

Randomized-Control Efficacy Study of IXL Math in Holland Public Schools

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EXECUTIVE SUMMARY: Randomized-Control Efficacy Study of IXL Math in Holland Public Schools

The Center for Research and Reform in Education (CRRE) is a research center affiliated with the School of Education at Johns Hopkins University (JHU) specializing in K-12 education program evaluations. In 2022, CRRE partnered with IXL Learning, an educational technology company that offers supplemental e-learning tools (e.g., IXL Math) for preK-12 students and teachers, in conducting a randomized-control trial (RCT) efficacy study. The specific research interest was to determine the effects of IXL's online learning platform on Grades 3-5 students' mathematics achievement in Holland (MI) Public Schools (HPS). Achievement measures included both the participating district's respective progress monitoring assessment and state-mandated assessment in mathematics. The present report integrates findings from the teacher survey with student achievement analyses and outcomes.

The study addresses the following research questions:

- 1) How does participation in the IXL Learning platform impact student achievement in mathematics?
 - a) Does level of program usage relate to student achievement effects?
 - b) To what degree do effects vary across:
 - i) Grade levels?
 - ii) Student subgroups (ethnicity, ELL, SPED)?
- 2) What are teachers' perceptions of the program with regard to:
 - a) Benefits for students?
 - b) Student engagement?
 - c) Implementation requirements?
 - d) Strengths and weaknesses?
 - e) Recommendations for implementation improvement?

Research Design

This study examined perceptions and effectiveness of IXL Math by using a cluster randomized-control trial (RCT) in Grades 3-5 in the four elementary schools in HPS during the spring of 2023. The RCT design randomly assigned teachers (classes) within these grades in individual schools to implement IXL Math or continue with business as usual within their classrooms. Accordingly, teachers represented the units of analyses. Eleven Grade 3-5 classrooms across four schools were randomly selected to use IXL Math, while the remaining (control) classrooms across the same four schools conducted business-as-usual instruction. Outcome measures for this study included the end-of-

year (EOY) Renaissance Star Math and spring 2023 M-STEP Mathematics scores. A survey was also made available for voluntary completion to IXL Math teachers in Grades 3-5. The response rate was high, with nine of the 11 teachers who used IXL Math responding to the survey. Survey participants completed Likert-scale items relating to their perceptions of professional development, satisfaction, curriculum alignment, and program usage, along with open-ended items relating to program strengths and weaknesses and suggestions for future IXL Math implementation in HPS.

Study Sample

The present study sample included 545 Grades 3-5 students across four elementary schools. Similar distributions of race/ethnicity, gender, socioeconomic status, IEP status, and ELL status were found in the treatment and control samples. Teacher survey data were collected from nine of 11 program teachers.

Mathematics Achievement Impacts

A significant positive impact of IXL Math on student mathematics achievement was observed for Grades 3-5 students in HPS. Treatment students made approximately 10-point larger gains on the Renaissance Star Math assessment than did control students. The effect size of this impact was 0.13 SDs, indicating a small to moderate practical impact of IXL Math on student mathematics achievement. Subgroup analyses showed that IXL Math had additional significant positive impacts on Hispanic, special education, ELL, and free and reduced meal (FARMS) students, with the magnitudes of these impacts ranging from 13 to 17 points.

Descriptive analyses of student program usage showed that Grade 3 students averaged the most time spent using the program, at about 10 hours total. This was followed by Grade 5 and Grade 4 students, at approximately eight and seven hours of average usage, respectively. Pearson correlations showed significant positive associations between counts of skills practiced/proficient/mastered and EOY Star Math and M-STEP Mathematics scores across all grade levels, with correlations ranging between .30-.57 in magnitude. Regression models similar to the main impact analyses showed that measures of student program time (measures of minutes and active weeks) were all significantly positively associated with Renaissance Star Math and M-STEP Mathematics achievement gains.

Teacher Perceptions

Teacher perceptions of IXL Math were generally very positive, especially in relation to professional development and overall program perceptions. Teachers expressed agreement that IXL's professional development sufficiently prepared them to implement the program, and teachers were unanimous in perceiving IXL Math to be a meaningful tool for teaching and learning. Teachers also generally expressed

satisfaction with program alignment with state standards and district curricula, as well as with the capacity of the program to provide individualized instruction to students. Overall, participants reported high measures of satisfaction for all areas surveyed and expressed a desire for continuation of IXL Math in the upcoming school year. Recommendations provided communicate a need for ongoing professional development and increased support for students for whom English is a second language.

Conclusions

The key results and conclusions of this evaluation are as follows:

- IXL Math students significantly outgained control students by more than 10 points on the Renaissance Star Math assessment.
- Subgroup analyses showed significant positive program impacts for Hispanic, special education, ELL, and FARMS students. Advantages for IXL Math students averaged between 13-17 points. In addition, SPED IXL Math students outgained control SPED students by more than 6 points on the M-STEP Mathematics assessment.
- Average usage metrics were generally highest for Grade 3 students, with these students averaging approximately 10 hours of usage. Grades 4 and 5 students averaged 7-8 hours of usage.
- Measures of total student program usage were significantly positively associated with mathematics achievement gains, after controlling for prior mathematics achievement and demographics, as in the main impact analyses.
- Teachers generally held very positive overall perceptions of IXL Math, especially regarding professional development.
- Teachers also expressed positive views of IXL Math's meaningfulness to teaching and learning, as well as program alignment with state standards and the ability to individualize student instruction.

Randomized-Control Efficacy Study of IXL Math in Holland Public Schools

The Center for Research and Reform in Education (CRRE) is a research center affiliated with the School of Education at Johns Hopkins University (JHU) specializing in K-12 education program evaluations. In 2022, CRRE contracted with IXL Learning, an educational technology company that offers supplemental e-learning tools (e.g., IXL Math) for preK-12 students and teachers, to conduct a randomized-control trial (RCT) efficacy study. The specific research interest was to determine the effects of IXL's online learning platform on Grades 3-5 students' mathematics achievement. Achievement measures included both the Renaissance Star Math assessment and the Michigan state-mandated assessment (M-STEP) in mathematics. The present report integrates findings from the teacher survey with student achievement analyses and outcomes.

IXL Math is a personalized comprehensive mathematics program that addresses nearly 1,500 math skills in Grades 3-5. Unlimited interactive questions are provided via real-world scenarios with built-in support and motivating rewards. Real-time diagnostic data on students' knowledge levels allow teachers to make data-driven instructional decisions and assign customized learning instruction and intervention.

The participating district, Holland Public Schools (HPS), located in Holland, Michigan, is comprised of four elementary preK-5 grade schools, one of which is a bilingual-immersion school. There are approximately 25 Grade 3-5 classrooms in the four schools, serving approximately 600 students.

The study addresses the following research questions:

- 1) How does participation in the IXL Learning platform impact student achievement in mathematics?
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 - b) To what degree do effects vary across:
 - i) Grade levels?
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 - a) Benefits for students?
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Method

Research Design

This study examined perceptions and effectiveness of IXL Math by using a cluster randomized-control trial (RCT) in Grades 3-5 in the four elementary schools in HPS during the spring of 2023. The RCT design randomly assigned teachers (classes) within these grades in individual schools to implement IXL Math or continue with business as usual within their classrooms. Accordingly, teachers represented the units of analyses. A survey was made available for voluntary completion to IXL Math teachers in Grades 3-5.

Participants

Student sample. Demographically, 69% of HPS students are White, 22% are Hispanic/Latino, and 5% are Black. Roughly 12% of students are from families with income below the poverty level and nearly 20% from families receiving Food Stamp/SNAP benefits. In addition, 82% of students are from homes where English is the only spoken language. According to the 2021-22 Student Performance on State Assessments (M-STEP), 37% of district students are at least proficient in math and 46% in reading.¹ Students at these schools are provided with 1:1 technology.

The study's sample consisted of classrooms from a list of 21 Grades 3-5 HPS mathematics teachers who were randomly assigned to treatment and control conditions. Students within those classrooms were included in the analytic sample if they had non-missing pretest (MOY) Renaissance Star Math scores and either posttest (EOY) Renaissance Star Math or spring 2023 M-STEP Math scores, as well as demographic data. Table 1 shows percentages of student subgroups in the treatment and control conditions.

¹ Michigan's Center for Educational Performance and Information, [Achievement graph showing the percentage of students proficient in each grade in each subject area 2021-2022 Student Performance on State Assessments (MSTEP, PSAT & SAT)]. *District View, Holland City School District (2021-22)*. [District - Entity View Page \(mischooldata.org\)](#) (accessed June 15, 2023).

Table 1*Student Demographics, by Condition*

	IXL Math	Control
% White	42.59	39.01
% Hispanic	39.92	43.97
% Black	7.60	10.64
% Female	46.39	51.06
% Economically disadvantaged	65.02	69.50
% Students with IEPs	15.21	17.38
% English learners	14.83	13.83
<i>N</i>	263	282

The treatment and control students were very similar on all demographic variables, with no significant differences between the conditions on any of the available demographic variables. The treatment condition contained slightly larger percentages of White students, while the control condition contained slightly larger percentages of Hispanic, Black, Female, and economically disadvantaged students. In addition, baseline equivalence, as measured by MOY Renaissance Star Math scores, was met for the entire sample, with a very small standardized mean difference of 0.09 SDs. The full table of baseline equivalence estimates can be found in Appendix A.

Teacher sample. In the four preK-5 grade schools in HPS, approximately 25 classrooms are Grades 3-5. Eleven teachers were randomly assigned to participate in the study, serving as the treatment group.

Measures

Data sources for the current study included:

Renaissance Star Math. The Renaissance Star Math assessment was administered to all Grades 3-5 students in the current study. The Renaissance Star Math assessment is designed for Grades K-8 students (with a separate version available for high school students) and covers topics such as counting, numbers and operations, numerical expressions, fractions, and decimals. This assessment is state-specific, mapping to each state's specific mathematics learning standards. The Star Math assessment tracks mathematics growth, as well as overall progress, and may be administered in either English or Spanish. Star Math scores range from 0-1400. The Renaissance Star assessment does not have universally determined proficiency levels, although districts can set their own proficiency cut scores or align Star scores with state standards. Table 2 shows the ranges of Star Math scores for HPS students, by grade.

Table 2*Renaissance Star Mathematics Score Ranges, by Grade*

	Winter 2023	Spring 2023
Grade 3	748-1194	765-1232
Grade 4	799-1106	754-1144
Grade 5	797-1157	779-1205

M-STEP. The Michigan Student Test of Educational Progress (M-STEP) mathematics assessment is a computer-based assessment designed to measure how well students are mastering Michigan mathematics learning standards. While M-STEP scores increase across grades, they are not vertically scaled. Thus, while scores can be compared across years and test forms, they cannot be compared across grade levels. M-STEP scores are classified into four performance levels: Not Proficient, Partially Proficient, Proficient, and Advanced. Table 3 shows the M-STEP mathematics assessment score ranges for each proficiency level, by grade. It should be noted that raw M-STEP scores were used as outcome variables in the main achievement analyses; we provide performance levels for reference purposes here.

Table 3*M-STEP Mathematics Performance Level Score Ranges*

	Not Proficient	Partially Proficient	Proficient	Advanced
Grade 3	1217-1280	1281-1299	1300-1320	1321-1361
Grade 4	1310-1375	1376-1399	1400-1419	1420-1455
Grade 5	1409-1477	1478-1499	1500-1514	1515-1550

IXL Usage. IXL provided digital student-level usage data to CRRE for analysis. Usage data was available only for treatment students and included a series of variables including total minutes using the program, number of weeks using the program, and counts of skills practiced, proficient, and mastered. For the purposes of our analyses, we focused on time variables (minutes and weeks), as well as counts of skills practiced, skills proficient, and skills mastered.

Teacher Survey. This survey was developed with opportunities for input by IXL leadership and the HPS district-level administrators to address teachers' experiences with and reactions to the IXL Math program. The survey was administered online during late May into early June 2023 using the Qualtrics survey platform. The link was sent directly to the 11 participating teachers. To maximize access, the survey was administered prior to the close of the school year. District-wide, nine (81.8%) of 11 participating teachers completed the survey.

The survey contained one demographic item identifying the grade of most of their math students; a series of forced-choice items to gauge satisfaction with training and teacher implementation; items addressing student implementation and success; benefits for teachers and students; and open-ended opportunities to provide additional information and recommendations or suggestions for improvement. A copy of the teacher survey is provided in Appendix D of this report. An unedited copy of teacher open-ended responses is provided in Appendix E. Descriptive and frequency results are provided in Appendix F.

Analytic Approach

Hierarchical Linear Modeling (HLM) with students nested within classrooms was used to examine differences in spring 2023 Renaissance Star Math and M-STEP Mathematics achievement between IXL Math students and control students, controlling for winter 2023 Renaissance Star Math (as IXL Math was not implemented until February) achievement and other demographic covariates. Because classrooms were randomly assigned within schools, we also added dummy variables for each school and grade, in accordance with WWC (2022) standards. This was done to create the strongest comparison of IXL Math students to control students, controlling for school and grade effects.

To examine associations between the extent of IXL Math usage and student achievement gains, we conducted analyses similar to the main impact analyses in which the treatment indicator variable was replaced with one of the available usage variables. These models allowed us to examine which usage variables were associated with improvement of IXL Math students' mathematics achievement. Student achievement data were analyzed using quantitative analysis software (Stata v. 17.0), while quantitative survey data were analyzed using SPSS.

Achievement Results

We begin by descriptively analyzing patterns of IXL Math usage across grades and schools. We then discuss the overall impact of IXL Math on students' Renaissance Star and M-STEP mathematics achievement, as well as selected subgroup and usage regression analyses.

IXL Program Usage

IXL provided CRRE with a comprehensive set of platform usage variables. The following five variables were selected for inclusion in our analyses: minutes and weeks of usage, along with counts of skills practiced, skills proficient, and skills mastered. Minutes of usage refers to the total amount of time a student spent in the program, while weeks refer to the number of weeks that a student actively used the program. All usage variables indicate total usage across the entire spring semester of the school

year, from initial implementation to the end of the year. Table 4 displays average IXL Math usage by grade.

Table 4

Average IXL Math Digital Usage by Grade

	Minutes of Usage	Weeks	Skills Practiced	Skills Proficient	Skills Mastered
Grade 3 ($n = 89$)	606.23	14.90	90.58	59.37	52.92
Grade 4 ($n = 101$)	425.92	15.54	52.46	35.74	30.17
Grade 5 ($n = 72$)	487.55	13.92	59.63	37.17	31.25

Note. Analyses only include treatment students with non-missing pretest and posttest scores.

Usage metrics were generally highest in Grade 3, as these students averaged approximately 10 hours of usage, as compared to approximately eight hours of usage for Grade 5 students and seven hours of usage for Grade 4 students. Grade 3 students averaged 30-40 more skills practiced, 22-24 more skills proficient, and 20-22 more skills mastered than Grades 4 and 5 students. Grade 5 students used IXL Math for slightly fewer days and weeks than did Grades 3 and 4 students. Descriptive summaries of IXL Math usage by school can be found in Appendix B. Across the four schools, some disparities were observed, with students in one school averaging nearly twice the total program time (in minutes) than students in the bottom two usage schools averaged. Each of the four schools averaged 14-16 weeks of usage.

Unadjusted associations between IXL usage and mathematics achievement. Next, we computed Pearson correlations between IXL usage variables and spring mathematics outcomes. Correlations are shown by grade level and outcome variable in Table 5.

Table 5

Associations Between IXL Usage and Mathematics Achievement, by Grade and Assessment

	Minutes of Usage	Weeks	Skills Practiced	Skills Proficient	Skills Mastered
<i>Renaissance Star</i>					
Grade 3 ($n = 89$)	+.13	+.06	+.32**	+.40**	+.41**
Grade 4 ($n = 101$)	+.12	-.03	+.35**	+.43***	+.44***
Grade 5 ($n = 72$)	+.29*	+.30*	+.31**	+.39**	+.38**
<i>M-STEP</i>					
Grade 3 ($n = 89$)	+.22*	+.12	+.45***	+.51***	+.52***
Grade 4 ($n = 103$)	+.05	+.00	+.30**	+.40***	+.43***
Grade 5 ($n = 72$)	+.39***	+.29*	+.50***	+.57***	+.56***

Notes. 1. * $p < .05$.; ** $p < .01$.; *** $p < .001$. 2. Only treatment students with non-missing pretest and posttest scores were included in these analyses.

Significant positive associations were found between counts of skills practiced/proficient/mastered and spring mathematics scores on both the Renaissance Star and M-STEP, with correlations ranging between +.30 to +.57, indicating moderate associations between skills practiced or mastered and mathematics achievement. Significant positive associations were consistently found for Grade 5 students when examining program time usage variables, with correlations ranging from +.30 to +.40 observed for both the minutes and weeks of usage variables. Note that skills practiced, proficient, and mastered were consistently significant correlates of achievement in all grades and across both outcome measures.

Impacts on Student Mathematics Achievement – Renaissance Star

Unadjusted Renaissance Star Math achievement patterns. First, we present unadjusted descriptive analyses of average student mathematics achievement, as measured by the Renaissance Star Math assessment. We present average scores for winter and spring of 2023, by grade level and condition. The results of these analyses are shown in Table 6. Only students with non-missing winter and spring 2023 Renaissance Star Math scores were included in this analysis.

Table 6*Mean Renaissance Star Mathematics Scores by Grade*

	Winter 2023	Spring 2023	Mean Change
Grade 3			
IXL Math ($n = 90$)	952.59 (56.71)	984.08 (55.95)	31.49
Control ($n = 76$)	926.86 (60.99)	947.82 (71.53)	20.96
Grade 4			
IXL Math ($n = 101$)	1003.17 (56.51)	1028.03 (59.27)	24.86
Control ($n = 86$)	981.30 (58.86)	1002.24 (67.79)	20.94
Grade 5			
IXL Math ($n = 72$)	1042.39 (59.70)	1069.06 (62.99)	26.67
Control ($n = 120$)	1036.68 (71.02)	1052.43 (80.84)	15.75

Note. SDs in parentheses.

Patterns of achievement gains consistently favored IXL Math, with treatment students outgaining control students by 11 points in Grades 3 and 5, and by 4 points in Grade 4.

Overall impacts. Overall, IXL Math showed a significant positive impact on student mathematics achievement. Students who used IXL Math scored an average of 10 points higher on the Spring 2023 Renaissance Star Math assessment than did otherwise similar control students. Table 7 summarizes the results of this analysis.

Table 7*Overall Impact of IXL Math on Spring 2023 Renaissance Star Math Scores*

Variable	Estimate	Standard Error	p value	Effect Size
IXL Math	10.158*	3.999	.011	.131
Constant	1011.116***	2.731	<.001	
Variance of constant	41.95			
Residual	1093.266			
Student N	545			
Class N	24			

Notes. 1. * $p < .05$, *** $p < .001$. 2. The model also controlled for FARMS, ELL, and SPED status, as well as student grade and school effects. 3. Variables were grand mean centered to facilitate interpretation of the constant.

Student subgroup impacts. We conducted a series of analyses to examine whether IXL Math impacts varied across different student groups. Table 8 shows the results of subgroup analyses that reached statistical significance. Specifically, we report additive impacts of treatment main effects plus interaction terms for each subgroup of

interest, with Wald tests performed on each simple effect. Complete regression tables related to subgroup analyses can be found in Appendix C.

Table 8

IXL Math Impacts on 2023 Renaissance Star Math Scores, by Subgroup

Subgroup	Estimate	<i>p</i> value
Hispanic (<i>n</i> = 229)	14.581**	.005
Special Education (<i>n</i> = 89)	15.112*	.049
ELL (<i>n</i> = 78)	16.891*	.038
FARMS (<i>n</i> = 367)	14.133**	.001

Note. 1. * $p < .05$, ** $p < .01$.

While the models including an interaction term of treatment by student demographic characteristic revealed no significant interactions, meaning that IXL Math had a positive impact on mathematics achievement regardless of subgroup status, follow-up regression analyses on each subgroup individually revealed that impacts of IXL Math were greater among underserved groups including Hispanic, Special Education, ELL, and FARMS students. Impacts across these subgroups ranged in magnitude from 13 to 17 points, indicating that IXL students in these subgroups outscored their comparison counterparts by an average of 13-17 points. The results of these analyses provide evidence of IXL having uniquely positive impacts on underserved and at-risk student subgroups of interest.

Associations between IXL usage and math achievement. Next, we discuss the results of analyses that examined the associations between IXL Math digital usage variables and EOY 2023 Renaissance Star Math scores, while controlling for prior achievement and the same demographic, school, and grade variables included in previous analyses. The regression estimates can be interpreted as the expected increase in EOY 2023 Star Math score for every unit of a given usage variable. These analyses were conducted only on treatment students. Table 9 displays the results of these analyses.

Table 9

Associations Between IXL Math Usage Variables and EOY 2023 Star Math Scores (n = 262)

Usage Variable	Estimate	Standard Error	p value
Total Minutes	0.011	0.008	.158
Total Weeks	2.839	1.457	.051
Skills Practiced	0.050	0.045	.271
Skills Proficient	0.092	0.059	.122
Skills Mastered	0.095	0.064	.137

Neither of the time variables was significantly positively associated with Star Math score gains, although Total Weeks very nearly reached statistical significance ($p = .051$), with each week of IXL Math usage associated with a nearly 3-point increase in Star Math score. Each of the three skill variables was directionally associated with Star Math score gains but did not quite reach statistical significance. In terms of total usage time, each hour of IXL usage was associated with a nearly 1-point gain (coefficient for Total Minutes multiplied by 60) in Star Math score.

We also conducted regression analyses using quartiles of IXL Math usage, in terms of minutes of total usage and their associations with Star Math scores. Relationships between usage variables that measure total program time and achievement gains are often nonlinear, so regression analyses that include usage quartiles can be used to discern potential nonlinear relationships. Results of these analyses are shown in Table 10. Quartile 1 refers to the lowest quartile of IXL Math usage (least usage), while Quartile 4 refers to the highest quartile of IXL Math usage (most usage). Quartile 1 usage consisted of less than 261 minutes of online usage, while Quartile 2 referred to between 261 and 484 minutes of online usage, Quartile 3 referred to between 484 and 703 minutes of online usage, and Quartile 4 referred to greater than 703 minutes of IXL Math online usage. Regression estimates can be interpreted as the average change in the EOY 2023 Star Math score associated with the usage quartile, in relation to control students.

Table 10

Associations Between IXL Usage Quartiles and EOY 2023 Star Math Scores (n = 545)

Usage Quartile	Estimate	Standard Error	p value
Quartile 1	7.733	5.814	.184
Quartile 2	4.186	5.360	.435
Quartile 3	12.924*	5.376	.016
Quartile 4	15.405**	5.620	.006

Note. * $p < .05$; ** $p < .01$.

Program usage in Quartiles 3 and 4 were significantly positively related with Star Math achievement gains, with Quartile 3 usage associated with nearly 13-point Star Math gains and Quartile 4 usage associated with greater than 15-point Star Math gains in relation to control students. Usage in Quartiles 1 and 2 was also associated with mathematics achievement gains, but these impacts were smaller and did not reach statistical significance.

Impacts on Student Mathematics Achievement – M-STEP

For the M-STEP Mathematics assessment, we do not present unadjusted descriptive analyses of average student mathematics achievement across time points because many students were missing prior year M-STEP scores. In the main impact analysis that follows therefore, winter Star Math scores were used as the pretest.

Overall impacts. Overall, IXL Math showed a positive, but not statistically significant, impact on student mathematics achievement as measured by the M-STEP assessment. Students who used IXL Math scored an average of 2 points higher on the Spring 2023 M-STEP Mathematics assessment than did otherwise similar control students. Table 11 summarizes the results of this analysis.

Table 11

Overall Impact of IXL Math on Spring 2023 M-STEP Mathematics Scores

Variable	Estimate	Standard Error	<i>p</i> value	Effect Size
IXL Math	2.248	1.794	.210	.027
Constant	1395.247***	1.228	<.001	
Variance of constant	10.185			
Residual	182.753			
Student <i>N</i>	546			
Class <i>N</i>	24			

Notes. 1. *** $p < .001$. 2. The model also controlled for FARMS, ELL, and SPED status, as well as student grade and school effects. 3. Variables were grand mean centered to facilitate interpretation of the constant.

Student subgroup impacts. We also conducted a series of analyses to examine whether IXL Math impacts on M-STEP varied across different student groups. Table 12 shows the results of the only subgroup analysis that reached statistical significance: the impact on special education students. Specifically, we report additive impact of treatment main effect plus interaction term for the subgroup, with a Wald test performed on the simple effect. Complete regression tables related to subgroup analyses can be found in Appendix C.

Table 12*IXL Math Impacts on 2023 M-STEP Mathematics Scores, by Subgroup*

Subgroup	Estimate	<i>p</i> value
Special Education (<i>n</i> = 103)	6.762*	.037

Note. 1. * $p < .05$.

In the model, the main treatment effect for non-special education students remained positive but non-significant, mirroring the main impact analysis. However, the impact for special education students assigned to IXL was almost five times larger than for non-special education students. Additionally, special education students in IXL Math scored 6.7 points higher on M-STEP Mathematics than their special education peers not assigned to IXL Math. These results build on the Renaissance Star results, indicating that IXL provides additional benefits to underserved and at-risk student subgroups of interest.

Associations between IXL usage and math achievement. Next, we discuss the results of analyses that examined the associations between IXL Math digital usage variables and the Spring 2023 M-STEP Mathematics scores, while controlling for prior achievement and the same demographic, school, and grade variables included in previous analyses. The regression estimates can be interpreted as the expected increase in 2023 M-STEP Mathematics score for every unit of a given usage variable. These analyses were conducted only on treatment students. Table 13 displays the results of these analyses.

Table 13*Associations Between IXL Math Usage Variables and M-STEP Mathematics Scores (*n* = 264)*

Usage Variable	Estimate	Standard Error	<i>p</i> value
Total Minutes	0.007	0.004	.050
Total Weeks	1.159	0.704	.099
Skills Practiced	0.069**	0.021	.001
Skills Proficient	0.105***	0.027	.000
Skills Mastered	0.113***	0.028	.000

Note. ** $p < .01$; *** $p < .001$.

The time variables had directionally positive associations with M-STEP score gains, which approached statistical significance ($p = .05$ and $.10$). All three skill variables were positive and statistically significantly associated with M-STEP Mathematics score gains. The largest of these relationships was observed for counts of skills mastered, with each additional skill mastered in IXL Math equating to an additional 0.1-point gain on the M-STEP.

As with Star Math scores, we conducted regression analyses using quartiles of IXL Math usage, in terms of minutes of total usage, to examine any potentially non-linear associations between usage and M-STEP Mathematics scores. Results of these analyses are shown in Table 14. Quartile 1 refers to the lowest quartile of IXL Math usage (least usage), while Quartile 4 refers to the highest quartile of IXL Math usage (most usage). Quartile 1 usage consisted of less than 251 minutes of online usage, while Quartile 2 referred to between 252 and 479 minutes of online usage, Quartile 3 referred to between 480 and 703 minutes of online usage, and Quartile 4 referred to greater than 703 minutes of IXL Math online usage. Regression estimates can be interpreted as the average change in the 2023 M-STEP Mathematics score associated with the usage quartile, in relation to control students.

Table 14

Associations Between IXL Usage Quartiles and M-STEP Mathematics Scores (n = 546)

Usage Quartile	Estimate	Standard Error	<i>p</i> value
Quartile 1	-0.246	2.454	.920
Quartile 2	0.640	2.294	.780
Quartile 3	3.659	2.289	.110
Quartile 4	4.384	2.419	.070

Program usage was not significantly positively related with M-STEP Mathematics achievement gains when broken down by quartiles. The association between Quartile 4 usage and M-STEP achievement approached statistical significance ($p = .07$) and indicated that students in this top quartile of usage scored 4.4-points more than students in the control group.

Teacher Survey Results

Demographics

All participants in the study were randomly chosen grade-level teachers. Table 15 below reports the number of survey respondents by grade level of the majority of the students they teach.

Table 15

Respondent Numbers by Grade-Level

Grade	Number of Respondents	Percentage of Respondents
Third	3	33.3%
Fourth	4	44.4%
Fifth	2	22.2%

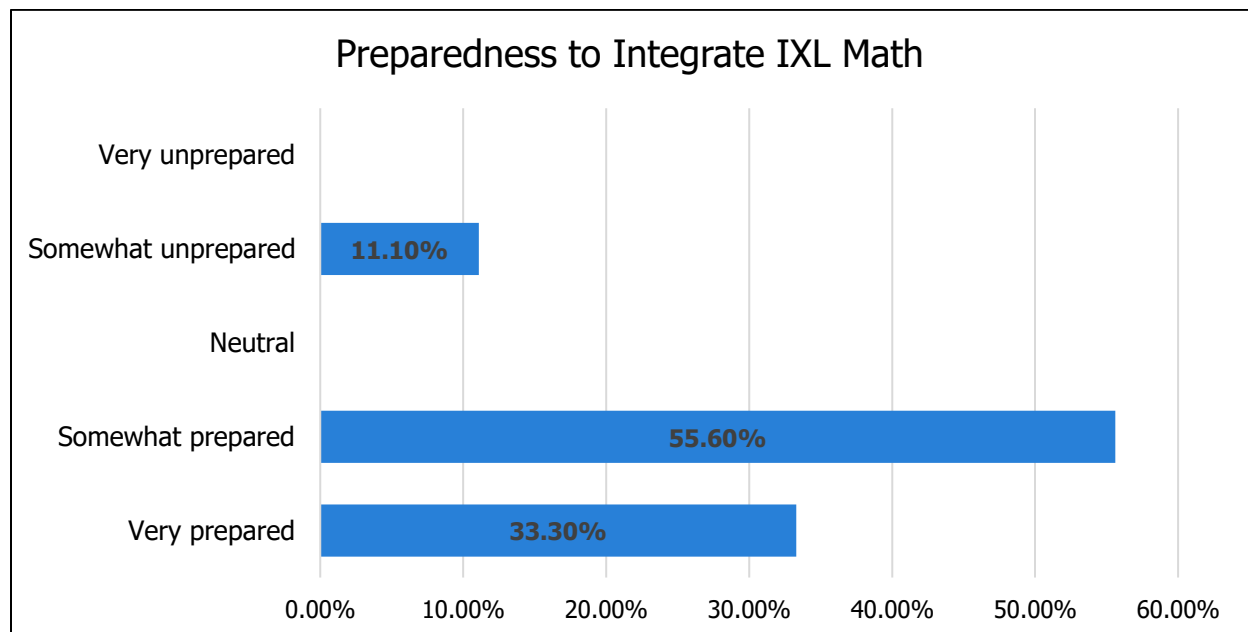
Training and Other Resources

Teachers were trained in-person by IXL Learning personnel in January 2023. When asked, all ($n = 9$) of the responding teachers reported the IXL Math training was sufficient.

A second question tied to professional development dealt with teachers' perceptions of overall preparedness to integrate IXL Math's curriculum support tools into their teaching. Although some teachers may have the initiative and find the time to explore IXL Math's reports and features on their own, a feeling of preparedness can be logically linked to the quality of professional development received. As Figure 1 reflects, nearly all responding participating teachers reported they felt prepared to integrate IXL Math curriculum support tools into their teaching, whereas only one reported feeling somewhat unprepared.

Figure 1

Preparedness to Integrate IXL Math Curriculum Support Tools



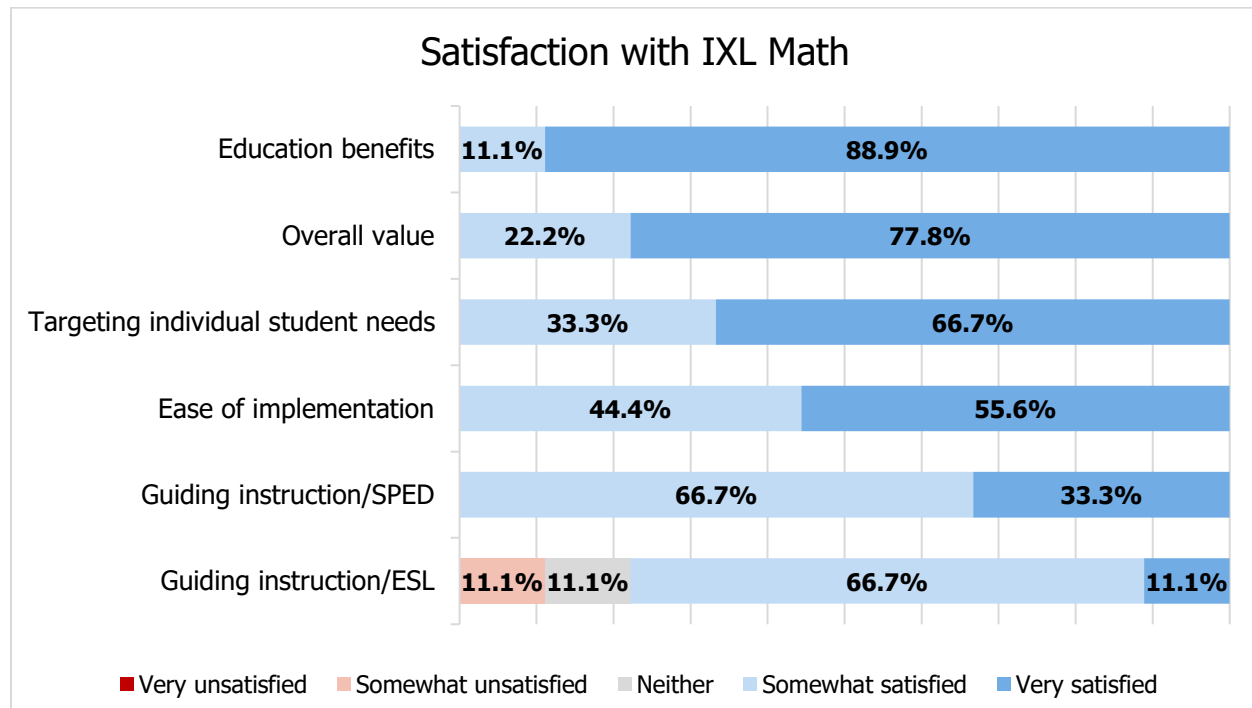
Perceptual Items about IXL Math

Teachers were asked for their level of agreement (using a 5-point Likert scale of strongly disagree to strongly agree) with statements about several aspects of IXL Math. These perceptions fall into six categories: education benefits; ease of implementation; guiding instruction for students for whom English is a second language (ESL); guiding instruction for students receiving Special Education (SPED) services; targeting individual student needs; and overall value.

As can be seen in Figure 2, teachers reacted to all items positively, with the highest satisfaction expressed about the education benefits of IXL Math, followed closely by the overall value. Satisfaction with guiding instruction for ESL students was less positive, but still reflects satisfaction by 78% of the respondents.

Figure 2

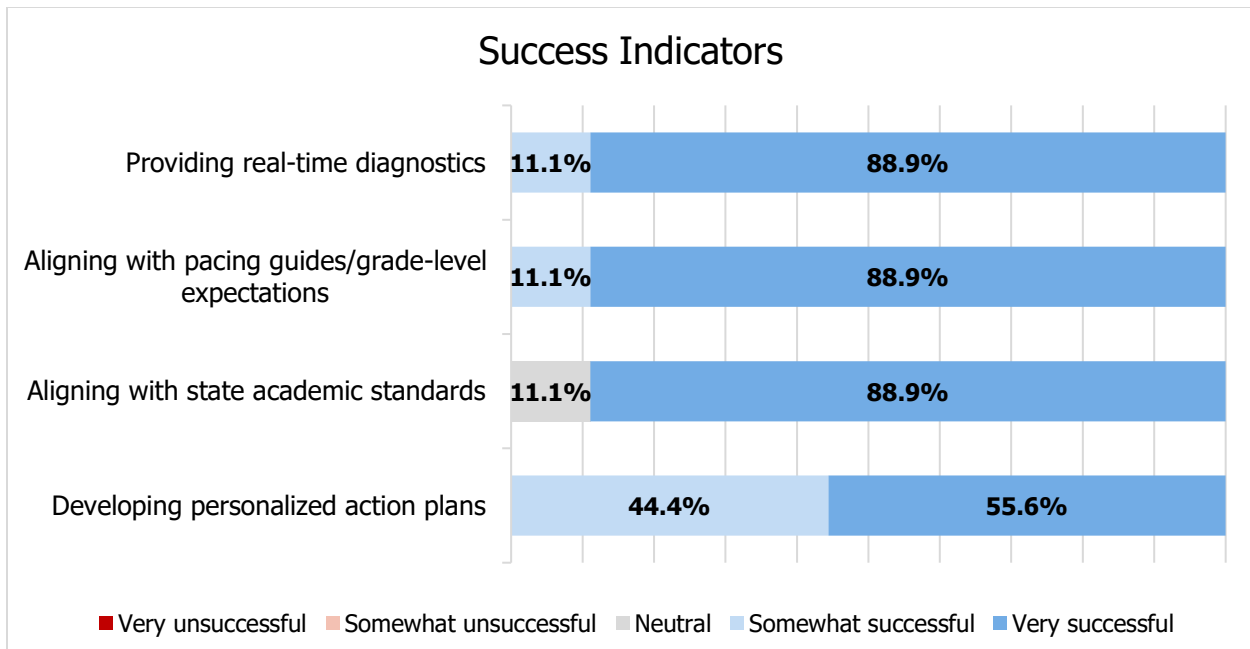
Level of Teacher Satisfaction with IXL Math



Teachers were then asked to respond to four statements specifically about the success of IXL Math using a 5-point Likert scale ranging from very unsuccessful to very successful. Their perceptions are reported in Figure 3. Nearly 90% of the responding teachers indicated that IXL Math is very successful in providing real-time diagnostics; aligning with pacing guides/grade level expectations; and aligning with state academic standards. All teachers found the program successful in developing personalized action plans.

Figure 3

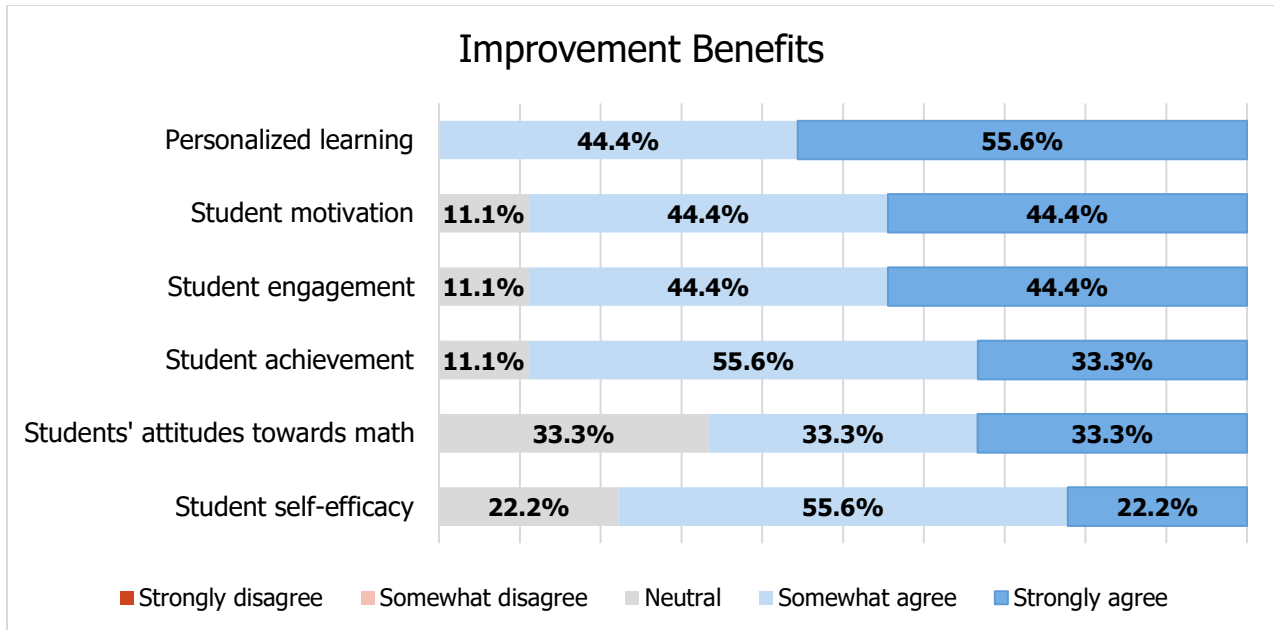
Reported Successful Indicators of IXL Math



The survey addressed teachers' perceptions of the benefits of IXL Math to improvement in six areas (Figure 4). Again, using a Likert scale ranging from strongly disagree to strongly agree, teachers considered one of the most prevailing benefits of IXL Math to be the improvement of personalized learning, all somewhat or strongly agreeing. With only one neutral rating, teachers indicated improvement benefits in student achievement, student motivation, and student engagement. Two-thirds of the respondents reported the benefit of improvement in students' attitudes toward math and nearly 90% indicated an improvement in student achievement.

Figure 4

Perceptions of Improvement Benefits of IXL Math



Open-Ended Opportunities to Provide Additional Information about IXL Math

The following questions provided teachers with opportunities to provide feedback in an unstructured format:

1. What do you like best about IXL Math for yourself?
2. What do you like best about IXL Math for your students?
3. What do you find challenging about IXL Math for yourself?
4. What do you find challenging about IXL Math for your students?
5. What are your recommendations for improving IXL program use in the future?

Unedited responses to these questions are provided in Appendix E of this report.

Question 1: *What do you like best about IXL Math for yourself?*

All nine of the responding teachers provided positive input regarding what they liked best about IXL Math for themselves. A teacher commented,

I am able to monitor students in live mode to ensure they are working on assignments or to monitor the grade levels they are working at. I can pull up a report that shows how much time they've dedicated to IXL, the number of skills and so much more valuable information I can use as a teacher and also share with parents.

Five teachers commented on the ability to individualize lessons to meet the needs of the learner. The benefits of this to the teachers included:

- Assistance in identifying students' strengths and weaknesses
- Changes that can be made to each assignment in real time
- Differentiation (mentioned twice)
- Practice that supports learning
- Meeting the needs of the student

Four teachers indicated that IXL Math aligns with the curriculum, the math textbook, and the required lessons. Another commented on the ease of use and the easy-to-use analytics. Also noted were a variety of options that assist teachers in:

- Checking on students
- Assigning lessons
- Identifying ways to provide whole group instruction
- Assisting students in working independently

Question 2: *What do you like best about IXL Math for your students?*

All respondents provided responses for what they liked best about IXL Math for their students. Student choice and ease of use was noted, along with:

- Student motivation
- Student engagement
- Student ownership of their learning
- Student support

Interactive teaching and learning of IXL Math were spotlighted. Specifically mentioned were the Group Jams, the Leaderboard, and the video support. Overall, as one teacher wrote,

It is self-paced, provides opportunities for relearning, learning new content and challenging students. They are able to read and learn why their answers were incorrect. They have an abundance of skills to choose from for each grade level.

Question 3: *What do you find challenging about IXL Math for yourself?*

While one teacher reported no challenges, six indicated a need to learn to use the platform more effectively, noting that all the program has to offer requires more training. Understanding the data and how to utilize it most effectively and efficiently was a challenge identified by three. Repetition of skills already mastered was noted, with one teacher saying,

I struggle with students' smart scores being reset after they reach 100 and receive a medal, some students have multiple gold medals for a single skill ... but from the skill analysis window I only see their current smart score, not that they've already mastered and are continuing to work on a mastered skill. I then encourage them to keep working on it, even though they've already mastered it 5 times.

Question 4: *What do you find challenging about IXL Math for your students?*

One-third of the nine responding teachers identified they found nothing about IXL Math to be a challenge for their students. "Lengthy explanations" was noted with the suggestion of providing videos for students who have difficulty reading. A request for more Spanish options for all skills was made. Time is always an issue, to fit the program into the day, as well as the time needed for modeling.

Question 5: *What are your recommendations for improving IXL program use in the future?*

Two-thirds of the responding participants replied to Question 5, with one of those responding, "nothing." Continued training and support using practical applications and examples of successful integration were requested. Spanish was again requested for all skills. One teacher summed it up by saying, "I LOVE it and definitely plan on using it next year!"

Summary

IXL Math in Holland Public Schools, as reported by nine of the 11 teachers piloting the program in the randomized-control trial, received a high level of approval. Meaningful professional development before implementation began provided the entry level implementation skills needed for successful integration and use of the program.

Teachers unanimously perceived IXL Math to be a meaningful tool for teaching and learning. Positive views of the program include alignment with state standards and district curriculum. Individualized instruction combined with student choice make for a robust instructional component in which teachers have confidence. Recommendations are minimal yet exhibit thoughtful specificity. Teachers look forward to the continued use of IXL Math in the future.

Discussion

The current study was a classroom-level randomized-control trial (RCT) designed to provide efficacy evidence of the IXL Math program on student mathematics achievement for Grades 3-5 students in Holland Public Schools by comparing treatment students who participated in IXL Math with control students who did not. This report

also includes survey findings from nine of the 11 teachers participating in the pilot program. This survey provided information on teachers' perceptions of several aspects of the implementation, benefits, and challenges of IXL Math. On the basis of this study's methodology and results, we believe that the evidence obtained meets inclusion criteria for ESSA Tier 1 and What Works Clearinghouse (WWC) Without Reservations designations.

Results of quantitative analyses showed that IXL Math had a statistically significant positive impact on student mathematics achievement, as IXL Math students outgained control students on the EOY Renaissance Star Math assessment by 10 points. The effect size of 0.13 SDs shows both practical and statistical significance of this impact. In addition, subgroup analyses showed additional significant positive IXL Math impacts for Grade 3, Hispanic, special education, ELL, and FARMS students, with treatment students in these subgroups outscoring their control counterparts by an average of 13-17 points. Impact on the M-STEP Mathematics assessment was directionally positive but was not statistically significant except for special education students, who particularly benefited from IXL Math in relation to M-STEP Mathematics achievement.

Usage analyses showed that IXL Math digital usage variables were generally positively related with student mathematics achievement. Pearson correlations between usage variables and both EOY Star Math and spring 2023 M-STEP Mathematics scores showed significant positive associations between counts of skills practiced, proficient, and mastered and mathematics achievement across all grades. Regression analyses similar to those in the main impact analyses showed that measures of student time in the program, including total minutes and active weeks, were significantly positively associated with mathematics achievement gains on both outcomes. Analyses of usage quartiles, as defined by total minutes of usage, showed that Quartiles 3 and 4 of usage were significantly positively associated with mathematics achievement gains, with students in these usage quartiles averaging 12-15 points larger gains on the STAR Math assessment, in relation to control students who did not use the program.

Teacher perceptions of the IXL Math program were generally positive, with a combination of factors contributing to participating teachers' overall positive perceptions of IXL Math in Holland Public Schools. Initial training proved to be highly beneficial and gave the teachers the information needed to implement the program successfully and easily. The ability to monitor students in real-time, adjust individual instruction appropriately, and confidently allow students to work independently with the knowledge that IXL Math lessons are in alignment with the curriculum, the textbooks, and the state standards are convincing indicators identified by the teachers that IXL Math is a resource valuable to the teaching and learning of mathematics in Holland Public Schools. Recommendations for continued successful implementation include:

- Consider developing online opportunities for training and modeling videos for teachers.
- Find ways to address the issue of repetitive lessons on standards that students have previously demonstrated mastery.
- Consider adding more lessons in Spanish.

In all, the results of this evaluation showed positive findings regarding both student achievement impacts and teacher perceptions relating to IXL Math. One limitation of this evaluation was that the study sample consisted of Grades 3-5 teachers in one small school district. Thus, the results of this evaluation may not generalize to other contexts or student populations. Further evaluation therefore is encouraged in additional school districts in other educational contexts to further examine the IXL Math program's impacts on mathematics achievement.

Conclusions

The key results and conclusions of this evaluation are as follows:

- IXL Math students significantly outgained control students by more than 10 points on the Renaissance Star Math assessment.
- Subgroup analyses showed significant positive program impacts for Hispanic, special education, ELL, and FARMS students. Advantages for IXL Math students in these subgroups averaged between 13-17 points. In addition, SPED IXL Math students outgained control SPED students by more than 6 points on the M-STEP Mathematics assessment.
- Average usage metrics were generally highest for Grade 3 students, with these students averaging approximately 10 hours of usage. Grades 4 and 5 students averaged 7-8 hours of usage.
- Measures of total student program usage were significantly positively associated with mathematics achievement gains, after controlling for prior mathematics achievement and demographics, as in the main impact analyses.
- Teachers generally held very positive overall perceptions of IXL Math, especially regarding professional development.
- Teachers also expressed positive views of IXL Math's meaningfulness to teaching and learning, as well as program alignment with state standards and the ability to individualize student instruction.

Appendix A: Baseline Equivalence and Attrition Tables

Table A1

Baseline Equivalence, MOY Renaissance Star Mathematics Scores

	Overall Mean	IXL Math Mean (SD)	Control Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Grade 3	940.81	952.59 (56.71)	926.86 (60.99)	25.73	58.71	0.44
Grade 4	993.11	1003.17 (56.51)	981.30 (58.86)	21.87	57.60	0.38
Grade 5	1038.82	1042.39 (59.70)	1036.68 (71.02)	5.71	67.01	0.09
All students	993.28	996.60 (67.35)	990.19 (78.79)	6.41	73.49	0.09

Note. SD=standard deviation.

Table A2

Summary of Cluster Attrition (for Both Outcomes)

C Cluster N	T Cluster N	N Randomized to C	N Randomized to T	Attrited C Clusters	Attrited T Clusters	Overall Cluster Attrition Rate (%)	Differential Cluster Attrition Rate (%)
10	11	10	11	0	0	0.00	0.00

Table A3

Summary of Student Attrition – By Outcome

Outcome	C Student N	T Student N	N Randomized to C	N Randomized to T	Attrited C Students	Attrited T Students	Overall Student Attrition Rate (%)	Differential Student Attrition Rate (%)
Renaissance Star	282	263	285	265	3	2	0.86	0.30
M-STEP	281	265	285	265	4	0	0.73	1.4

Appendix B: Descriptive Usage Analyses

Table B1

Average IXL Math Usage by School

	Minutes of Usage	Weeks	Skills Practiced	Skills Proficient	Skills Mastered
School 1 ($n = 51$)	368.57	15.33	56.78	41.90	38.12
School 2 ($n = 74$)	527.25	14.71	76.84	51.05	44.57
School 3 ($n = 56$)	776.68	15.68	71.86	44.71	36.55
School 4 ($n = 81$)	379.85	14.23	62.32	38.90	33.56

Note. Analyses only include treatment students with non-missing pretest and posttest scores.

Appendix C: Subgroup Analyses

Table C1

Renaissance Star Math Regression Results with SPED Interaction

	Estimate	Standard Error	p value
IXL Math	9.202*	4.150	.027
IXL Math*SPED	5.910	7.837	.451
SPED	-10.386	5.427	.056
Constant	1011.146***	2.707	<.001

Note. * $p < .05$; *** $p < .001$.

Table C2

Renaissance Star Math Regression Results with FARMS Interaction

	Estimate	Standard Error	p value
IXL Math	1.880	5.758	.744
IXL Math*FARMS	12.253	6.299	.052
FARMS	-15.340**	4.801	.001
Constant	1011.271***	2.674	<.001

Note. ** $p < .01$; *** $p < .001$.

Table C3

Renaissance Star Math Regression Results with ELL Interaction

	Estimate	Standard Error	p value
IXL Math	9.204*	4.161	.030
IXL Math*ELL	7.867	8.285	.342
ELL	-5.143	6.169	.404
Constant	1011.101***	2.724	<.001

Note. * $p < .05$; *** $p < .001$.

Table C4

Renaissance Star Math Regression Results with Ethnicity Interaction

	Estimate	Standard Error	p value
IXL Math	4.479	4.913	.362
IXL Math*Black	14.069	10.593	.184
IXL Math*Hispanic	10.107	6.124	.099
Constant	1011.407***	2.650	<.001

Note. *** $p < .001$.

Table C5

M-STEP Mathematics Regression Results with SPED Interaction

	Estimate	Standard Error	p value
IXL Math	1.425	1.873	.447
IXL Math*SPED	5.338	3.20	.096
SPED	-10.320***	2.236	<.001
Constant	1396.899***	1.283	<.001

Note. *** $p < .001$.

Table C6

M-STEP Mathematics Regression Results with FARMS Interaction

	Estimate	Standard Error	p value
IXL Math	-0.785	2.459	.749
IXL Math*FARMS	4.451	2.587	.085
FARMS	-6.864***	1.963	<.001
Constant	1399.933***	1.791	<.001

Note. *** $p < .001$.

Table C7

M-STEP Mathematics Regression Results with ELL Interaction

	Estimate	Standard Error	p value
IXL Math	2.373	1.857	.201
IXL Math*ELL	-0.875	3.383	.796
ELL	-0.984	2.504	.694
Constant	1395.394***	1.276	<.001

Note. *** $p < .001$.

Table C8

M-STEP Regression Results with Ethnicity Interaction

	Estimate	Standard Error	p value
IXL Math	2.172	2.187	.321
IXL Math*Black	2.359	4.415	.593
IXL Math*Hispanic	-0.325	2.509	.897
Black	-4.987	3.015	.098
Hispanic	-3.511	1.929	.069

Constant	1397.202***	1.576	<.001
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Note. *** $p < .001$.

Appendix D: Teacher Questionnaire

IXL Math Teacher Questionnaire

**Formative Evaluation of IXL Math in
Holland Public Schools
Johns Hopkins University
Spring 2023**

[Consent language was added into Qualtrics.]

Johns Hopkins University is working with IXL Math in the Holland Public Schools to evaluate IXL Math's effectiveness as a tool for improving teaching and learning in its elementary schools, Grades 3-5. Feedback from teachers is essential to this work. Thank you for taking the time to complete this questionnaire.

What is the grade of the majority of your students?

Third

Fourth

Fifth

Was the IXL Math training you received sufficient? Yes/No If no, please explain.

How prepared do you feel to integrate IXL Math curriculum support tools into your teaching? [Likert scale: very unprepared (1) somewhat unprepared (2) neutral (3) somewhat prepared (4) very prepared (5)]

Please indicate your satisfaction with the following: [Likert scale: very dissatisfied (1) dissatisfied (2) neither satisfied nor dissatisfied (3) satisfied (4) very satisfied (5)]

The overall value of IXL Math for teaching and learning

The value of IXL Math for targeting instruction based on individual student needs

The value of IXL Math for guiding instruction for students with special needs (SPED)

The value of IXL Math for guiding instruction for students for whom English is a second language (ELL)

The ease of implementing IXL Math

The educational benefits of IXL Math for students

How successful is IXL Math at: [Likert scale: very unsuccessful (1) somewhat unsuccessful (2) neither successful nor unsuccessful (3) somewhat successful (4) very successful (5)]

Aligning with Michigan State Academic Standards

Aligning with pacing guides/grade-level expectations

Providing real-time diagnostics
Developing personalized action plans

Please indicate your level of agreement to the following statements: [Likert scale:
strongly disagree (1) disagree (2) neutral (3) agree (4) strongly agree (5)]

IXL Math has been beneficial in improving:

- Student engagement
- Student motivation
- Student self-efficacy
- Students' attitudes toward math
- Student achievement
- Personalized learning

What did you like best about IXL Math?

- For yourself
- For your students

What did you find challenging about IXL Math:

- For yourself
- For your students

What are your recommendations for improving IXL program use in the future?

Appendix E: Unedited Open-Ended Teacher Questionnaire Results

Q9 - What do you like best about IXL Math for yourself?

I like the way IXL targets the individual needs of my learners, which helps me identify their strengths and weaknesses.

Easy to use! Easy to recommend skills aligned with curriculum, easy to use analytics.

I am able to monitor students in live mode to ensure they are working on assignments or to monitor the grade levels they are working at. I can pull up a report that shows how much time they've dedicated to IXL, the number of skills and so much more valuable information I can use as a teacher and also share with parents.

That it follows the text book we use.

How you can change each assignment to meet the needs of the student.

I love the way that it aligns with our curriculum and has a variety of options that assist students.

I like that I have options within IXL: ways to assign, ways to check on kids, differentiation and ways to do whole group work.

Helps students work independently and useful for differentiation

I love how it aligns with our math lessons. I can teach a lesson and then have my students practice questions that support their learning.

Q10 - What do you like best about IXL Math for your students?

I like the way IXL allows students a choice on the skills they want to work on.

Students were motivated, engaged and able to take ownership of their learning.

It is self-paced, provides opportunities for relearning, learning new content and challenging students. They are able to read and learn why their answers were incorrect. They have an abundance of skills to choose from for each grade level.

The set up is easy to use for students.

Group Jams, live classroom

I loved the video that is included for students that helps them out! They also love the Leaderboard and the Group Jams.

The video support and differentiation.

Supports them where they need it

My students like the leaderboard and the interactive teaching.

Q11 - What do you find challenging about IXL Math for yourself?

I'm still learning how to use IXL in the most effective way.

I struggle with students' smart scores being reset after they reach 100 and receive a medal, Some students have multiple gold medals for a single skill...but from the skill analysis window I only see their current smart score, not that they've already mastered and are continuing to work on a mastered skill. I then encourage them to keep working on it, even though they've already mastered it 5 times.

none

understanding all of the options I have to use.

What to do with the data

I would like to understand other data aspects. There is so much IXL can do and I don't feel confident in knowing all of the parts.

Knowing how to best and efficiently use it.

There's a lot of different ways to use it and tools that I'm not familiar with

There is a lot to it and would like to receive a bit more training.

Q12 - What do you find challenging about IXL Math for your students?

I found that many of my students didn't enjoy IXL as they prefer to play "games" rather than engage in math skills.

When selecting the "suggestions from your teacher" dropdown menu, I wish students could see which of the skills had Spanish options. Additionally, Spanish options for all skills would be awesome.

none

nothing

Having time to fit it in

Nothing at this time.

Making sure all kids are using video tools and not just guessing. Lots of modeling is needed. helping kids to track learning by also using pencil and paper.

Lengthy explanations / no videos for students with difficulty reading

Q13 - What are your recommendations for improving IXL program use in the future?

I think continued training and support would be beneficial. It's difficult to collaborate with other teachers when only a few in our building were piloting the program.

-Spanish option for all skills...until then, ability for students to see in menu which are in Spanish. -Visibility of which skills have been mastered multiple times by one student.

nothing

More practical applications on how we can use it with troubling students and what to do with the results.

I LOVE It and definitely plan on using it next year!

Show examples of teachers on video successfully integrating IXL. Tips, etc.

Appendix F: Descriptive Questionnaire Results

Table F1

How prepared do you feel to integrate IXL Math curriculum support tools into your teaching?

Very unprepared %	Somewhat prepared %	Neutral %	Somewhat prepared %	Very prepared %	<i>M</i>	<i>SD</i>	<i>N</i>
0.0	11.1	0.0	55.6	33.3	4.11	0.87	9

Table F2

Use the scale below to indicate your level of satisfaction with each statement.

Very dissatisfied %	Somewhat dissatisfied %	Neither %	Somewhat satisfied %	Very satisfied %	<i>M</i>	<i>SD</i>	<i>N</i>
The overall value of IXL Math for teaching and learning							
0.0	0.0	0.0	22.2	77.8	4.78	0.42	9
The value of IXL Math for targeting instruction based on individual student needs							
0.0	0.0	0.0	33.3	66.7	0.47	0.22	9
The value of IXL Math for guiding instruction for students with special needs (SPED)							
0.0	0.0	0.0	66.7	33.3	4.33	0.47	9
The value of IXL Math for guiding instruction for students for whom English is a second language (ELL)							
0.0	11.1	11.1	66.7	11.1	3.78	0.79	9
The ease of implementing IXL Math							
0.0	0.0	0.0	44.4	55.6	4.56	0.50	9
The education benefits of IXL Math for students							
0.0	0.0	0.0	11.1	88.9	4.89	0.31	9

Table F3

How successful is IXL Math at...

Very unsuccessful %	Somewhat unsuccessful %	Neutral %	Somewhat successful %	Very successful %	<i>M</i>	<i>SD</i>	<i>N</i>
Aligning with Michigan State Academic Standards							
0.0	0.0	11.1	0.0	88.9	4.78	0.63	9
Aligning with pacing guides/grade-level expectations							
0.0	0.0	0.0	11.1	88.9	4.89	0.31	9
Providing real-time diagnostics							

	0.0	0.0	0.0	11.1	88.9	4.89	0.31	9
Developing personalized action plans	0.0	0.0	0.0	44.4	55.6	4.56	0.50	9

Table F4

Please indicate your level of agreement with the following statements. IXL Math has been beneficial in improving:

	Strongly disagree %	Somewhat disagree %	Neutral %	Somewhat agree %	Strongly Agree %	<i>M</i>	<i>SD</i>	<i>N</i>
Student engagement	0.0	0.0	11.1	44.4	44.4	4.33	0.67	9
Student motivation	0.0	0.0	11.1	44.4	44.4	4.33	0.67	9
Student self-efficacy	0.0	0.0	22.2	55.6	22.2	4.00	0.67	9
Students' attitudes towards math	0.0	0.0	33.3	33.3	33.3	4.00	0.82	9
Student achievement	0.0	0.0	11.1	55.6	33.3	4.22	0.63	9
Personalized learning	0.0	0.0	0.0	44.4	55.6	4.56	0.50	9