RESEARCH REPORT

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IXL's Fluency Zone: Using Both Untimed and Timed Practice to Support Math Achievement

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Table of Contents

Executive Summary **3**
Background **4**
RESEARCH QUESTIONS 5
Study Design and Methodology **6**
PARTICIPANTS 6
MEASURES AND DATA SOURCES 6
Math Performance 6
IXL Fluency Zone Usage 6
ANALYTIC APPROACH 7
Results **7**
Conclusion **9**
References **10**
Appendix **11**

Executive Summary

IXL brings assessment, responsive teaching tools, and personalized practice together to help educators understand what students need, respond at the right time, and keep every learner moving forward. 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.

As part of supporting students' broader math development, building mathematics fact fluency is especially important, as it provides a foundation for long-term success in math. Rather than relying on memorization alone, developing fluency involves building conceptual understanding, strengthening accuracy through practice, and progressing toward automatic recall. To support this development, IXL designed the Fluency Zone as a learning hub that helps students build math fact knowledge and fluency through a combination of untimed skill practice and timed fluency practice. Untimed practice provides opportunities for students to develop accurate math fact knowledge, while timed practice is designed to strengthen speed and rapid retrieval.

The goal of the present study was to examine whether untimed and timed practice within IXL's Fluency Zone were each associated with students' overall math achievement. We analyzed IXL Fluency Zone usage during 2025–26 and its impact on students' NWEA MAP® Growth™ assessment (MAP Growth)[1] math scores. The sample included 8,784 students in 1st through 4th grade across nine districts in Illinois, Kansas, North Carolina, and Ohio. Key findings include:

- **More untimed math fact skill practice was associated with higher math scores.** Each additional skill in which a student reached proficiency (i.e., *SmartScore* of 80) was associated with a 0.15-point higher MAP Growth score ($p < .001$; $\beta = .03$).

- **Timed Raceway challenge practice showed additional benefits on math performance.** After accounting for untimed skills proficient, students who earned at least one Raceway trophy scored 1.41 points higher, on average, than peers who did not earn a trophy ($p < .001$). Each additional fact set with a trophy was associated with a 0.53-point higher MAP Growth score ($p < .001$).

[1] *Note: MAP®, MAP® Growth™, and NWEA are trademarks owned by HMH Education Company, and their use here is for identification purposes only. No claim of affiliation or endorsement is made.*

IXL's Fluency Zone: Combining Untimed and Timed Practice to Support Math Achievement

Background

IXL brings assessment, responsive teaching tools, and personalized practice together to help educators understand what students need, respond at the right time, and keep every learner moving forward. IXL supports students from Pre-K through 12th grade across 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 18 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).

Within IXL's broader approach to personalized learning, developing mathematics fact fluency is an important foundation for students' continued growth in math. Math fact fluency is the ability to quickly and accurately recall basic addition, subtraction, multiplication, and division facts without relying on strategies such as counting or visual aids (Binder, 1996; Douglas et al., 2026). When students can recall these facts automatically, they can devote more attention to solving complex math problems, making fact fluency an important building block for later math achievement (Bailey et al., 2014; Geary, 2011; Fuchs et al., 2016; National Mathematics Advisory Panel, 2008).

Learning hierarchy theory (Haring & Eaton, 1978) describes learning as a gradual progression from executing a skill accurately to performing it more fluently and automatically with practice. Applied to math fact fluency, this framework suggests that students first learn to solve facts accurately and then develop faster, more automatic responses through continued practice. For example, a student learning 6 × 8 might initially rely on repeated addition, skip counting, or an array to determine that the answer is 48. With repeated opportunities to retrieve the answer, the student can gradually move toward faster, more automatic recall (Roediger & Karpicke, 2006; Karpicke & Blunt, 2011). This progression suggests a role for both untimed and timed practice: Untimed practice can help students establish accurate math fact knowledge, while timed practice can strengthen speed and automatic retrieval.

IXL's Fluency Zone is designed to support this progression. This centralized learning hub organizes addition, subtraction, multiplication, and division practice by grade level, operation, and fact set, allowing students to progress from simpler to more challenging content. A key feature of the Fluency Zone is its combination of untimed math fact skill practice with timed Raceway challenges, with a variety of fact fluency resources, including games, videos, and worksheets. By integrating these

resources in one place, IXL's Fluency Zone supports students across different stages of fact fluency development. IXL recommends that students build proficiency in skills before and alongside timed Raceway challenges, allowing them to establish accuracy while gradually developing greater speed and automaticity (IXL Learning, 2025). Figure 1 shows an example of a Raceway challenge in progress.

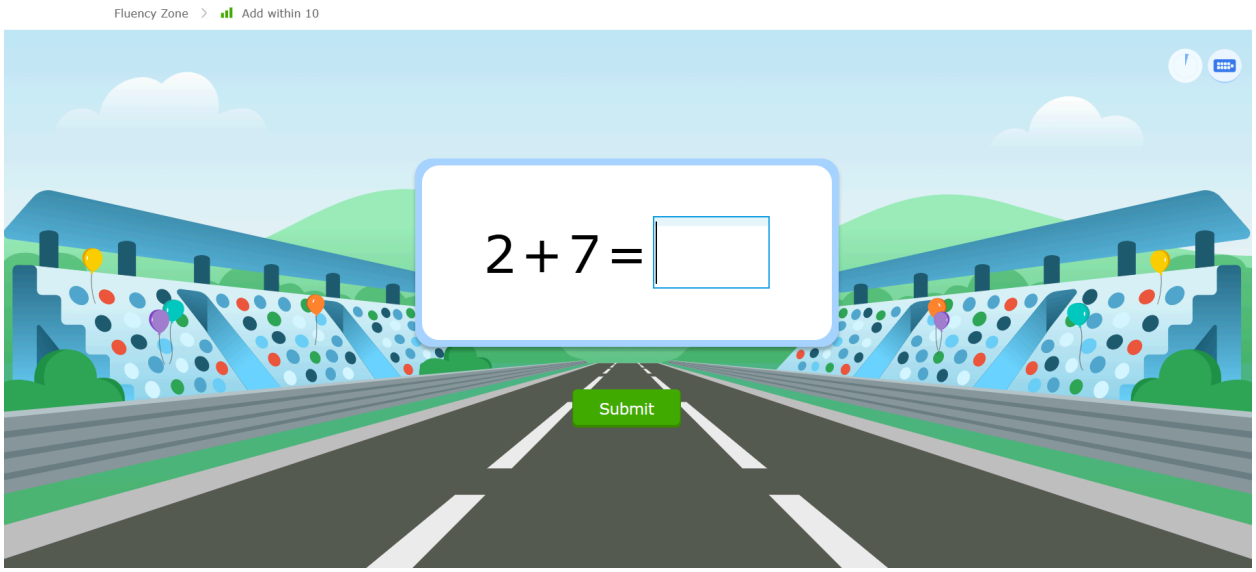


Figure 1. Screenshot of an In-Progress IXL Fluency Zone Raceway Challenge

RESEARCH QUESTIONS

The goal of the present study was to examine whether untimed skill practice and timed fluency practice within IXL's Fluency Zone were each associated with students' overall math achievement. The present study aimed to answer the following research questions:

1. **Impact of untimed math fact skill practice.** Does reaching proficiency in a greater number of math fact skills (e.g., Complete the subtraction sentence - up to 10) predict higher math achievement?

2. **Impact of timed fluency practice.** After accounting for math fact skill proficiency, is timed Raceway challenge practice associated with higher math achievement?

Study Design and Methodology

PARTICIPANTS

We analyzed data from 8,784 students in 1st through 4th grade across nine school districts in four states. All students had access to IXL Fluency Zone through their school or district during the 2025–26 academic year. Most students were from Illinois (79.08%), followed by Ohio (8.72%), Kansas (8.06%), and North Carolina (4.14%). By grade level, 17.59% of students were in 1st grade, 20.17% in 2nd grade, 29.39% in 3rd grade, and 32.84% in 4th grade.

MEASURES AND DATA SOURCES

Math Performance

Students' math performance was assessed via the NWEA MAP® Growth™ assessment (MAP Growth), a computer-adaptive assessment that provides vertically-scaled Rasch Unit scores to measure student achievement and growth across grade levels. Fall 2025 MAP Growth scores served as the pretest, and Spring 2026 MAP Growth scores served as the posttest (see Table 1 in the Appendix for descriptives).

IXL Fluency Zone Usage

IXL's Fluency Zone offers skill practice across 16 foundational fact sets spanning the four basic operations. It includes dozens of adaptive math fact skills that emphasize accuracy through consistent practice and immediate feedback, as well as timed Raceway challenges designed to promote increasingly efficient fact retrieval. Table 1 in the Appendix presents descriptive statistics of students' average Fluency Zone usage during the 2025–26 academic year.

Untimed Skill Practice. In each math fact skill (e.g., Multiply 6 by numbers up to 12), students complete practice problems (e.g., 3 × 6 = ?) targeting a specific math fact. In this practice activity, students can answer questions without a time limit. They could use any strategy to solve problems, such as counting on their fingers or writing notes. The emphasis is on developing accurate knowledge of math fact sets. Students' progress within each skill is measured using IXL's proprietary *SmartScore*, a dynamic scale ranging from 0 to 100 that updates after every response. SmartScore increases or decreases based on both response accuracy and item difficulty, with a score of 80 indicating proficiency in a skill. In this study, the number of skills proficient (SPs) served as the primary indicator of math fact skill acquisition.

Timed Fluency Practice. Students can also engage with Raceway challenges, a fluency activity in which students answer as many questions correctly as possible within one minute. These activities emphasize both accuracy and response speed, encouraging increasingly automatic retrieval of math facts. Because of the time constraint, successful performance depends on rapid, automatic retrieval of math facts, rather than the use of counting or other deliberate strategies. Students earn a trophy for the Raceway challenge each time they answer at least 15 questions correctly within one minute.

ANALYTIC APPROACH

To answer our first research question, we used multilevel modeling to account for the nested structure of the data at the district level (ICC = .154). We regressed posttest MAP Growth math scores on the total number of math fact SPs—the primary indicator of untimed skill practice—controlling for pretest MAP Growth math scores and grade level (1st through 4th).

To address the second research question, we extended the same multilevel model to examine whether Raceway practice was associated with math achievement beyond math fact SPs. First, we added a binary indicator of Raceway engagement (whether a student earned at least one trophy; 1 = yes, 0 = no) throughout the school year while retaining total SPs in the model. Then, we replaced the binary indicator with the number of math fact sets in which students earned a trophy, providing a more precise measure of successful Raceway practice.

Results

Of the 8,784 students in the sample, 3,053 (34.76%) reached proficiency in at least one math fact skill over the 2025–26 school year. After accounting for clustering, pretest MAP Growth scores, and grade level, the number of math fact SPs was significantly and positively associated with posttest MAP Growth math achievement (see Table 2 in the Appendix). Each additional SP was associated with a 0.15-point increase in MAP Growth math scores ($p < .001$, $\beta = .03$). For example, reaching proficiency in 10 more math fact skills over the school year was associated with a 1.5-point increase in spring MAP Growth math scores (Figure 2).

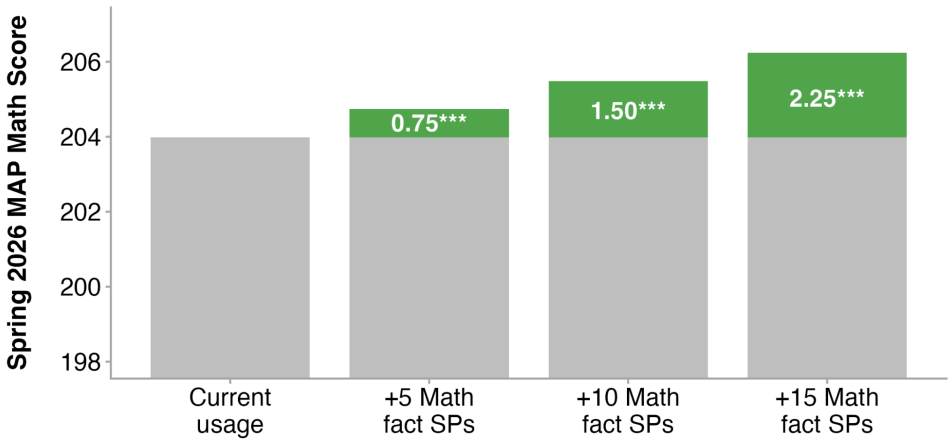


Figure 2. Predicted usage effects of untimed math fact skill practice

We found that 1,545 students (17.59%) participated in timed Raceway challenges and earned at least one Raceway trophy. After accounting for math fact SPs, timed Raceway practice was significantly associated with higher math achievement. Students who earned at least one Raceway trophy scored 1.41 points higher on MAP Growth math, on average, than students who did not earn a trophy (p < .001, Hedges' g = .07; Table 3, Appendix). When Raceway engagement was measured by the number of math fact sets in which students earned a trophy, each additional fact set was associated with a 0.53-point increase in math scores (p < .001, β = .02; Table 4, Appendix). For example, earning trophies in Raceway challenges for three additional fact sets was associated with a 1.59-point higher MAP Growth math score (Figure 3). Together, these findings suggest that timed fluency practice was associated with additional math achievement gains beyond those attributed to untimed math fact skill practice.

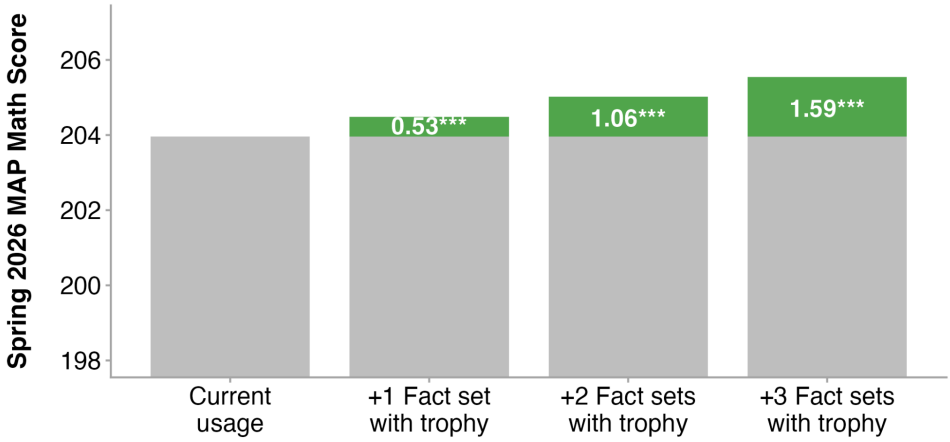


Figure 3. Predicted usage effects of timed fluency practice

Conclusion

The present study examined whether untimed skill practice and timed fluency practice within IXL's Fluency Zone were associated with students' overall math achievement. As expected, we found that reaching proficiency in a greater number of math fact skills (i.e., untimed practice) was associated with higher MAP Growth math scores after accounting for prior achievement and grade level. This finding underscores the importance of building accurate foundational knowledge through targeted practice. In addition, we found that timed Raceway practice was also associated with higher math achievement, beyond untimed math fact skill practice. This suggests that opportunities to practice rapid retrieval can provide additional benefits as students move toward greater automaticity.

IXL's Fluency Zone brings these complementary forms of practice together in one learning hub for elementary students. In addition to untimed math fact skills and timed Raceway challenges, the Fluency Zone includes games, videos, and worksheets that give students multiple ways to build and strengthen their math fact fluency. This integrated approach allows teachers to meet students at different stages of fluency development, from building accurate fact knowledge to developing faster and more automatic recall.

The Fluency Zone also provides educators with tools for monitoring progress and identifying areas where students may need additional practice. For example, the Student Raceway report tracks students' speed, accuracy, and growth across sessions. Teachers can then draw on the range of available resources within each fact set to reinforce learning as needed. Together, these features create a flexible, comprehensive approach to fact fluency development that helps students build the accuracy and automaticity needed for continued growth and success in mathematics.

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Appendix

Table 1. MAP Growth Math Scores and IXL Fluency Zone Usage During the 2025–26 Academic Year

	M	*SD*	Min	Max
MAP Growth Math Scores				
Pretest: Fall 2025	186.02	20.16	108	260
Posttest: Spring 2026	204.41	20.31	106	269
IXL Fluency Zone Usage				
Skill practice - Time (minutes)	13.74	34.21	0.00	736.37
Skill practice - # of skills proficient	1.40	3.86	0.00	47.00
Raceway - # of trophies	2.89	19.43	0.00	953.00
Raceway - # of fact sets with a trophy	0.31	0.86	0.00	10.00

Table 2. Predicting Spring 2026 MAP Growth Math Scores from Untimed Math Fact Skill Practice on IXL

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	203.99	0.64	202.68 – 205.30	-.02	317.02	<.001
Pretest math score[1]	0.90	0.01	0.89 – 0.91	.89	136.92	<.001
2nd grade[2]	-0.58	0.30	-1.16 – 0.01	-.03	-1.94	.053
3rd grade[2]	0.89	0.32	0.25 – 1.52	.04	2.75	.006
4th grade[2]	1.62	0.37	0.88 – 2.34	.08	4.34	<.001
Skills proficient (SP)[1]	0.15	0.02	0.10 – 0.20	.03	6.41	<.001

Note. b = unstandardized regression coefficient, SE = standard error, CI = confidence interval, β = standardized regression coefficient.

[1] Mean-centered.

[2] Dummy-coded; 1st grade as reference group.

Table 3. Predicting Spring 2026 MAP Growth Math Scores from Untimed Math Fact Skill Practice and Timed Fluency Practice on IXL

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	203.75	0.66	202.41 – 205.08	-.02	310.61	<.001
Pretest math score[1]	0.89	0.01	0.88 – 0.91	.89	134.16	<.001
2nd grade[2]	-0.57	0.30	-1.16 – 0.01	-.03	-1.93	.054
3rd grade[2]	0.92	0.32	0.29 – 1.55	.05	2.86	.004
4th grade[2]	1.60	0.37	0.87 – 2.33	.08	4.30	<.001
Skills proficient (SP)[1]	0.13	0.02	0.09 – 0.18	.03	5.64	<.001
Raceway trophy (0/1)	1.41	0.24	0.94 – 1.88	.03	5.90	<.001

Note. b = unstandardized regression coefficient, SE = standard error, CI = confidence interval, β = standardized regression coefficient.

[1] Mean-centered.

[2] Dummy-coded; 1st grade as reference group.

Table 4. Predicting Spring 2026 MAP Math Scores from IXL Math fact—aligned Skill Practice and Timed Fluency Practice (Number of Fact Sets)

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	203.96	0.66	202.63 – 205.30	-.02	310.60	<.001
Pretest math score[1]	0.89	0.01	0.88 – 0.91	.89	134.64	<.001
2nd grade[2]	-0.55	0.30	-1.14 – 0.03	-.03	-1.85	.064
3rd grade[2]	0.94	0.32	0.30 – 1.57	.05	2.91	.004
4th grade[2]	1.63	0.37	0.90 – 2.36	.08	4.39	<.001
Skills proficient (SP)[1]	0.13	0.02	0.08 – 0.18	.02	5.41	<.001
Raceway trophies (# of fact sets)[1]	0.53	0.11	0.32 – 0.73	.02	5.04	<.001

Note. b = unstandardized regression coefficient, SE = standard error, CI = confidence interval, β = standardized regression coefficient.

[1] Mean-centered.

[2] Dummy-coded; 1st grade as reference group.