



# Measuring the Impact of IXL Math and IXL Language Arts in Massachusetts

## Introduction

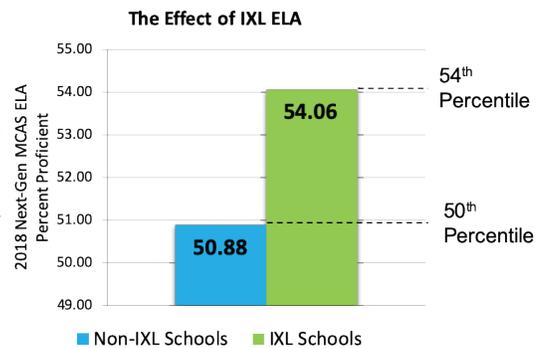
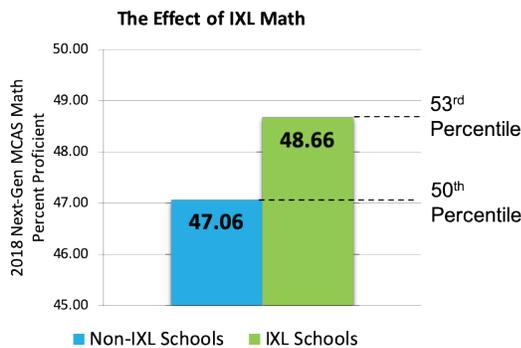
Previous research has shown that the use of IXL has a significant impact on student achievement for an individual school (Empirical Education, 2013). In this study, we explore IXL usage across the entire state of Massachusetts. Examining such a large sample of schools allows us to quantify the impact of IXL Math and IXL English Language Arts (ELA) on school performance as measured by Massachusetts state exams.

## Abstract

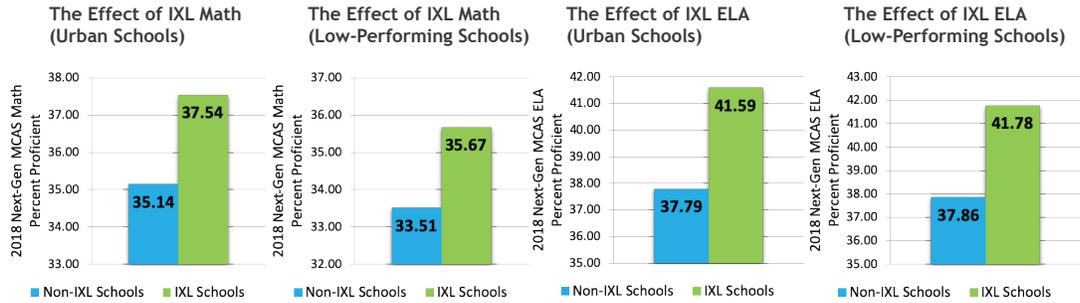
This study investigated hundreds of public schools in the state of Massachusetts that used IXL Math or IXL ELA between 2017 and 2018. Using data from the 2018 Next-Generation Massachusetts Comprehensive Assessment System (Next-Gen MCAS), researchers examined student achievement in both IXL schools and non-IXL schools. Scores from the 2017 Next-Gen MCAS were used as the control for schools' performance prior to using IXL. IXL usage by the schools in this study ranged from less than one minute per student, per week, to nearly 80 minutes per student, per week. Even with the wide range in student usage, our researchers found a strong positive correlation between IXL usage and school performance. These results are statistically significant.

## Key Findings

Massachusetts schools using IXL outperformed schools without IXL in both math and ELA.



The IXL effect was even larger at urban schools and low-performing schools.



### The IXL Effect in Massachusetts Schools

MAY 20, 2019

### 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 used a pretest-posttest control group design (see Figure 1) 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 in the 2017-18 school year. The control group consisted of schools that did not use IXL in the 2016-17 or 2017-18 school years.

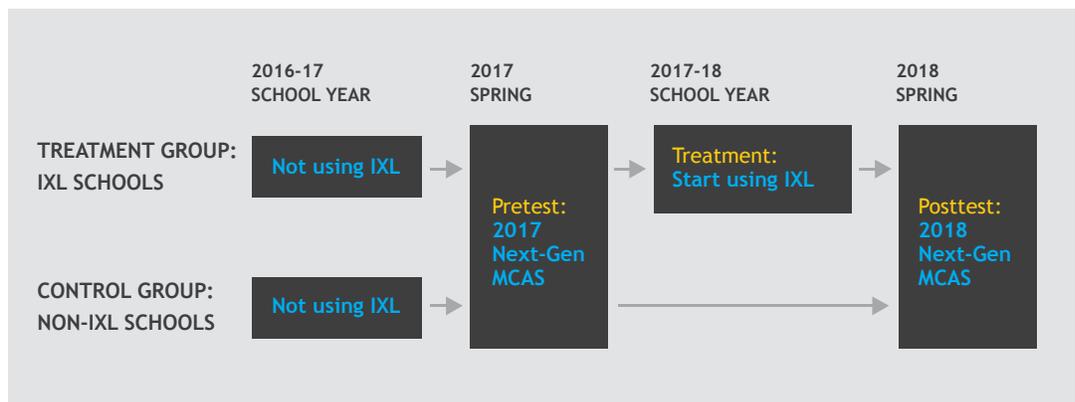


Figure 1. Study Design

The Next-Generation Massachusetts Comprehensive Assessment System (Next-Gen MCAS) was used as the pretest and the posttest in this study to determine the performance for all schools. The Next-Gen MCAS is an updated version of the previous MCAS and was designed to assess students on the Massachusetts learning standards in English language arts (ELA) and mathematics. Students in grades 3 through 8 have been taking the Next-Gen MCAS tests since 2017. The academic performance of each grade level within each school is evaluated based on the percentage of students who met or exceeded expectations (referred to as “percent proficient”).

### Methodology

The study analyzed data from 1,365 public schools in Massachusetts, including both traditional public schools and charter schools. A total of 571 public schools used IXL Math and/or IXL ELA during the 2017-18 school year. As the number of students who used IXL ranged from a single classroom to the entire school, this study defined a school as an “IXL school” at each grade level rather than the school level. A grade level cohort is identified as an IXL school if at least 70 percent of the students enrolled in the grade level practiced on IXL (see Appendix A for details on school selection and classification). Based on this criteria, 176 grade level cohorts from 116 schools were identified as IXL schools for IXL Math, and 58 grade level cohorts from 38 schools were identified as IXL schools for IXL ELA. Appendix B shows the characteristics of IXL schools and the state averages. The school performance and enrollment data were obtained from the state department of education websites and the Institute of Education Sciences.

Our researchers used multilevel linear models to calculate the IXL effect—i.e., the performance difference between IXL schools and non-IXL schools on the 2018 Next-Gen MCAS, controlling for factors such as prior performance, school size, percentage of English language learners, percentage of economically disadvantaged students, percentage of students in special education programs, and school location. Similar multilevel linear models were applied to elementary school levels (i.e., grades 3-5), middle school levels (i.e., grades 6-8), low-performing schools (i.e., schools with 2017 Next-Gen MCAS scores below the state average), and urban schools (i.e., schools located in urban areas). Another multilevel linear model was applied to compare the performance difference between IXL schools with different amounts of IXL usage. (See Appendix C for a detailed explanation of analytical methods.)

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

1. What is the IXL effect on student achievement? In other words, did IXL schools perform better on the 2018 Next-Gen MCAS tests than non-IXL schools?
2. What is the IXL effect for elementary schools, middle schools, low-performing schools, and urban schools?
3. What is the association between IXL usage and school performance?

## Results

Analysis of the data showed that the use of IXL had positive and statistically significant effects on school performance on the 2018 Next-Gen MCAS tests in both math and ELA, indicating there is a high probability that similar schools using IXL would achieve similar results. The IXL effect was even larger for low-performing schools and urban schools. Our analysis also showed a positive correlation between IXL usage and school performance. In particular, on the 2018 Next-Gen MCAS tests, schools with at least two IXL skills proficient per student, per week, outperformed schools with fewer skills proficient on IXL.

## The Efficacy of IXL Math

The implementation of IXL Math showed a statistically significant effect on schools' performance on the 2018 Next-Gen MCAS math tests across grades 3 through 8 (see Appendix D, Table D1 for details).

Figure 2 shows that the adjusted percent proficient<sup>1</sup> was 47.06 for non-IXL schools and 48.66 for IXL schools. The 1.60 percent difference corresponds to a percentile gain of 3 points in school ranking. That is, if an average non-IXL school (at the 50th percentile) had begun using IXL Math in the 2017-18 school year, the school's percent proficient would be expected to increase 1.60 percent, putting the school at the 53rd percentile.

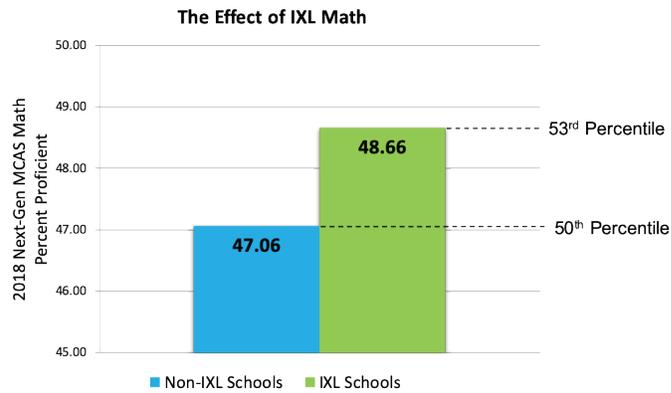


Figure 2. The Effect of IXL Math on the 2018 Next-Gen MCAS

<sup>1</sup> Adjusted percent proficient: the percentage of students who met or exceeded expectations on the 2018 Next-Gen MCAS, after adjusting for differences in prior performance and school characteristics between IXL schools and non-IXL schools.

Figure 3 shows the effect of IXL Math at the elementary school level (i.e., grades 3-5) and at the middle school level (i.e., grades 6-8). For elementary schools, the IXL effect is 1.08 points, corresponding to a 2-point percentile gain. For middle schools, the IXL effect is 1.95 points, corresponding to a 4-point percentile gain.

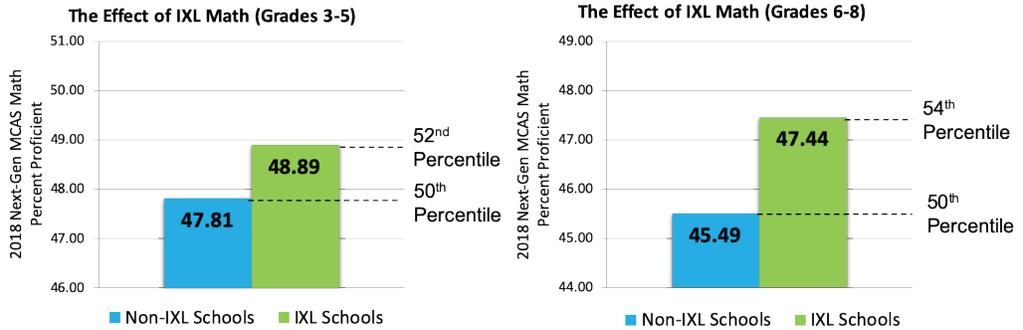


Figure 3. The Effect of IXL Math at the Elementary and Middle School Levels

Figure 4 shows the effect of IXL Math at urban schools and low-performing schools. For urban schools, the IXL effect is 2.40 points, corresponding to a 5-point percentile gain. For low-performing schools, the IXL effect is 2.16 points, corresponding to a 6-point percentile gain.

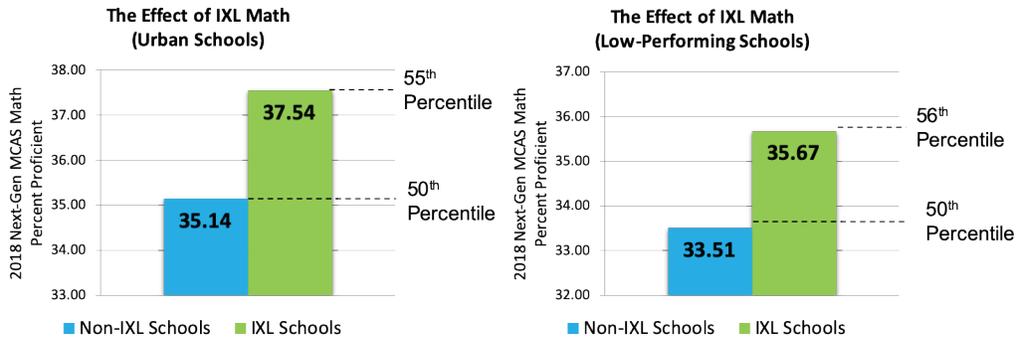


Figure 4. The Effect of IXL Math at Urban Schools and Low-Performing Schools

The Efficacy of IXL ELA

The implementation of IXL ELA showed a positive effect on schools' performance on the 2018 Next-Gen MCAS ELA tests across grades 3 through 8 (see Appendix D, Table D2 for details).

Figure 5 shows that the adjusted percent proficient was 50.88 for non-IXL schools and 54.06 for IXL schools. The 3.18 percent difference corresponds to a percentile gain of 6 points in school ranking. That is, if an average non-IXL school (at the 50th percentile) had begun using IXL ELA in the 2017-18 school year, the school's percent proficient would be expected to increase 3.18 percent, putting the school at the 56th percentile.

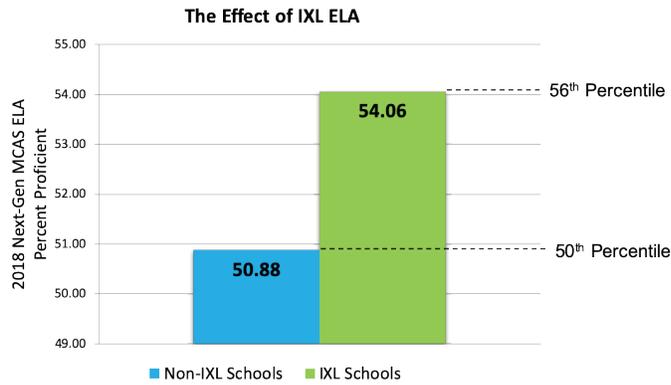


Figure 5. The Effect of IXL ELA on the 2018 Next-Gen MCAS

Figure 6 shows the effect of IXL ELA at the elementary school level (i.e., grades 3-5) and at the middle school level (i.e., grades 6-8). For elementary schools, the IXL effect is 4.23 points, corresponding to a 9-point percentile gain. For middle schools, the IXL effect is 1.75 points, corresponding to a 3-point percentile gain.

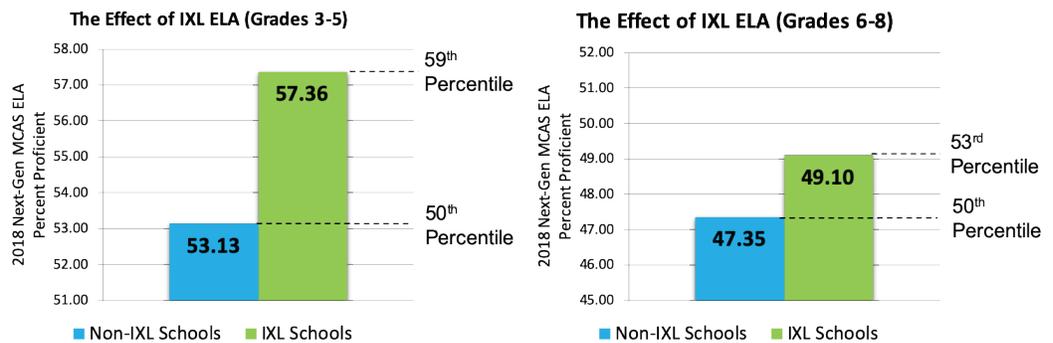


Figure 6. The Effect of IXL ELA at the Elementary and Middle School Levels

Figure 7 shows the effect of IXL ELA at urban schools and low-performing schools. For urban schools, the IXL effect is 3.80 points, corresponding to a 8-point percentile gain. For low-performing schools, the IXL effect is 3.92 points, corresponding to a 10-point percentile gain.

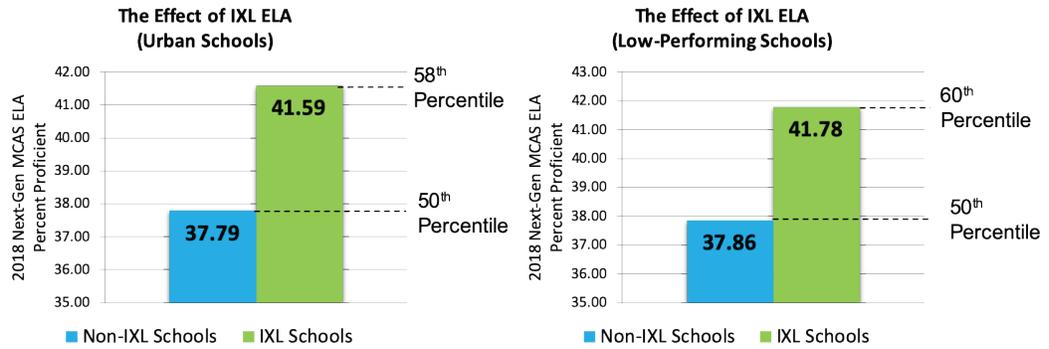


Figure 7. The Effect of IXL ELA at Urban Schools and Low-Performing Schools

## The Usage Effect of IXL

For schools that used IXL Math in the 2017-18 school year, our analyses found a positive and statistically significant association between IXL Math usage and schools’ performance on the 2018 Next-Gen MCAS math tests (see Appendix D, Table D3 for details).

Figure 8 shows the adjusted percent proficient for schools with different numbers of skills proficient<sup>2</sup> on IXL. More skills proficient is associated with a greater IXL effect. Schools with at least two IXL math skills proficient per student, per week, had 5.59 percent more students meeting and exceeding expectations on the 2018 Next-Gen MCAS math tests than schools with less than one skill proficient per student, per week.

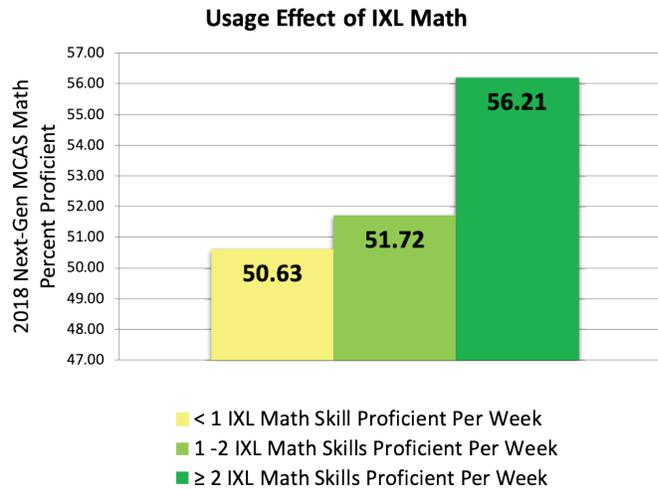


Figure 8. The Usage Effect of IXL Math

The number of schools with at least one IXL ELA skill proficient per student, per week, was not large enough to conduct a usage effect analysis.

<sup>2</sup> Skill proficiency on IXL is measured by IXL’s proprietary SmartScore. The SmartScore starts at 0, increases as students answer questions correctly, and decreases if questions are answered incorrectly. A student is considered proficient in a skill when they reach a SmartScore of 80.

## References

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 whether a school is an IXL school based only on the number of students using IXL. Because a school may choose to use IXL in only a few classrooms or across the entire school, this study defined IXL schools at each testing grade level<sup>3</sup> rather than the school level. The group of students at the same grade level within the same school is referred to as a grade level cohort.

A school is identified as an IXL school for a certain grade level in a certain school year if: 1) the school has an active IXL account within the school year, and 2) at least 70 percent of the enrolled students at this grade level have practiced on IXL within the school year.

A school is identified as a non-IXL school for a certain grade level in a certain school year if less than 70 percent of the students at this grade level have practiced on IXL within this school year.

For example, suppose a K-6 school had an active IXL account within the 2016-17 school year, and over 70 percent of students in grades K-4 had practiced on IXL. Less than 70 percent of students in grades 5 and 6 practiced on IXL during that year. This school would be defined as an IXL school for the 3rd and 4th grade level cohorts and as a non-IXL school for the 5th and 6th grade level cohorts. Students in grades K-2 are excluded from the analysis because they do not take the state standardized tests.

**Appendix B:  
Schools’  
Background  
Information**

Table B1 shows the background information for all public schools in Massachusetts and for IXL schools. IXL schools performed slightly better than the state average on the Next-Gen MCAS tests in 2017 and 2018. IXL schools had more schools located in cities compared to the state average.

**Table B1. Background Information for Massachusetts state and IXL schools**

	State average	IXL schools	
		IXL Math	IXL ELA
Number of schools	1,365	116	38
Number of grade level cohorts	4,281	176	58
2017 Next-Gen MCAS math percent proficient	49%	50%	-
2018 Next-Gen MCAS math percent proficient	49%	51%	-
2017 Next-Gen MCAS ELA percent proficient	50%	-	55%
2018 Next-Gen MCAS ELA percent proficient	50%	-	57%
% of economically disadvantaged students	32%	30%	30%
% of English language learners	10%	10%	9%
% of students in special education programs	17%	16%	16%
% of schools in cities	18%	19%	29%
% of schools in suburbs	68%	66%	48%
% of schools in towns	2%	3%	6%
% of schools in rural areas	11%	11%	16%

## Appendix C: Analytical Methods

A three-level linear model was used to calculate the IXL effect on Next-Gen MCAS performance (i.e., the performance difference between IXL schools and non-IXL schools on the 2018 Next-Gen MCAS), after adjusting for schools' prior academic performance (i.e., 2017 Next-Gen MCAS percent proficient), cohort size (i.e., the number of enrolled students in the grade level cohort), school size (i.e., the number of enrolled students in the school), percentage of economically disadvantaged students, percentage of English language learners, percentage of students in special education programs, and school location (i.e., city, suburb, town, or rural as defined by the Institute of Education Sciences). The units of analysis of the three-level model are grade level cohorts (i.e., level 1). Grade level cohorts are nested within school districts (i.e., level 2), which are further nested within states (i.e., level 3). Similar multilevel linear models were applied to the urban grade level cohorts only (i.e., cohorts within schools located in urban areas) and low-performing grade level cohorts only (i.e., cohorts with the 2017 Next-Gen MCAS percent proficient below the state average) to calculate the IXL effect on these two types of schools separately. 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 applied another three-level linear model to compare the performance difference between IXL schools with different amounts of IXL usage. We set benchmarks for low, medium, and high IXL usage based on the number of skills proficient (SmartScore  $\geq 80$ ) per student per week. The model was very similar to the first model described in this appendix, but the model included the IXL usage group as an independent variable and the sample only included schools that used IXL during the 2017-18 school year.

Appendix D:  
Data Tables

**Table D1.** The Effect of IXL Math on the 2018 Next-Gen MCAS Math Tests

Values	Overall (all schools across grades 3-8)	ES level (grades 3-5)	MS level (grades 6-8)	Urban schools	Low-performing schools
Number of grade level cohorts at IXL schools	176	92	84	35	75
Number of grade level cohorts at non-IXL schools	3,520	2,357	1,163	777	1,801
The IXL effect	1.60*	1.08	1.95	2.40	2.17
Effect size	0.08	0.06	0.09	0.12	0.14
Percentile gain	3.17	2.19	3.68	4.65	5.63
Adjusted 2018 Next-Gen MCAS math percent proficient for IXL schools	48.66%	48.89%	47.44%	37.54%	35.67%
Adjusted 2018 Next-Gen MCAS math percent proficient for non-IXL schools	47.06%	47.81%	45.49%	35.14%	35.51%

Note: 1) \*: significant at .05 level

2) ES: elementary school; MS: middle school

**Table D2. The Effect of IXL ELA on the 2018 Next-Gen MCAS ELA Tests**

Values	Overall (all schools across grades 3-8)	ES level (grades 3-5)	MS level (grades 6-8)	Urban schools	Low-performing schools
Number of grade level cohorts at IXL schools	58	31	27	17	24
Number of grade level cohorts at non-IXL schools	4,006	2,608	1,398	880	1,946
The IXL effect	3.18*	4.23	1.75	3.80	3.92
Effect size	0.16	0.23	0.09	0.19	0.26
Percentile gain	6.49	8.95	3.45	7.67	10.13
Adjusted 2018 Next-Gen MCAS ELA percent proficient for IXL schools	54.06%	57.36%	49.10%	41.59%	41.78%
Adjusted 2018 Next-Gen MCAS ELA percent proficient for non-IXL schools	50.88%	53.13%	47.35%	37.79%	37.86%

Note: 1) \*\*\*: significant at .001 level; \*: significant at .05 level  
 2) ES: elementary school; MS: middle school; HS: high school

**Table D3. The Usage Effect of IXL Math**

Values	< 1 skill proficient per student per week	1-2 skills proficient per student per week	≥ 2 skills proficient per student per week
Number of grade level cohorts used IXL in the 2017-18 school year	331	102	31
IXL usage effect	N/A	1.09	5.58**
Effect size		0.06	0.29
Adjusted 2018 Next-Gen MCAS math percent proficient	50.63%	51.72%	56.21%

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