# Measuring the Impact of IXL Math in Hawaii Schools

## Introduction

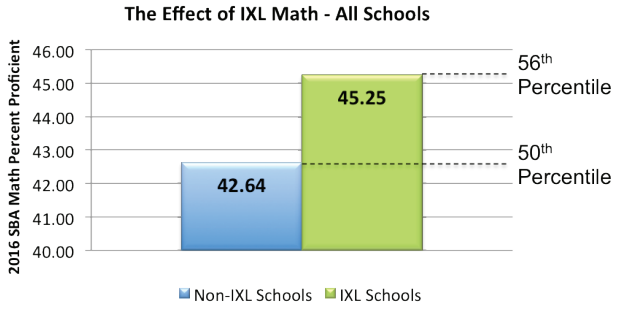
Previous research has shown that the implementation of IXL Math has significant impact on student achievement for an individual school (Empirical Education, 2013). In this study, we explored IXL usage across the entire state of Hawaii. Examining such a large sample of schools allowed us to quantify the impact of IXL Math on school performance as measured by the state exams.

## Abstract

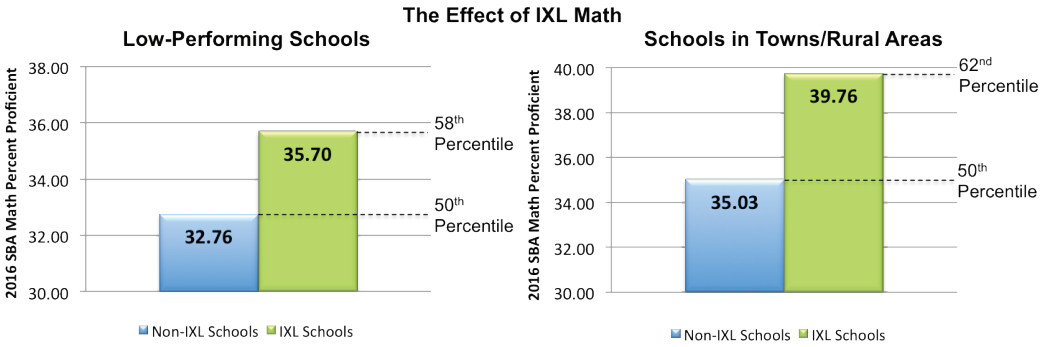
This study investigated 260 public schools in Hawaii that used IXL Math during the 2015–16 school year. Using data from the 2016 Smarter Balanced Assessments (SBA) across grades 3 through 8 and in grade 11[1], researchers examined student achievement in both IXL schools and non-IXL schools. Scores from the 2015 SBA were used to control for schools' performance prior to using IXL. IXL usage by the schools in this study ranged from less than two minutes per student, per week, to over 50 minutes per student, per week. Even with the wide range in usage, our researchers found a strong positive correlation between IXL usage and school performance. These results are statistically significant.

## Key Findings

Hawaii schools using IXL Math outperformed schools without IXL on the 2016 SBA.




The positive effect of IXL math was even higher for low-performing schools and for schools located in towns or rural areas.




*Note: The 50th percentile in these graphs refers to the 50th percentile among low-performing schools or schools located in towns or rural areas.*



[1] *Grade 9 and 10 are not testing grades in Hawaii and are therefore not included in this study.*

## The IXL Effect in Hawaii Schools

JUNE 1, 2017

## 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 a 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 to measure the impact of IXL. This type of study design 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 (see Figure 1). The treatment group consisted of schools that used IXL in the 2015–16 school year (called "IXL schools"). The control group consisted of schools that did not use IXL in the 2015–16 school year (called "non-IXL schools").

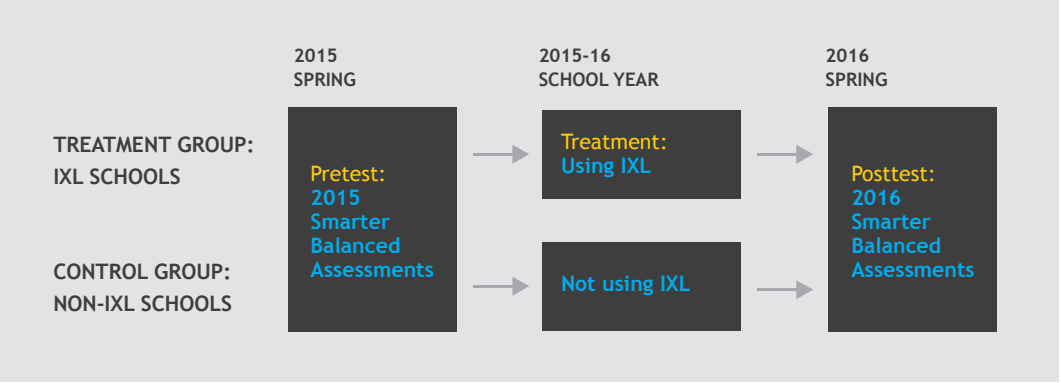



*Figure 1. Study Design*

The Smarter Balanced Assessments (SBA) were used as the pretest and the posttest to determine the performance for all schools. The assessments are aligned to the Hawaii Common Core Standards and are designed to measure whether students are "on track" for readiness in college and/or careers. In Hawaii, SBA are mandatory assessments given to students in grades 3–8 and in grade 11. The academic performance of each grade level at each school is evaluated based on the percentage of students who met or exceeded the achievement standard (referred to as "percent proficient").

## Methodology

The study analyzed data from 260 Hawaii public schools, including both traditional public schools and charter schools. A total of 129 public schools used IXL Math during the 2015–16 school year. As the number of students who practiced on IXL within a school ranged from a single classroom to the entire school, this study defined a school as an "IXL school" at each grade level rather than at a school level. At a certain grade level within a school, the school is identified as an IXL school at this grade level if at least 70% 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, 84 schools were identified as IXL schools in this study. Appendix B shows the characteristics of IXL schools and the Hawaii state averages. The school performance and enrollment data were obtained from the Hawaii Department of Public Instruction and the Institute of Education Science.

Our researchers used a multilevel linear model to calculate the IXL effect—i.e., the performance difference between IXL schools and non-IXL schools on the 2016 SBA, controlling for factors such as prior performance, school size, percentage of economically disadvantaged students, Title I status, and school location. Similar multilevel linear models were applied to low-performing schools (i.e., schools with a 2015 SBA math percent proficient below the state average) and schools located in towns or rural areas to calculate the IXL effect for these two types of schools. (See Appendix C for a detailed explanation of analytical methods.)

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

1. Did IXL schools perform better in math than non-IXL schools on the 2016 SBA?
2. What was the effect of using IXL Math for low-performing schools and schools in towns/rural areas?

## Results

Analysis of the data showed that IXL Math had a positive and statistically significant effect on school performance in math, indicating there is a high probability that similar schools using IXL Math would achieve similar results. The IXL effect was larger for low-performing schools and schools located in towns or rural areas.

## The Efficacy of IXL Math for All Schools

The implementation of IXL Math showed a positive and statistically significant effect on schools' performance on the 2016 SBA in math across grades 3 through 8 and in grade 11 (see Appendix D, Table D1 for details).

Figure 2 shows that the adjusted percent proficient[2] was 42.64 for non-IXL schools and 45.25 for IXL schools. The 2.61 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 used IXL Math during the 2015–16 school year, the school's percent proficient would be expected to increase 2.61 percent, putting the school at the 56th percentile.

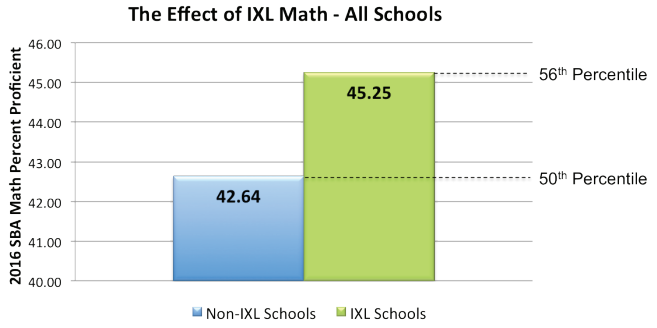



*Figure 2. The Effect of IXL Math for All Schools*

## The Efficacy of IXL Math for Low-Performing Schools

The implementation of IXL Math produced a larger effect at low-performing schools (see Appendix D, Table D1 for details).

Figure 3 shows that the adjusted percent proficient was 32.76 and 35.70 for non-IXL schools and IXL schools, respectively. The 2.94 percent difference corresponds to a percentile gain of 8 points in school ranking. That is, if an average low-performing non-IXL school (at the 50th percentile) had used IXL Math during the 2015–16 school year, the school's percent proficient would be expected to increase 2.94 percent, putting the school at the 58th percentile.

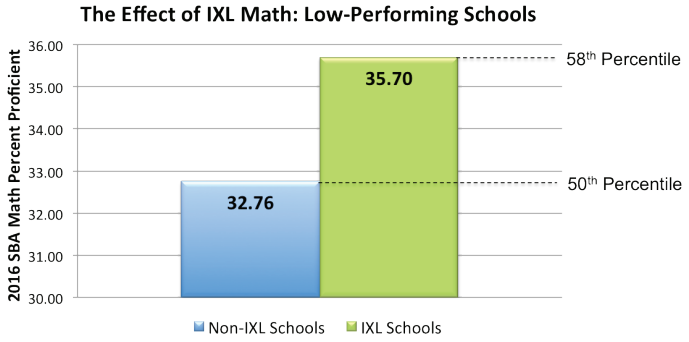



*Figure 3. The Effect of IXL Math for Low-Performing Schools*

[2] *Adjusted percent proficient: the percentage of students who met or exceeded the achievement standard after adjusting for differences in prior performance and school characteristics between IXL schools and non-IXL schools.*

## The Efficacy of IXL Math for Schools in Towns or Rural Areas

The implementation of IXL Math also produced a large and statistically significant effect at schools located in towns or rural areas (see Appendix D, Table D1 for details).

Figure 4 shows that the adjusted percent proficient was 35.03 for non-IXL schools and 39.76 for IXL schools. The 4.73 percent difference corresponds to a percentile gain of 12 points in school ranking. That is, if an average non-IXL school located in a town or rural area (at the 50th percentile) had used IXL Math during the 2015–16 school year, the school's percent proficient would be expected to increase 4.73 percent, putting the school at the 62nd percentile.

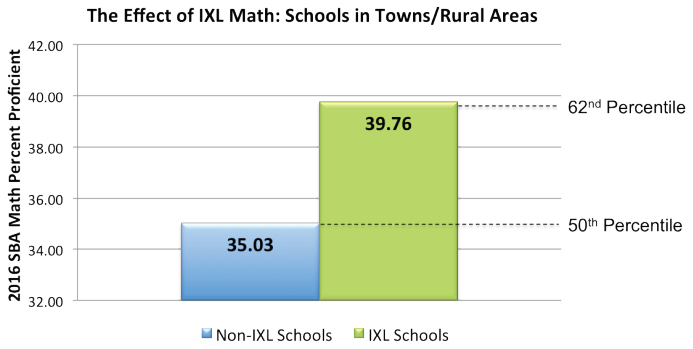



*Figure 4. The Effect of IXL Math for Schools in Towns/Rural Areas*

## 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

## 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 only at a few grade levels, this study defined schools as IXL schools at each testing grade level[3] rather than at a school level. The group of students at the same grade level within the same school is referred to as a grade level cohort.

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

[3] *Testing grade level: a grade level in which students are required to take the state standardized tests.*

For a certain grade level cohort within a school, during a certain school year, the school is identified as a non-IXL school for this grade level if no students at this grade level have practiced on IXL within the school year.

For example, if a K-6 school had an active IXL account within the 2015-16 school year and over 70% of students in grades K-4 had practiced on IXL during this 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 all analysis because they are not at a testing grade level and do not take the state standardized tests.

## Appendix B: Schools' Background Information

Table 1 shows the background information for all public schools in Hawaii and for IXL schools. A total of 84 schools were identified as IXL schools in the 2015-2016 school year. Based on the 2015 and 2016 SBA math percent proficient, IXL schools showed higher academic performance than the state average. Fewer IXL schools are located in a suburban area compared to the state average, and the percentage of economically disadvantaged students in IXL schools is higher than the state average.

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

| | State of Hawaii | IXL schools |
|---|---|---|
| # of schools | 260 | 84 |
| # of grade level cohorts | 792 | 351 |
| 2016 SBA math percent proficient | 42% | 48% |
| 2015 SBA math percent proficient | 41% | 47% |
| % of economically disadvantaged students | 49% | 60% |
| % of schools in cities | 13% | 4% |
| % of schools in suburbs | 74% | 49% |
| % of schools in towns | 8% | 35% |
| % of schools in rural areas | 5% | 13% |

## Appendix C: Analytical Methods

A three-level linear model was used to calculate the IXL effect (i.e., the performance difference between IXL schools and non-IXL schools), after adjusting for schools' prior academic performance (i.e., 2015 SBA math percent proficient), school size (i.e., the number of enrolled students), percentage of economically disadvantaged students (i.e., the percentage of students eligible for free or reduced-priced lunch), Title I status (i.e., whether the school received Title I funding in 2015), and school location (i.e., city, suburb, town, or rural). In this study, the units of analysis are grade level cohorts (i.e., level 1). Grades level cohorts are nested within schools (i.e., level 2), which are further nested within districts (i.e., level 3). Similar multilevel linear models were applied to low-performing schools (i.e., schools with a 2015 SBA math percent proficient below the state average) and schools located in towns or rural areas to calculate the IXL effect for these two types of schools.

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).

## Appendix D: Data Tables

**Table D1. The Efficacy of IXL Math**

| Values | All schools | Low-performing schools | Schools in towns/ rural areas |
|---|---|---|---|
| # of grade level cohorts at IXL schools | 351 | 166 | 106 |
| # of grade level cohorts at non-IXL schools | 441 | 244 | 207 |
| The IXL effect | 2.61** | 2.94* | 4.73* |
| Effect size | 0.14 | 0.21 | 0.30 |
| Percentile gain | 5.72% | 8.29% | 11.86% |
| Adjusted 2016 SBA math percent proficient for IXL schools | 45.25% | 35.70% | 39.76% |
| Adjusted 2016 SBA math percent proficient for non-IXL schools | 42.64% | 32.76% | 35.03% |

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