RESEARCH REPORT

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The Impact of IXL on At-Home Math and ELA Learning Across 20 States

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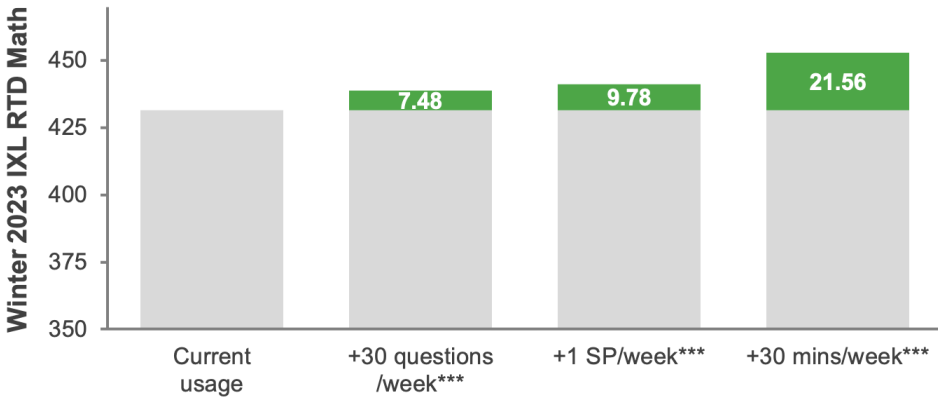
Executive summary

IXL is an end-to-end teaching and learning solution that engages learners in Pre-K through 12th grade with a comprehensive curriculum and personalized recommendations for meeting learning goals. Previous research has shown that IXL can have a significant positive impact on students' academic performance (Copeland et al., 2023; also see https://www.ixl.com/research) and self-efficacy (An & Schonberg, 2024).

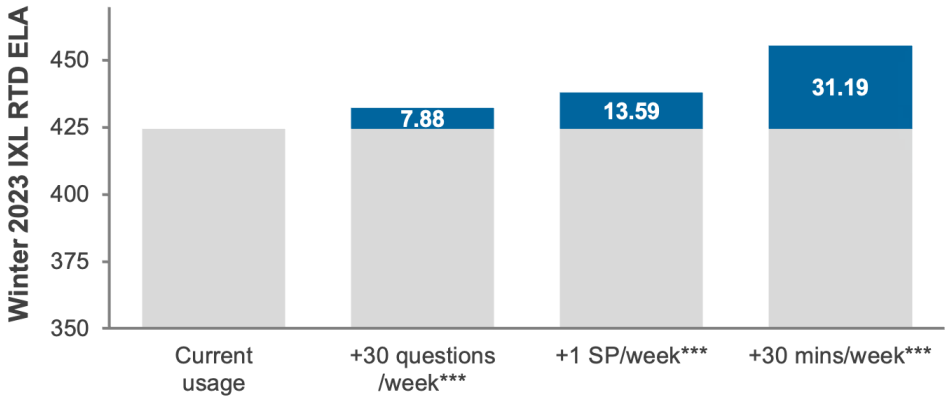
IXL Family is intended for parents seeking to support their children's education at home. This service grants children and adolescents access to IXL's comprehensive online learning platform, aiding their progress by helping them keep up with school curricula, bridge learning gaps, and advance to enrichment opportunities. While a number of studies have supported the positive impacts of IXL on students' learning outcomes at school, IXL's impact on learning at home had not yet been empirically studied.

Analyzing data from over 5,000 children and adolescents with IXL family memberships across 20 states, this study aimed to examine the impact of IXL on learning at home. We used the IXL Real-Time Diagnostic (IXL RTD) assessments to measure learners' math and ELA performance. Using a

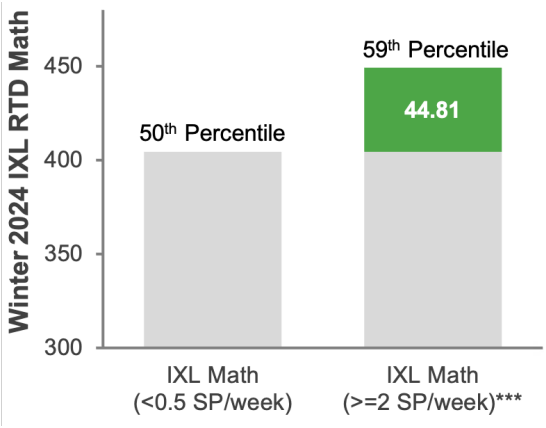
- **Higher IXL usage is associated with bigger learning gains.** In both math and ELA, children and adolescents made significantly larger gains on the IXL RTD when they answered more questions, reached proficiency in more skills (SP), and/or spent more time in the corresponding subject on IXL.

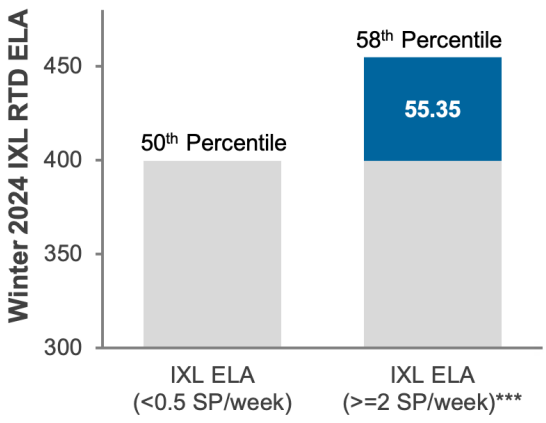


[1] *Note. In all figures, * indicates statistical significance at the p < .05 level, ** indicates p < .01, and *** indicates p < .001. SP = skills proficient (i.e., SmartScore of 80+).*



- **Learners make even larger gains when they use IXL as recommended.** In both math and ELA, children and adolescents who used IXL with high fidelity (i.e., reached proficiency in at least two IXL skills per week, or 2 SP/week) significantly outperformed learners with minimal IXL usage.





The Impact of IXL on At-Home Math and ELA Learning Across 20 States

Background

IXL is an end-to-end teaching and learning solution that engages learners in Pre-K through 12th grade with a comprehensive curriculum 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 one in four students in the U.S. and by more than 15 million students worldwide. IXL is deeply rooted in learning sciences research (see Bashkov et al., 2021) and engages each learner in a personalized learning experience tailored to their working level. As a result, children and adolescents 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 IXL family membership is a type of subscription offered by IXL Learning, designed for families seeking support for their children's education at home. Through the comprehensive online learning platform that IXL offers, parents can provide the best educational opportunities for their children, whether it's to keep up with school curricula, bridge learning gaps, or advance to enrichment opportunities. IXL is developed with meticulous care to meet children and adolescents where they are and empower them to take control of their educational growth. By providing a suite of learning tools that grant children access to extensive learning opportunities, IXL fosters qualities such as persistence, determination, curiosity, and initiative.

Prior research has consistently reported significant positive effects of IXL on student learning, including in an independent randomized controlled trial (Copeland et al., 2023). While a number of studies have investigated the positive impacts of IXL on students' learning outcomes at school, IXL's impact on learning at home had not yet been studied empirically. Therefore, using data from more than 5,000 children and adolescents with IXL family memberships across 20 states, this study aimed to examine the impact of IXL usage on math and ELA achievement. Specifically, we examined the relationship between the amount of IXL usage and performance on the IXL Real-Time Diagnostic (IXL RTD) assessments among learners in Pre-K through 12th grade.

RESEARCH QUESTION

In two analyses, we aimed to answer the following research questions for math and ELA separately:

1. Overall usage effects of IXL: Accounting for state of residence and baseline performance, how did the amount of IXL Math or IXL ELA usage relate to learners' IXL RTD performance in the corresponding subject?

2. Using IXL as recommended: Accounting for state of residence and baseline performance, did learners who used IXL with high fidelity perform better on the IXL RTD assessments than their peers with minimal IXL usage?

Study Design and Methodology

PARTICIPANTS

This study analyzed data from children and adolescents in Pre-K through 12th grade who used IXL during the Fall 2023 semester. We drew a sample of children and adolescents with IXL family memberships from 20 states, including Arizona, California, Florida, Georgia, Illinois, Indiana, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, Washington, and Wisconsin. We included learners with any amount of IXL usage during the Fall 2023 semester, as well as non-missing IXL RTD pretest scores (September 2023) and IXL RTD posttest scores (January 2024), resulting in a sample of 5,549 learners in math analysis and 4,189 learners in ELA analysis.

DATA SOURCES

IXL Usage Data

We obtained IXL usage data from IXL's database. When learners use IXL, they complete practice problems organized within "skills," or specific topic areas within a subject. IXL uses a proprietary *SmartScore* to indicate a learner's proficiency within a skill. The SmartScore ranges from 0-100 and increases as learners answer questions correctly. However, it is not a percent correct score; a SmartScore of 100 is always possible. A SmartScore of 80 indicates proficiency in a skill, and a SmartScore of 100 indicates mastery. IXL recommends that learners should aim to reach proficiency in at least two skills per week (An et al., 2022). For both math and ELA, IXL usage indicators included the number of questions answered, the number of skills in which learners reached proficiency (i.e., skills proficient), and the amount of time spent (in minutes) practicing on IXL.

Using three standard deviations from the mean level of IXL usage, we identified 171 IXL Math "super users" and 147 IXL ELA "super users". We treated these "super users" as outliers and excluded them from the analyses in order to obtain a more accurate and generalizable estimate of the IXL effect. Thus, the final sample included 5,378 learners in math analysis and 4,042 learners in ELA analysis.

See Table 1 for detailed information on weekly average IXL usage among learners throughout the Fall 2023 semester. There was a wide range of IXL usage for both math and ELA. On average, learners used IXL Math for 26 minutes, answering 61 questions and reaching proficiency in 1.7 skills per week. For language arts, learners used IXL ELA for 17 minutes, answering 53 questions and reaching proficiency in 1.2 skills per week.

Table 1. **Students' IXL Usage During the Study Period**

	M	*SD*	Min	Max
IXL Math (*n* = 5,378)				
Questions answered	61.40	55.92	0.00	353.43
Skills proficient	1.71	1.61	0.00	9.65
Time spent (in minutes)	25.99	24.02	0.00	136.73
IXL ELA (*n* = 4,042)				
Questions answered	53.24	55.75	0.00	323.74
Skills proficient	1.24	1.37	0.00	7.46
Time spent (in minutes)	17.31	18.18	0.00	100.99

M = mean; *SD* = standard deviation; *n* = number of learners.

Assessment Data

We obtained IXL RTD data from IXL's database as well. When a learner completes a sufficient number of questions in a subject (math or ELA) in IXL's Diagnostic, they receive a pinpointed score that indicates their overall grade-level proficiency in that subject. For example, a score of 350 indicates that the learner has acquired about 50% of 3rd grade material, whereas a score of 400 indicates that the learner is ready to learn 4th grade material. We obtained all available pinpointed math and ELA diagnostic scores during September 2023 and January 2024 for each learner. The latest pinpointed score in September 2023 served as the pretest score in the analysis, while the latest pinpointed score in January 2024 served as the posttest score.

Over the Fall 2023 semester, spanning from September 2023 to January 2024, learners' IXL RTD math scores increased by 52 on average, rising from 381 to 432. Similarly, learners' IXL RTD ELA scores increased by 61 points on average, climbing from 364 to 425. This means that a learner with average IXL usage experienced growth roughly equivalent to a half grade level in both math and ELA during one school semester. See Table 2 for more details.

Table 2. **IXL RTD Scores During the Fall 2023 Semester**

	M	*SD*	Growth
IXL RTD Math (*n* = 5,378)			
September 2023	380.77	194.24	
January 2024	432.30	210.73	+ 51.53
IXL RTD ELA (*n* = 4,042)			
September 2023	363.78	258.29	
January 2024	424.72	279.95	+ 60.94

M = mean; *SD* = standard deviation; *n* = number of learners.

ANALYSIS

We specified and tested separate multilevel models for each research question and subject (math and ELA) to account for clustering at the state level (i.e., learners within a state tend to be more similar to each other than learners in other states; ICC = [.112 - .134]). Each model regressed posttest IXL RTD score on pretest IXL RTD score and an IXL usage predictor.

In the models examining the overall usage effects of IXL, the IXL predictors were learners' weekly average IXL usage, including number of questions answered, number of skills proficient (SP) and the amount of time spent (in minutes). Because the three IXL usage indicators were highly intercorrelated, we specified and tested a separate regression model using each indicator. For this research question, we analyzed all 5,378 learners for IXL Math and 4,042 learners for IXL ELA.

In the models examining the impact of IXL when used as recommended, the IXL predictor was a binary variable that indicated whether a learner (a) used IXL with high fidelity (i.e., reaching proficiency in at least two IXL skills per week or 2 SP/week; An et al., 2022) throughout the semester, or (b) used IXL minimally (< 0.5 SP/week). Among the 5,378 learners in math analysis, we identified 1,744 learners who used IXL Math with high fidelity and 1,153 learners in the comparison group. Among the 4,042 learners in ELA analysis, we identified 1,427 learners who used IXL ELA with high fidelity and 803 learners in the comparison group.

Following What Works Clearinghouse guidelines (WWC, 2022), each effect is accompanied by a test of statistical significance using a probability (*p*) value and a measure of effect size. The *p*-value is the probability of observing the current or more extreme data, assuming the effect is zero (Cohen, 1994). The smaller the *p*-value, the less likely it is that the result occurred at random, with *p*-values less than .05 considered statistically significant. Effect size is reported using Hedges' *g* and indicates the difference between treatment and comparison groups on an outcome measure in standard deviation units. For broad-scope educational assessments, moderate effect sizes range from about .05 – .20, and effect sizes of about .20 or higher are considered large (Kraft, 2020; Lipsey et al., 2012).

Results

OVERALL USAGE EFFECTS OF IXL

Math

We found a statistically significant positive effect of IXL Math usage on IXL RTD math performance. Figure 1 shows the expected improvement in IXL RTD math score with additional IXL Math usage over a semester. Full model results are reported in Table A1 (Appendix A).

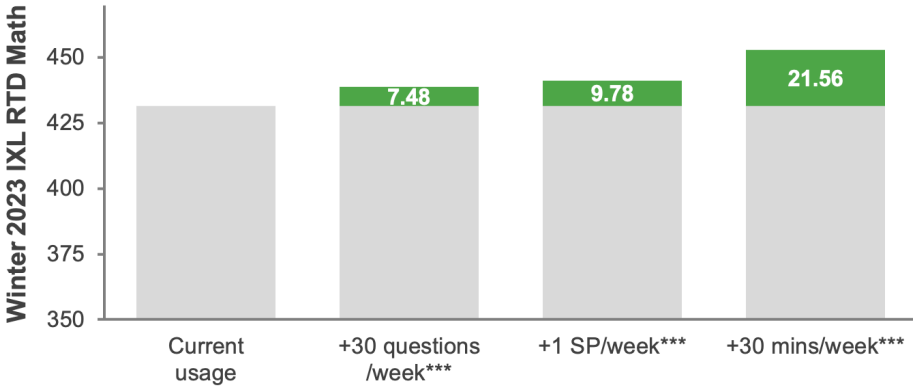


Figure 1. Expected usage effects of IXL Math on IXL RTD math score

Specifically, the effect for questions answered was 0.25 ($p < .001$, $\beta = .07$). That is, with each additional question answered on IXL Math per week, a learner's IXL RTD math score is expected to increase by 0.25 points. For example, if a learner answered 30 more questions per week, their math score would increase by 7.48 points after a semester. The effect for SP/week was 9.78 ($p < .001$, $\beta = .07$). That is, reaching proficiency in one additional IXL Math skill per week is associated with an approximately 10-point increase in a learner's IXL RTD math score. The effect for time spent was 0.72 ($p < .001$, $\beta = .08$). That is, with each additional minute spent on IXL Math per week, a learner's IXL RTD math score is expected to increase by 0.72 points. For example, if a learner practiced for 30 more minutes per week, their math score would increase by 21.56 points after a semester.

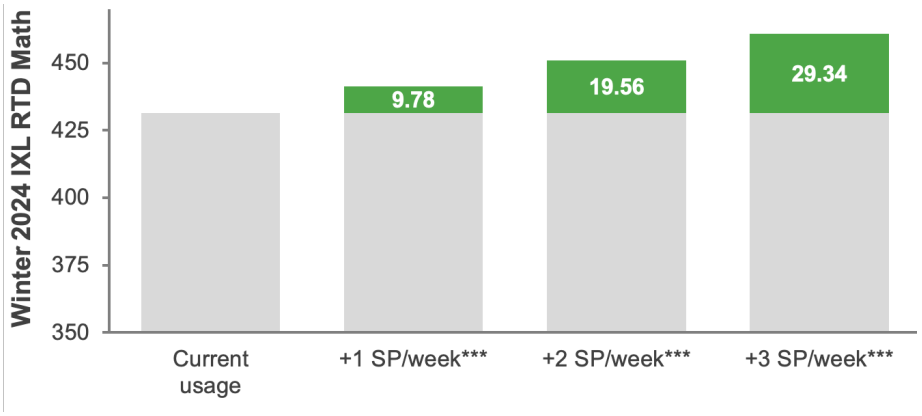


Figure 2. Cumulative usage effects of IXL Math

The usage effects of IXL Math are cumulative (see Figure 2). Based on the data, with current IXL Math usage averaging 1.7 SP/week (see Table 1), an average 4th-grade child starting with an IXL Math score of 400 at the beginning of the school year is expected to advance half a grade level—approximately a 50-point increase in IXL RTD Math score (see Table 2)—reaching 450 by the end of the fall semester. Consider a 4th-grade child initially scoring 380 on the IXL RTD math, aiming to catch up. If they reach proficiency in two additional IXL Math skills per week (resulting in a total of 3.7 SP/week), they would gain an additional 20 points (see Figure 2) beyond the average 50-point growth. Consequently, by the end of the fall semester, they would be on par with peers scoring 450 on the IXL RTD math assessment. This example is illustrated in Figure 3.

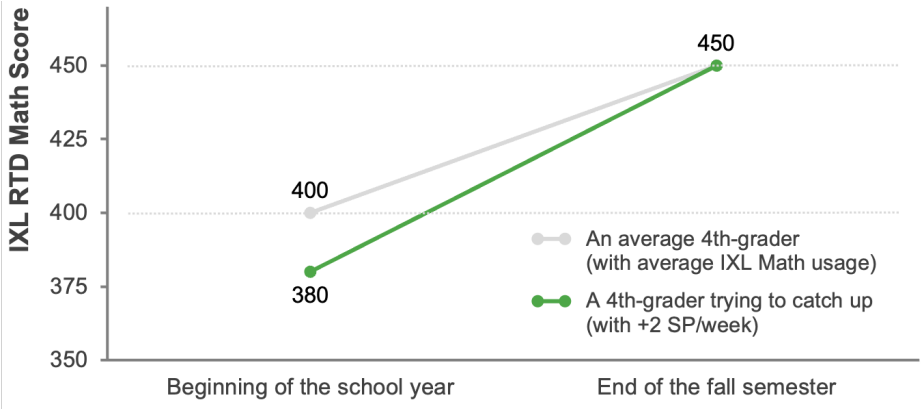


Figure 3. Additional IXL usage enables students to remediate quickly.

ELA

Similar to math, we found a statistically significant positive effect of IXL ELA usage on IXL RTD ELA performance. Figure 4 shows the expected improvement in IXL RTD ELA score with additional IXL ELA usage over a semester. Full model results are reported in Table A2 (Appendix A).

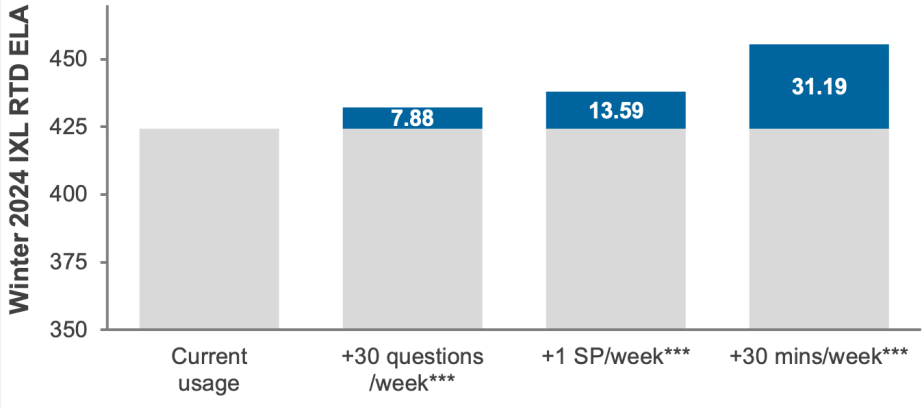


Figure 4. Expected usage effects of IXL ELA on IXL RTD ELA score

Specifically, the effect for questions answered was 0.26 ($p < .001$, $\beta = .05$). That is, with each additional question answered on IXL ELA per week, a learner's IXL RTD ELA score is expected to increase by 0.26 points. For example, if a learner answered 30 more questions per week, their ELA score would increase by 7.88 points after a semester. The effect for SP/week was 13.59 ($p < .001$, $\beta = .07$). That is, reaching proficiency in one additional IXL ELA skill per week is associated with an approximately 14-point increase in a child's IXL RTD ELA score. The effect for time spent was 1.04 ($p < .001$, $\beta = .07$). That is, with each additional minute spent on IXL ELA per week, a learner's IXL RTD ELA score is expected to increase by 1.04 points. For example, if a learner practiced for 30 more minutes per week, their ELA score would increase by 31.19 points after a semester. Similar to math, the usage effects of IXL ELA are cumulative (see Figure 5).

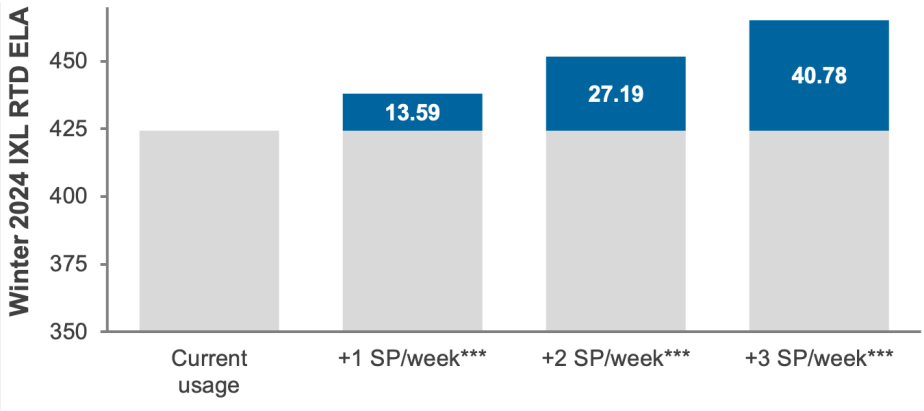


Figure 5. Cumulative usage effects of IXL ELA

USING IXL AS RECOMMENDED

Math

We found that children who used IXL Math with fidelity outperformed their peers who had minimal usage of IXL Math after one semester. This effect was positive and statistically significant; see Figure 6. Specifically, compared to children who used IXL Math for less than 0.5 SP/week (n = 1,153), children who met or exceeded the 2 SP/week IXL Math threshold (n = 1,744) during the fall semester had IXL RTD math scores that were 45 points higher ($p < .001$; Hedges' $g = .22$) by the end of the semester. The effect size (g) of .22 corresponds to a percentile gain of 9 points. Full results for this model are reported in Table B1 (Appendix B).

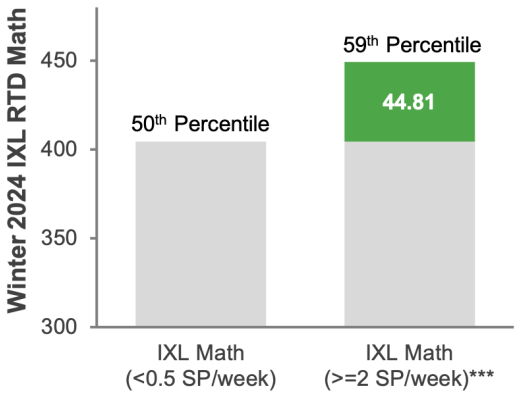


Figure 6. Using IXL Math as Recommended

ELA

Similar to math, we found that children who used IXL ELA with fidelity outperformed their peers who had minimal usage of IXL ELA after one semester. This effect was positive and statistically significant; see Figure 7. Specifically, compared to children who used IXL ELA for less than 0.5 SP/week (n = 803), children who met or exceeded the 2 SP/week IXL ELA threshold (n = 1,427) during the fall semester had IXL RTD ELA scores that were 55 points higher (p < .001; Hedges' g = .19) by the end of the semester. The effect size (g) of .19 corresponds to a percentile gain of 8 points. Full results for this model are reported in Table B2 (Appendix B).

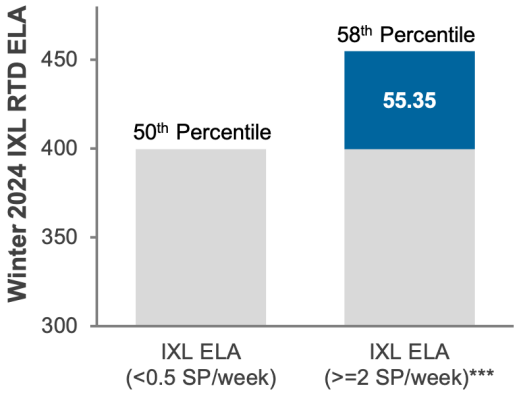


Figure 7. Using IXL ELA as Recommended

Discussion and Recommendations

Analyzing data from more than 5,000 learners across 20 states, this study examined the impact of IXL on math and ELA achievement among learners with IXL family memberships. Accounting for state of residence and baseline performance, we found that greater IXL usage was associated with larger performance gains. Furthermore, we found that learners who used IXL with fidelity outperformed peers with minimal IXL usage. These results add to the large body of research showing that IXL boosts academic achievement regardless of whether it is being used at school or at home, especially when used as recommended: aiming to reach proficiency in at least two IXL skills per week in each subject (An et al., 2022).

IXL is an efficient and effective platform for parents to help their children advance in school (whether they're catching up or getting ahead) or to enhance the core curricula of homeschool programs. IXL is convenient and flexible for families because it's always available online and has a variety of ways to guide children depending on how they like to learn. It additionally supports parents by offering easy access to topics they might need to review to help their children with homework.

Moreover, IXL is comprehensive and goes beyond a digital workbook or tutoring service, as it promotes skills that are applicable throughout life. Designed to help children and adolescents develop critical thinking and problem-solving skills, IXL encourages them to persevere through challenges, fostering a sense of accomplishment and spurring curiosity. It inspires them to explore new topics and reach for higher goals.

Coupled with prior research, this study shows that IXL is a powerful platform that significantly boosts children and adolescents' math and ELA learning. Parents can trust IXL as a reliable educational tool. With IXL's personalized support, learners at home can unlock their full academic potential and prepare for every learning milestone along the way.

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Appendix A: Full Model Results—Overall Usage Effects of IXL

Table A1. Predicting Winter 2024 IXL RTD Math Score from IXL Math Usage Indicators

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
Baseline model						
(Intercept)	431.48	3.20	424.99 – 437.87	.00	134.67	<.001
Fall 2023 IXL RTD math[1]	1.03	0.00	1.02 – 1.04	.95	227.41	<.001
IXL usage effects						
IXL Math: questions answered[2]	0.25	0.02	0.22 – 0.28	.07	16.41	<.001
IXL Math: skills proficient[2]	9.78	0.52	8.75 – 10.81	.07	18.65	<.001
IXL Math: time spent[2]	0.72	0.04	0.65 – 0.79	.08	20.05	<.001

Note. Dependent variable: Score on the Winter 2024 IXL RTD in math. *b* = unstandardized regression coefficient, *SE* = standard error, CI = confidence interval, β = standardized regression coefficient.
[1] Grand mean-centered.
[2] Weekly average amount.

Table A2. Predicting Winter 2024 IXL RTD ELA Score from IXL ELA Usage Indicators

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
Baseline model						
(Intercept)	424.43	3.71	416.98 – 431.87	.00	114.53	<.001
Fall 2023 IXL RTD ELA[1]	1.04	0.00	1.03 – 1.05	.96	225.59	<.001
IXL usage effects						
IXL ELA: questions answered[2]	0.26	0.02	0.22 – 0.30	.05	12.55	<.001
IXL ELA: skills proficient[2]	13.59	0.84	11.94 – 15.25	.07	16.10	<.001
IXL ELA: time spent[2]	1.04	0.07	0.91 – 1.17	.07	15.92	<.001

Note. Dependent variable: Score on the Winter 2024 IXL RTD in ELA. *b* = unstandardized regression coefficient, *SE* = standard error, CI = confidence interval, β = standardized regression coefficient.
[1] Grand mean-centered.
[2] Weekly average amount.

Appendix B: Full Model Results—Using IXL as Recommended

Table B1. Predicting Winter 2024 IXL RTD Math Score from IXL Math Usage Status

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	404.61	4.18	396.17 – 412.87	-.01	96.68	<.001
Fall 2023 IXL RTD math[1]	1.02	0.01	1.01 – 1.04	.93	159.61	<.001
IXL Math: ≥ 2 SP/week[2]	44.81	2.50	39.92 – 49.70	.10	17.95	<.001

Note. Dependent variable: Score on the Winter 2024 IXL RTD in math. *b* = unstandardized regression coefficient, *SE* = standard error, CI = confidence interval, β = standardized regression coefficient.
[1] Grand mean-centered.
[2] Dummy coded; students with < 0.5 SP/week as reference group.

Table B2. Predicting Winter 2024 IXL RTD ELA Score from IXL ELA Usage Status

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	399.67	3.69	392.34 – 407.08	.00	108.32	<.001
Fall 2023 IXL RTD ELA[1]	1.03	0.01	1.02 – 1.04	.95	182.50	<.001
IXL ELA: ≥ 2 SP/week[2]	55.35	3.18	49.14 – 61.61	.09	17.39	<.001

Note. Dependent variable: Score on the Winter 2024 IXL RTD in ELA. *b* = unstandardized regression coefficient, *SE* = standard error, CI = confidence interval, β = standardized regression coefficient.
[1] Grand mean-centered.
[2] Dummy coded; students with < 0.5 SP/week as reference group.