



**RESEARCH REPORT**

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# Combating Summer Learning Loss with IXL: A 10-State Study

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## Executive Summary

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IXL is an end-to-end teaching and learning solution that engages learners in Pre-K through 12th grade with a comprehensive curriculum, next-generation assessment suite, and personalized recommendations for meeting learning goals. Previous research, including a randomized controlled trial (Copeland et al., 2023), has shown that IXL can have a significant positive impact on students' academic performance.

The goal of the present study was to examine whether summer use of IXL helps mitigate summer learning loss in math. The study analyzed data from nearly 50,000 students across 10 states who used IXL Math during summer 2024. Key findings include:

- **IXL Math summer usage helps prevent summer learning loss.** Students who did not use IXL Math showed significant declines in math performance over the summer, whereas students who practiced on IXL maintained or improved their performance.
- **Higher levels of summer IXL Math usage are associated with greater math achievement gains.** Students who answered more questions, reached proficiency in more skills, and spent more time on IXL demonstrated stronger post-summer math performance.

# Combating Summer Learning Loss with IXL: A 10-State Study

## Background

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IXL is an end-to-end teaching and learning solution that engages learners in Pre-K through 12th grade with a comprehensive curriculum, next-generation assessment suite, and personalized recommendations for meeting learning goals. It covers five main subject areas: mathematics, English language arts (ELA), science, social studies, and Spanish. As of this writing, IXL is used by 30% of students in the U.S. and 17 million students worldwide. IXL is deeply rooted in learning sciences research (see Bashkov et al., 2021) and engages each student in a personalized learning experience tailored to their working level. As a result, students work through problems that are neither too easy nor too difficult, which in turn supports their self-efficacy and motivation for continued learning (An & Schonberg, 2024).

The goal of the present study was to examine whether summer use of IXL helps mitigate summer learning loss in math. Summer learning loss, often referred to as the summer slide, describes the decline in academic performance that occurs during lengthy breaks from school (Alexander, Pitcock, & Boulay, 2016; Gierczyk & Hornby, 2023). Prior research has documented declines in students' knowledge and skills over the summer, especially in mathematics (Cooper et al., 1996). This phenomenon poses a significant challenge for educators, as learning loss during summer months can offset much of the progress made during the school year, making it difficult for students to maintain academic momentum. In addition, the problem of summer learning loss is especially pronounced among students from low socioeconomic status backgrounds, further widening existing achievement gaps (Alexander, Entwisle, & Olson, 2007; Burkam et al., 2004; Downey, Hippel, & Broh, 2004).

Previous studies have shown that high-quality tutoring (e.g., Bell et al., 2020; Lenhoff et al., 2020; Strong & Anderson, 2024) and extended learning time, such as summer programs (e.g., Cooper, 2003; Lynch, An, & Mancenido, 2021), are effective in mitigating summer learning loss. In a similar vein, IXL offers personalized practice, adaptive instruction, and ongoing low-stakes assessment to support continuous learning beyond the school year. To evaluate the impact of IXL Math on summer learning loss, this study analyzed data from students across 10 states who used IXL Math in summer 2024.

## RESEARCH QUESTIONS

The present study aimed to answer the following research questions:

- 1. Combating summer learning loss.** Does using IXL Math help mitigate summer learning loss? Specifically, after accounting for baseline math performance, did students who used IXL Math during the summer perform better on math assessments administered after the summer break than their peers who did not use the platform?
- 2. Cumulative usage effects of IXL Math during summer.** What is the relationship between IXL Math usage and math learning gains? Specifically, was greater usage of IXL Math during the summer associated with larger improvements in math performance?

## Study Design and Methodology

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### PARTICIPANTS

This study analyzed data from 49,618 students who had access to IXL Math during summer 2024 and had non-missing math assessment scores from both May 2024 (pretest) and September 2024 (posttest). The sample spanned 10 states: California (5.4%), Florida (4.3%), Georgia (2.6%), Illinois (3.1%), New Jersey (27.2%), New York (6.7%), North Carolina (6.4%), Texas (24.1%), Virginia (15.1%), and Washington (5.2%). The sample comprised students in kindergarten through 12th grade. Of the students, 52.1% were male. By race, 54.1% identified as White, 13.6% as Black, and 32.3% as other. Additionally, 35.3% of students identified as Hispanic.

### MEASURES AND DATA SOURCES

#### *Math Performance*

We measured students' math achievement using the IXL Flex Diagnostic for math. The IXL Flex Diagnostic is an interim assessment designed to deliver timely, precise, and reliable information about students' subject-area knowledge. When students complete a sufficient number of questions, the assessment provides a pinpointed score that reflects their overall grade-level proficiency. For example, a score of 380 indicates that the learner has mastered approximately 80% of third-grade material. For this study, we obtained all available pinpointed IXL Flex Diagnostic math scores for May 2024 and September 2024. The most recent score from May 2024 was used as the pretest (prior to summer), and the most recent score from September 2024 served as the posttest (after summer).

### ***IXL Math Usage***

We obtained IXL Math usage data for summer 2024 from IXL's database. When students use IXL Math, they complete practice problems organized within "skills," which represent specific topic areas within math. IXL uses a proprietary SmartScore to indicate a student's proficiency within each skill. The SmartScore ranges from 0 to 100 and increases as students answer questions correctly. However, it is not a percent correct score; a score of 100 is always achievable. A SmartScore of 80 indicates proficiency in a skill, and a SmartScore of 100 indicates mastery.

The usage indicators analyzed in this study included the average number of questions answered per week, the average number of skills in which students reached proficiency (i.e., skills proficient) per week, and the average time spent practicing (in minutes) on IXL Math per week. Using a cutoff of three standard deviations above the mean number of minutes of IXL usage, we identified 592 "super users" as outliers and excluded them from the analysis. The final analytic sample consisted of 49,026 students.

### **ANALYTIC APPROACH**

For each research question, we specified and tested separate multilevel models to account for clustering at the school/district level (ICC = 0.401) or at the state level (ICC = 0.182). Each model regressed posttest IXL Flex Diagnostic math scores on pretest scores, grade level, demographic variables (i.e., gender, race, and ethnicity), and a key predictor of IXL Math usage.

To examine whether IXL helps mitigate summer learning loss, the key predictor was a binary variable indicating whether a student (a) used IXL Math (i.e., answered at least one question;  $n = 29,040$ ) or (b) did not use IXL Math (i.e., answered zero questions;  $n = 19,986$ ) during the summer. Additionally, we ran a similar model comparing students who met the 15 questions/week threshold ( $n = 6,855$ ) with those who did not use IXL Math ( $n = 19,986$ ). Prior research has shown that students who answer a minimum of 15 questions per week outperform others (IXL Learning, 2022).

In models examining IXL usage effects during summer, predictors included students' weekly average number of questions answered, skills proficient, and time spent (in minutes). Because these three usage indicators were highly inter-correlated ( $r_s = [.67-.81]$ ), we tested separate regression models for each. This analysis included all 29,040 students with non-zero IXL Math usage.

## Results

### COMBATING SUMMER LEARNING LOSS

We found that students who did not use IXL Math during summer 2024 showed significant summer learning loss, with mean assessment scores dropping from 451 before summer to 446 after ( $t = -13.64, p < .001$ ). In contrast, students who practiced any amount on IXL Math showed no significant change, with mean scores remaining at 442 before and after summer ( $t = 1.01, p = .313$ ). See Table 1 for descriptive statistics by group. Controlling for pretest scores, grade level, and demographics, students who practiced any amount on IXL Math outperformed their peers with no IXL Math usage by 3.19 points ( $p < .001$ ; Hedges'  $g = .015$ ; see Table A1 in Appendix A).

**Table 1. Means (Standard Deviations) of IXL Flex Diagnostic Math Scores by IXL Math Usage Group**

	<b>Comparison Group<sup>1</sup></b> ( $n = 19,986$ )	<b>IXL Math Treatment Group 1<sup>2</sup></b> ( $n = 29,040$ )	<b>IXL Math Treatment Group 2<sup>3</sup></b> ( $n = 6,855$ )
May 2024	451.05 (224.99)	441.69 (225.40)	446.65 (221.25)
September 2024	446.05 (218.82)	441.98 (221.05)	458.37 (220.54)

*Note.*

<sup>1</sup> Answered zero questions on IXL Math

<sup>2</sup> Answered at least one question on IXL Math

<sup>3</sup> Answered at least 15 questions per week on IXL Math

Additionally, students who answered at least 15 questions per week exhibited significant learning gains, with scores increasing from 447 before summer to 458 after summer ( $t = 11.73, p < .001$ ; See Table 1). The multilevel model showed these students outperformed their peers with no IXL Math usage by 13.28 points ( $p < .001$ ; Hedges'  $g = .061$ ; see Table A2 in Appendix A), which is equivalent to 13% of the growth expected in an academic year.

### CUMULATIVE USAGE EFFECTS OF IXL MATH DURING SUMMER

Among the 29,040 students, IXL usage varied widely. On average, time spent on IXL Math ranged from less than one minute to more than 30 minutes per week, and the number of skills proficient ranged from zero to more than 10 per week (see Table 2).

Table 2. IXL Math Weekly Usage During the 2023-24 School Year

IXL Math Weekly Usage	<i>M</i>	<i>SD</i>	Min	Max
Questions answered	11.29	15.28	0.08	297.98
Skills proficient	0.36	0.50	0.00	10.96
Time spent (in minutes)	4.54	5.48	0.00	33.51

Controlling for pre-summer math performance, grade level, and demographics, we found statistically significant positive effects of IXL Math usage on post-summer math performance. See Figure 1 for the expected usage effects; see Table A3 in Appendix A for full model results.

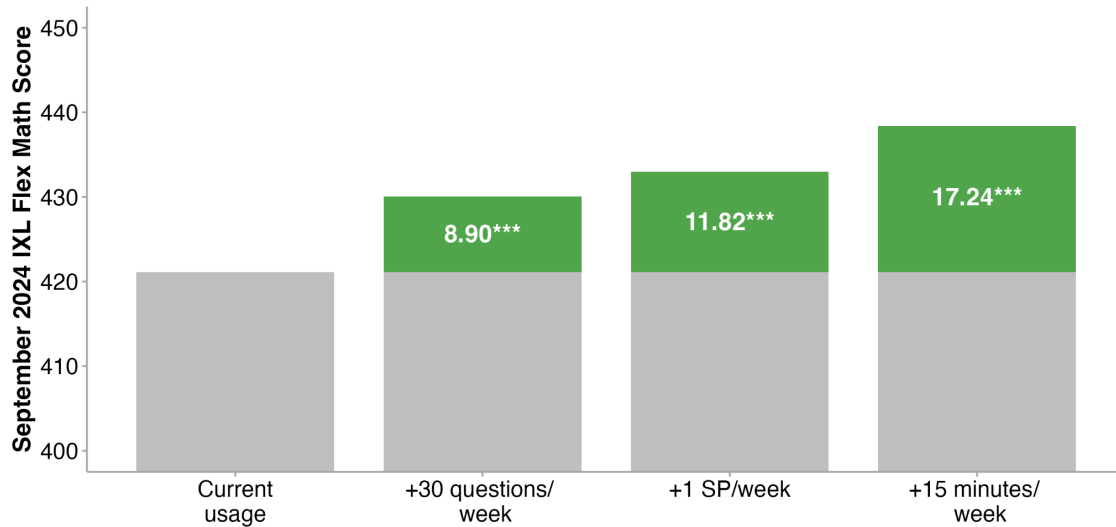


Figure 1. Predicted usage effects for IXL Math

We also examined usage effects by grade band, specifically elementary school (kindergarten through 5th grade), middle school (6th through 8th grade), and high school (9th through 12th grade), and found similar usage effects across all grade bands. Answering 30 more questions per week was associated with a post-summer math score gain of 8.28 points for elementary students, 9.21 points for middle school students, and 11.71 points for high school students ( $ps < .001$ ). Each additional skill proficient per week was associated with a math score gain of 11.60 points for elementary students, 11.11 points for middle school students, and 15.09 points for high school students ( $ps < .001$ ). Finally, each additional 15 minutes of practice per week was associated with an increase of 16.58 points for elementary students, 17.76 points for middle school students, and 15.57 points for high school students ( $ps < .001$ ).

## Conclusion

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In this study of nearly 50,000 students across 10 states, we found that IXL Math had statistically significant positive effects on summer learning loss: Students who used IXL Math during the summer did not exhibit a decline. On average, these students maintained their math performance. Moreover, those who met the minimum usage goal even exhibited measurable learning gains. These results are consistent with a growing body of research suggesting that IXL implementation and consistent usage support students' academic progress (see IXL research), whether used during the school year or during out-of-school periods such as summer breaks.

In contrast, and consistent with prior research on summer learning loss, students who did not use IXL during the summer showed declines in their math assessment scores. While prior research (Cooper et al., 1996) has shown that summer learning loss can equal at least one month of instruction (about 11% of the growth expected in a 9-month school year), the decline observed in our study was smaller, about 5%. One possible explanation is that all participants had access to IXL during the 2023–24 school year, which may have helped reinforce students' understanding of key math skills, making their knowledge more durable and less susceptible to decline over the summer.

Importantly, the benefits of IXL Math have been shown to be cumulative, indicating that students who engage in regular IXL practice over the summer can not only avoid learning loss but also make significant academic progress. This may be especially important for students from disadvantaged backgrounds, who often have fewer resources and fewer opportunities for enriching educational activities during the summer months (Slates et al., 2012). Unlike in school settings, where such differences may contribute to widen achievement gaps during extended school breaks, continued access to IXL during the summer may help support learning continuity and reduce these disparities.

Because usage in this study was likely self-directed by students or their families, we expect that structured opportunities for summer learning on IXL would further support student outcomes. As such, we recommend that schools and educators consider incorporating IXL into summer learning initiatives and that parents use IXL as a supplemental learning resource at home.

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## Appendix A: Full Analysis Results

Table A1. Predicting September 2024 IXL Flex Diagnostic Math Score from IXL Math Usage (answered at least 1 question)

Predictor	b	SE	95% CI	$\beta$	t	p
(Intercept)	429.06	5.88	417.59 – 440.50	-.06	72.96	<.001
May 2024 Flex Diagnostic math <sup>1</sup>	0.94	0.00	0.94 – 0.94	.96	562.78	<.001
Grade 1 <sup>2</sup>	8.47	5.41	-2.13 – 19.07	.04	1.57	.117
Grade 2 <sup>2</sup>	9.26	5.40	-1.32 – 19.84	.04	1.72	.086
Grade 3 <sup>2</sup>	16.04	5.39	5.47 – 26.61	.07	2.98	.003
Grade 4 <sup>2</sup>	12.97	5.40	2.38 – 23.55	.06	2.40	.016
Grade 5 <sup>2</sup>	19.97	5.41	9.36 – 30.56	.09	3.69	<.001
Grade 6 <sup>2</sup>	20.04	5.43	9.39 – 30.68	.09	3.69	<.001
Grade 7 <sup>2</sup>	20.40	5.44	9.72 – 31.06	.09	3.75	<.001
Grade 8 <sup>2</sup>	25.41	5.45	14.71 – 36.09	.12	4.66	<.001
Grade 9 <sup>2</sup>	1.71	5.55	-9.16 – 12.58	.01	0.31	.758
Grade 10 <sup>2</sup>	14.91	5.59	3.96 – 25.88	.07	2.67	.008
Grade 11 <sup>2</sup>	12.88	5.63	1.87 – 23.92	.06	2.29	.022
Grade 12 <sup>2</sup>	2.31	5.69	-8.83 – 13.47	.01	0.41	.685
Gender: Male <sup>3</sup>	2.40	0.44	1.54 – 3.25	.01	5.48	<.001
Race: White <sup>4</sup>	0.85	0.64	-0.40 – 2.09	.00	1.34	.182
Race: Black <sup>4</sup>	-4.99	0.86	-6.67 – -3.31	-.01	-5.82	<.001
Ethnicity: Hispanic <sup>5</sup>	-4.97	0.60	-6.13 – -3.80	-.01	-8.34	<.001
<b>IXL Math (at least 1 question)</b>	<b>3.19</b>	<b>0.49</b>	<b>2.23 – 4.15</b>	<b>.01</b>	<b>6.51</b>	<b>&lt;.001</b>

Note.

<sup>1</sup> Grand mean-centered

<sup>2</sup> Dummy-coded; kindergarten as reference group

<sup>3</sup> Dummy-coded; female as reference group

<sup>4</sup> Dummy-coded; other race as reference group

<sup>5</sup> Dummy-coded; non-hispanic as reference group

**Table A2. Predicting September 2024 IXL Flex Diagnostic Math Score from IXL Math Usage (answered at least 15 questions per week)**

<b>Predictor</b>	<b>b</b>	<b>SE</b>	<b>95% CI</b>		<b><math>\beta</math></b>	<b>t</b>	<b>p</b>
(Intercept)	433.02	6.44	420.46	- 445.54	-.06	67.23	<.001
May 2024 Flex math <sup>1</sup>	0.94	0.00	0.93	- 0.94	.96	422.80	<.001
Grade 1 <sup>2</sup>	6.09	6.02	-5.70	- 17.88	.03	1.01	.312
Grade 2 <sup>2</sup>	8.17	6.01	-3.62	- 19.94	.04	1.36	.174
Grade 3 <sup>2</sup>	14.38	6.00	2.60	- 26.13	.07	2.40	.017
Grade 4 <sup>2</sup>	11.50	6.02	-0.31	- 23.27	.05	1.91	.056
Grade 5 <sup>2</sup>	18.85	6.02	7.02	- 30.64	.09	3.13	.002
Grade 6 <sup>2</sup>	18.10	6.05	6.23	- 29.93	.08	2.99	.003
Grade 7 <sup>2</sup>	18.59	6.06	6.69	- 30.45	.08	3.07	.002
Grade 8 <sup>2</sup>	28.33	6.08	16.38	- 40.23	.13	4.66	<.001
Grade 9 <sup>2</sup>	3.41	6.22	-8.77	- 15.59	.02	0.55	.583
Grade 10 <sup>2</sup>	16.13	6.30	3.82	- 28.51	.07	2.56	.010
Grade 11 <sup>2</sup>	14.36	6.35	1.94	- 26.85	.07	2.26	.024
Grade 12 <sup>2</sup>	5.54	6.45	-7.07	- 18.21	.03	0.86	.391
Gender: Male <sup>3</sup>	1.59	0.60	0.43	- 2.76	.00	2.68	.007
Race: White <sup>4</sup>	1.01	0.85	-0.66	- 2.66	.00	1.19	.234
Race: Black <sup>4</sup>	-6.06	1.16	-8.34	- -3.80	-.01	-5.23	<.001
Ethnicity: Hispanic <sup>5</sup>	-5.09	0.81	-6.68	- -3.50	-.01	-6.28	<.001
<b>IXL Math (at least 15 questions /week)</b>	<b>13.28</b>	<b>0.84</b>	<b>11.65</b>	<b>- 14.94</b>	<b>.03</b>	<b>15.90</b>	<b>&lt;.001</b>

Note.

<sup>1</sup> Grand mean-centered

<sup>2</sup> Dummy-coded; kindergarten as reference group

<sup>3</sup> Dummy-coded; female as reference group

<sup>4</sup> Dummy-coded; other race as reference group

<sup>5</sup> Dummy-coded; non-hispanic as reference group

Table A3. Predicting September 2024 IXL Flex Diagnostic Math Score from IXL Math Usage Indicators

Predictor	b	SE	95% CI	$\beta$	t	p
(Intercept)	421.14	12.89	395.87 - 446.31	-.09	32.67	<.001
May 2024 Flex math <sup>1</sup>	0.94	0.00	0.94 - 0.95	.96	436.21	<.001
Grade 1 <sup>2</sup>	18.09	12.62	-6.65 - 42.82	.08	1.43	.152
Grade 2 <sup>2</sup>	16.94	12.61	-7.78 - 41.63	.08	1.34	.179
Grade 3 <sup>2</sup>	24.91	12.60	0.20 - 49.59	.11	1.98	.048
Grade 4 <sup>2</sup>	21.67	12.61	-3.05 - 46.37	.10	1.72	.086
Grade 5 <sup>2</sup>	29.05	12.61	4.32 - 53.75	.13	2.30	.021
Grade 6 <sup>2</sup>	30.34	12.64	5.55 - 55.11	.14	2.40	.016
Grade 7 <sup>2</sup>	29.05	12.65	4.24 - 53.83	.13	2.30	.022
Grade 8 <sup>2</sup>	30.54	12.66	5.72 - 55.34	.14	2.41	.016
Grade 9 <sup>2</sup>	5.32	12.75	-19.66 - 30.32	.02	0.42	.677
Grade 10 <sup>2</sup>	21.93	12.76	-3.07 - 46.95	.10	1.72	.086
Grade 11 <sup>2</sup>	19.11	12.79	-5.93 - 44.19	.09	1.49	.135
Grade 12 <sup>2</sup>	5.24	12.84	-19.90 - 30.42	.02	0.41	.683
Gender: Male <sup>3</sup>	2.79	0.55	1.71 - 3.87	.01	5.05	<.001
Race: White <sup>4</sup>	1.27	0.82	-0.34 - 2.86	.00	1.55	.121
Race: Black <sup>4</sup>	-3.05	1.08	-5.16 - -0.94	.00	-2.83	.005
Ethnicity: Hispanic <sup>5</sup>	-4.32	0.75	-5.79 - -2.85	-.01	-5.77	<.001
<b>IXL Math usage effects:</b>						
<b>Questions answered</b>	<b>0.30</b>	<b>0.02</b>	<b>0.26 - 0.34</b>	<b>.02</b>	<b>14.92</b>	<b>&lt;.001</b>
<b>Skills proficient</b>	<b>11.82</b>	<b>0.62</b>	<b>10.60 - 13.05</b>	<b>.03</b>	<b>18.92</b>	<b>&lt;.001</b>
<b>Time spent (in minutes)</b>	<b>1.15</b>	<b>0.06</b>	<b>1.03 - 1.27</b>	<b>.03</b>	<b>19.31</b>	<b>&lt;.001</b>

Note.

<sup>1</sup> Grand mean-centered

<sup>2</sup> Dummy-coded; kindergarten as reference group

<sup>3</sup> Dummy-coded; female as reference group

<sup>4</sup> Dummy-coded; other race as reference group

<sup>5</sup> Dummy-coded; non-hispanic as reference group