The Effect of IXL Math by Grade

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

For a certain subject, a school is identified as an 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 a certain 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.

For a certain subject, a school is identified as a 3-year IXL school if the school used IXL for this subject within the 2012-13, 2013-14, and 2014-15 school years.

For a certain subject, a school is identified as a discontinuation school if the school: 1) used IXL for this subject within the 2012-13 school year, and 2) discontinued IXL usage in the 2013-14 or 2014-15 school years.

## Appendix B: Schools’ Background Information

Table 1 shows the background information for all public schools in Illinois and for IXL schools. A total of 164 and 268 schools were identified as IXL schools for IXL ELA and IXL Math, respectively. The 2013 ISAT percent proficient and the 2015 PARCC percent proficient indicate that IXL schools performed better than the state average.

**Table 1. Background Information for State and IXL Schools**

	State	IXL Schools IXL ELA	IXL Schools IXL Math
# of schools	3,764	164	268
2013 ISAT ELA percent proficient (Grades 3-8)	59%	62%	-
2013 ISAT Math percent proficient (Grades 3-8)	59%	-	62%
2015 PARCC ELA percent proficient (Grades 3-8)	38%	41%	-
2015 PARCC Math percent proficient (Grades 3-8)	29%	-	33%
% of schools in cities	24%	25%	33%
% of schools in suburbs	42%	47%	40%
% of schools in towns	14%	9%	8%
% of schools in rural areas	20%	20%	19%

*Note: Among the IXL schools referenced above, 49 schools used both IXL Math and ELA.*

## Appendix C: Analytical Methods

A linear regression model was used to calculate the IXL effect (i.e., the performance difference between IXL schools and non-IXL schools on the 2015 PARCC tests), after adjusting for schools’ prior academic performance (i.e., 2013 ISAT results), school size (i.e., the number of enrolled students), and school location (i.e., city, suburb, town, or rural). 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).

We used another linear regression model to estimate the strength of association between IXL usage and school performance. This regression model was very similar to the one described above, but it included IXL usage (i.e., the average number of skills a student mastered every week) in the model and excluded non-IXL schools in the sample.

We also used a linear regression model to calculate the abatement effect of IXL Math, which is the performance difference between 3-year IXL schools and discontinuation schools on the 2015 PARCC tests, after adjusting for schools' prior academic performance, school size, and school location. Similar to the regression model that was used to calculate the IXL effect, we also reported statistical significance, effect size, and percentile gain to assist in the interpretation of the abatement effect.

Appendix D:  
Data Tables

**Table 2.** The Efficacy of IXL ELA and Math

Values	ELA		Math	
	1-year	2-year	1-year	2-year
# of IXL Schools	79	30	101	128
# of Non-IXL Schools	2,766		2,325	
IXL Effect	2.29*	3.69*	2.64**	3.82***
Effect Size	0.10	0.20	0.11	0.22
Percentile Gain	3.93%	7.90%	4.51%	8.58%
Adjusted Average 2015 PARCC Percent Proficient for IXL Schools	38.11%	39.51%	29.48%	30.66%
Adjusted Average 2015 PARCC Percent Proficient for Non-IXL Schools	35.82%		26.84%	

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

**Table 3.** The Abatement Effect for IXL Math

Values	Math	
	1-year discontinuation	2-year discontinuation
# of Discontinuation Schools	30	30
# of 3-year IXL Schools	208	
Abatement Effect	2.36	3.91*
Effect Size	0.07	0.21
Percentile Gain	-2.89%	-8.17%
Adjusted Average 2015 PARCC Percent Proficient for Discontinuation Schools	32.85%	31.30%
Adjusted Average 2015 PARCC Percent Proficient for 3-year IXL Schools	35.21%	

Note: \*: significant at .05 level.

**Table 4. The Effect of IXL at Each Grade Level**

Subjects	Values	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
The Effect of IXL ELA	# of IXL Schools	87	92	86	56	34	36
	# of Non-IXL Schools	1,952	1,885	1,816	1,401	1,244	1,233
	IXL Effect	4.01**	3.18*	3.35*	3.59*	4.70*	4.33
	Effect Size	0.21	0.16	0.17	0.18	0.23	0.21
	Percentile Gain	8.18%	6.24%	6.76%	7.16%	9.15%	8.46%
	Percent Proficient for IXL Schools	38.68%	41.10%	39.81%	35.49%	40.23%	40.56%
	Percent Proficient for Non-IXL Schools	34.67%	37.92%	36.45%	31.89%	35.53%	36.23%
The Effect of IXL Math	# of IXL Schools	196	189	199	163	149	130
	# of Non-IXL Schools	1,611	1,580	1,519	1,177	1,037	1,031
	IXL Effect	5.11***	3.86***	2.10*	2.21*	2.48*	1.44
	Effect Size	0.26	0.20	0.11	0.12	0.14	0.08
	Percentile Gain	10.12%	8.00%	4.56%	4.86%	5.57%	3.00%
	Percent Proficient for IXL Schools	37.35%	29.17%	26.60%	25.33%	25.90%	29.29%
	Percent Proficient for Non-IXL Schools	32.24%	25.32%	24.50%	23.13%	23.43%	27.85%

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