LXD RESEARCH
ESSA
Level 3
Evidence

MindPlay Reading

EFFICACY STUDY

Examining the Correlation of MindPlay Use and Outcomes on NWEA MAP Fall 2021 - Spring 2022, Grades 2-6

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MindPlay Reading

Learning Experience Design (LXD) Research & Consulting
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LXD RESEARCH ESSA Level 3 Evidence

EFFICACY STUDY SUMMARY

2021-2022

PROGRAM DESCRIPTION

MindPlay Reading is a digital program with a universal screener and virtual coach to assess and improve students reading skills. The program aligns with the Science of Reading and covers phoneme awareness, phonics, vocabulary, fluency, and comprehension. The program's structure follows a flowchart sequence, determining the progression of lessons and practice tasks. Continuously adapted, it flexibly accommodates each student's evolving skills and needs.

SAMPLE DESCRIPTION

- Dayton City Schools, Ohio
- Fall 2021 - Spring 2022
- 3,444 students in grades 2-6

Demographics

66% Black| 33% White | 13% ELL

Assessments

MAP Growth scores and MindPlay universal screener scores were collected for all students with MindPlay use at the beginning and end of the school year.

Implementation

- MindPlay Reading was used by most students in 15 elementary schools in grades 2-6 as supplemental and/or intervention instruction.
- Most students (74%) used MindPlay Reading for over 60 hours throughout the year, an average of 20 minutes a day

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STUDY SUMMARY

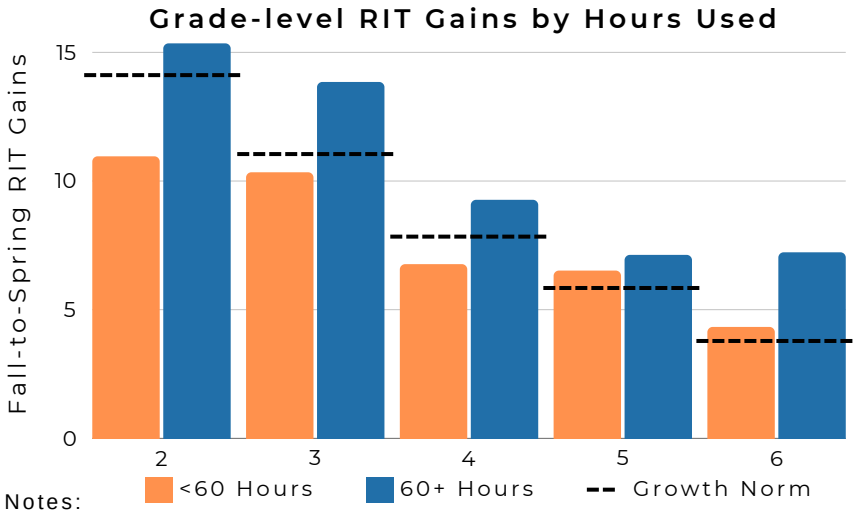
MindPlay partnered with LXD Research to conduct a correlational study to investigate the impact of MindPlay Reading on student literacy achievement scores over the 2021-2022 school year. The analyses included MindPlay's assessments, which estimate a student's relative grade level, and MAP Growth, which provides an overall reading ability score called a Rasch unIT (RIT). Results showed that there was a positive relationship between more use on MindPlay and higher Spring RIT scores. Students with at least 60 hours of use (20 minutes/day) made higher than typical growth on MAP, supporting efforts for those students to close skill gaps.

KEY FINDINGS

Students below grade level made substantial progress in MindPlay with students who were farther behind making the most gains. In MindPlay, 32% of second-sixth graders reading at a K-2 grade level made at least two years of skill growth.

There was a positive correlation between time spent on MindPlay and EOY MAP scores, controlling for BOY scores. The highest usage group made nearly double the RIT gains as the lowest usage group (11 vs. 6 points). Students with over 60 hours on MindPlay across the year had higher RIT gains than the national normed sample.

Students with over 60 hours on Mindplay Reading consistently outpaced 2023 growth norms across grades 2-6.



Notes:

- Pearson r correlations ranged from .11-.26 depending on the grade
- 2023 Normed Sample: 54% FRPL, 49% white, 15% black, 25% hispanic
- Growth norms for 2nd grade were from 2022 due to availability
- 60+ hours vs. normed sample: $p < .001$, Hedge's g Effect Size = .26

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Introduction

Quality instruction for early reading development is crucial, particularly considering the concerning drop in fourth-grade reading scores in 2022. These scores fell below those from assessments dating back to 2005, aligning closely with scores from 1992 (NAEP, 2022), underscoring the urgent necessity for effective reading education. This emphasizes the urgent necessity for effective reading education. The increase in digital tool availability in schools since COVID (GovTech, 2022) means more devices and opportunities for ed-tech use. However, there is a shortage of interventionists to support teachers, especially for students already identified as needing special education services. Recent research on early literacy has highlighted three key principles widely accepted: the recognition that reading involves strategic processes demanding diverse comprehension strategies (Juel & Minden-Cupp, 2000), the need for differentiated instruction tailored to individual student needs (Spiro, 2001), and the overarching goal of reading comprehension through contextual understanding and prior knowledge (Filderman et al., 2022).

MindPlay's Virtual Reading Coach© (Mindplay Reading) is an educational software with a Universal Screener and Reading Fluency programs. Virtual Reading Coach assesses student reading abilities with MindPlay's Universal Screener and automatically develops a unique, differentiated syllabus of instruction and mastery-based activities for every student, thus improving their reading fluency. MindPlay Reading, utilizing a reading program aligned with the core principles of the Science of Reading (The Reading League, 2022), encompasses key elements such as vocabulary, phonics, comprehension, phonemic awareness, and fluency, representing an evidence-based, explicit, direct, and systematic Orton-Gillingham reading intervention approach.

Numerous research studies have highlighted the positive impact of exposure to MindPlay Reading on reading abilities (e.g., Bauer-Kealey & Mather, 2019; Chambers, Mather, & Stoll, 2013; Kloos, Sliemers, Cartwright, Mano, & Stage, 2019; Schneider et al., 2016; Vaughan, Crews, Sisk, & Garcia, 2004). For instance, second-grade students who engaged with MindPlay Reading for an average of 44 hours showed greater reading fluency enhancements than those not involved in the program (Schneider et al., 2016). Additionally, students exposed to MindPlay Reading over a 9-week period in second and fourth grades exhibited improved reading fluency compared to those using an alternative reading technology (Kloos et al., 2019).

The exposure to MindPlay Reading consistently showed a direct relationship with improved end-of-year English Language Arts (ELA) performance, regardless of students' initial reading skills or grade level. This benefit extended equally across genders and ethnicities. However, the primary factor influencing this relationship was the type of school, with notably higher advancements observed in non-failing elementary schools in contrast to high schools (Kloos, 2019).

With nearly two decades of aiding schools and districts across the United States in achieving substantial advancements in reading, MindPlay Reading stands as an endorsed reading intervention program in numerous states. In collaboration with LXD Research, Mindplay initiated a third-party assessment of MindPlay Reading's implementation within an Ohio school district during the 2023-2024 academic year.

Product Description

MindPlay Reading is designed to enhance reading fluency within a personalized learning setting. It uniquely features lessons delivered by virtual reading experts and speech pathologists, followed by online exercises offering prompt, tailored feedback. Designed to cater to each student's requirements, the focus spans phonological awareness, phonics, vocabulary, grammar, silent reading fluency, and comprehension. The program's structure follows a flowchart sequence, determining the progression of lessons and practice tasks. Continuously adapted, it flexibly accommodates each student's evolving skills and needs.

While MindPlay Reading is most appropriate for struggling readers in Tiers 2 and 3, the program has been used in various settings to support all students, whether classroom, small group, or one-on-one. The depth, nature, and intensity of skill reinforcement available in MindPlay Reading are unique in edtech and provide the resources needed to differentiate instruction.

Study Description

As part of their ongoing efforts to demonstrate the efficacy of MindPlay Reading, Mindplay contracted with Learning Experience Design (LXD) Research, a third-party edtech research company, to examine the relationship between MindPlay Reading usage and student outcomes. LXD Research conducted this secondary data analysis and report to satisfy Level III requirements (Promising Evidence) according to the Every Student Succeeds Act (ESSA).

Research Questions

The research questions centered around how different usage levels of MindPlay were associated with gains in literacy scores.

1. How was students' time on MindPlay Reading associated with their spring literacy achievement after controlling for students' prior literacy achievement?
2. What was the overall impact of MindPlay Reading usage levels on students' spring literacy achievement?
3. How did reaching a critical minimum number of hours (60 hours or 20 minutes/day) impact literacy gains?

Methods

This report section briefly describes the setting, participants, measures, and analysis methods.

Setting

The study included the Dayton City Schools in Ohio and an analysis sample of 2nd-6th grade students across 15 schools. All students in these grades used MindPlay regularly as part of supplemental and/or intervention instruction. Dayton City Schools is located in Montgomery County and educates around 11,000 PK-6 students with a 14:1 student-to-teacher ratio on average across the elementary schools. The student demographics in the District consist of roughly 47% White, 43% Black, 4% Hispanic, and 4% who identify as two or more races (National Center for Education Statistics, 2022). The district has over double the proportion of students receiving food stamps than the state and national averages (48% vs. ~20%) and has a majority of single-parent households (57%).

Participants

There were 3,444 students in grades 2-6 in the analytic sample. According to demographic data provided by the district, 66% of students were described as Black, a higher percentage than the district population. While only 2% of the district's families speak English less than very well, 13% of students in the sample were identified as having Limited English Proficiency (LEP).

Measures

This study included the following measures to provide insights into MindPlay Reading implementation and evidence about the potential impacts of MindPlay Reading on student outcomes.

MindPlay Reading Assessment. Within MindPlay Reading, assessments are provided to students to help adjust the difficulty of the material and help instructors monitor progress. Researchers utilized 2021-22 this student progress information. After students complete the assessment, they are assigned a

letter: C (Critical - 2 or more years below), A (Approaching - 1 year below), M (Meeting - on grade level), or E (Exceeding - above grade level). Beginning and end-of-year reading levels were shared with the research team.

Standardized Student Assessments. MAP Growth is a computer-administered adaptive assessment to measure reading fluency and comprehension skills. Students were given MAP at the start and end of the year, Fall 2021 and Spring 2022. Students are provided a Rasch unIT (RIT) score as a grade-neutral ability score for all students at any time of the year. Growth on MAP (the change in RIT score from fall to winter) has been studied extensively and most recently updated in 2023 with a population with a relatively diverse demographic profile (54% FRPL, 49% White, 15% Black, 25% Hispanic).

Data Analysis

Researchers used a variety of quantitative analytic approaches. First, researchers conducted descriptive statistics (e.g., histograms, bar plots, proportion tables, etc) to visualize and describe the distribution of student characteristics. Researchers then conducted partial correlations, t-tests, and analyses of covariance to examine how MindPlay Reading use predicted student literacy outcomes from Fall 2021 to Spring 2022. In addition, researchers calculated standardized effect sizes (e.g. Hedge's g) to determine the magnitude of changes in student outcomes and the proportion of variance accounted for by MindPlay Reading usage.

Sample Description

Because MindPlay Reading was used as a supplemental and intervention program, the demographic profile of the sample was not perfectly aligned with the district profile. The study group had a higher proportion of ELL students (2% for the district) and Black students (43% for the district).

Table 1. Student Demographics by Grade

Grade Level	N	% Female	% ELL	% Black
Grade 2	688	48%	16%	65%
Grade 3	712	52%	14%	64%
Grade 4	656	47%	13%	68%
Grade 5	714	49%	13%	66%
Grade 6	674	49%	11%	66%

Results

MindPlay Reading Implementation Description

Overall, the district was highly engaged with implementing MindPlay Reading across the grade levels. The average hours for each grade were above the recommended 60 hours for the year, and most students met the 60-hour threshold. The usage was particularly high in grades 2 and 3, with 79% and 95% of students using the program for at least 60 hours.

Table 2a. MindPlay Usage by Grade

Grade Level	N	Average Hours	% 60+ Hours
Grade 2	688	71.9	79%
Grade 3	712	72.3	85%
Grade 4	656	69.9	71%
Grade 5	714	71.5	74%
Grade 6	674	64.0	60%

MindPlay Assessment at BOY Results

This school district had been struggling to support student reading for many years, and MindPlay Reading was part of the solution to better support older readers who lacked foundational reading skills. As expected, most students placed at least 2 grades below their chronological grade level for their reading skill placement in MindPlay (Table 2b).

Table 2b. MindPlay BOY Placement by Grade

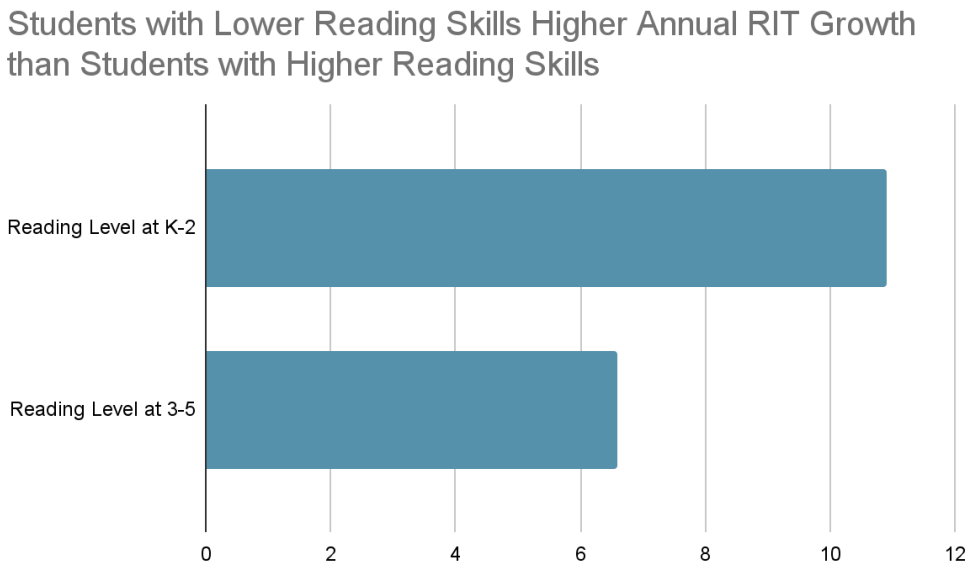
Grade Level	N	% 1 Below Grade Level	% 2 Below Grade Level	% 3+ Below Grade Level
Grade 2	683	16%	75%	NA
Grade 3	704	15%	23%	55%
Grade 4	653	16%	6%	66%
Grade 5	710	11%	16%	62%
Grade 6	670	11%	1%	73%

Progress in MindPlay for Students Below Grade Level

For Mindplay users reading below their grade level at the beginning of the year, there was a similar proportion of students who advanced one grade level in reading by the end of the year between students reading at the K-2 grade level (26.6%) and students reading at the 3-5 grade level (27.5%). Students reading at the K-2 level saw even higher gains by the end of the year, with 31.5% advancing 2 or more grade levels compared to students reading at the 3-5 grade level who had 13% of students advancing 2 or more grade levels.

For Mindplay users reading below their grade level at the beginning of the year, those reading at the K-2 grade level saw significantly higher MAP Growth RIT gains (10.9 points, Figure 1) between Fall 2022 RIT scores and Spring 2023 RIT scores compared to students reading at the 3-5 grade level (6.6 points, $t(3048) = 7.42$, $p < .001$, Hedge's g Effect Size = .36) regardless of the students' actual grade level. This indicates that students reading at grade levels K-2 saw the most benefit from the Mindplay program.

Figure 1. Fall-to-Spring RIT Gains by Reading Level



Overall Relationship Between MindPlay Reading Usage and Student Literacy Outcomes on MAP Growth

Usage Correlation

To explore the association between MindPlay Reading level and MAP Growth RIT scores,

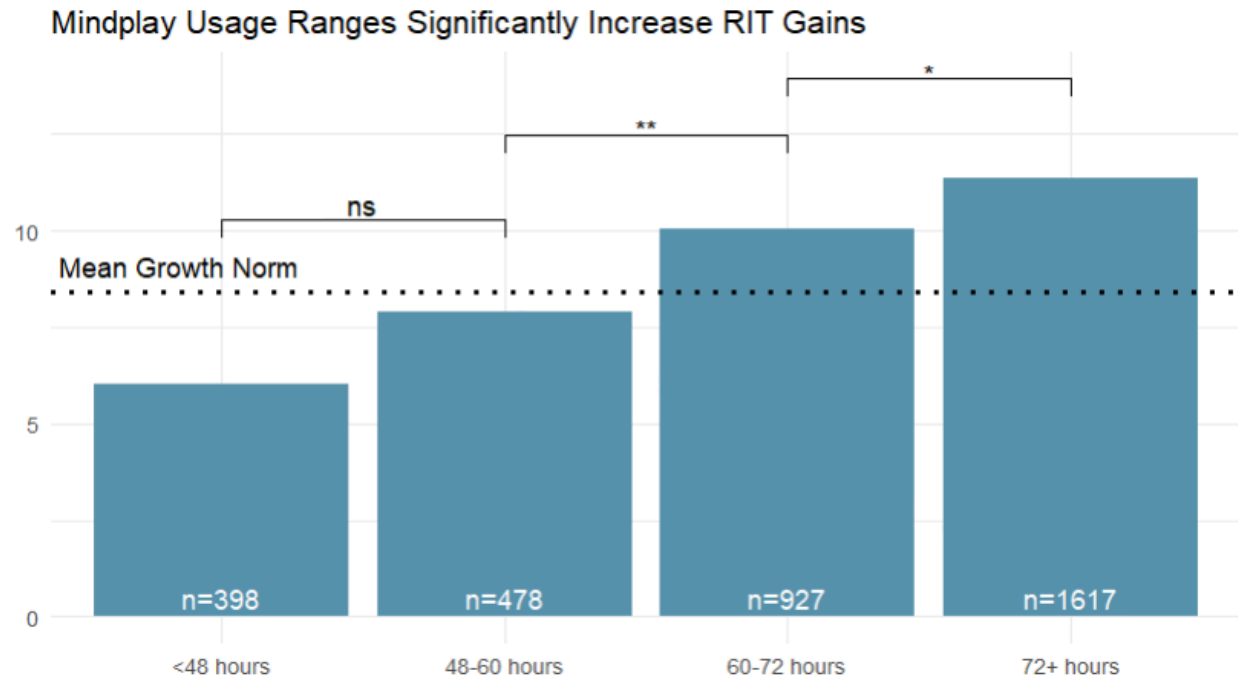
researchers examined whether higher MindPlay Reading levels correlated with Spring MAP achievement. MindPlay Reading usage was positively correlated with Spring 2023 RIT scores in each grade. Pearson correlation coefficients ranged from .11 to .26 ($p < .01$: see Table 3a). The correlation was relatively low due to an overall high usage of MindPlay (not enough variation).

Table 3a. Correlation between MindPlay Reading Level & Spring 2022 MAP Growth RIT Scores by Grade

Grade	N	r	95% CI	statistic	p
2	688	0.16	[0.09, 0.23]	$t(686) = 4.34$	< .001
3	712	0.26	[0.19, 0.33]	$t(710) = 7.14$	< .001
4	656	0.16	[0.09, 0.23]	$t(654) = 4.18$	< .001
5	714	0.11	[0.04, 0.18]	$t(712) = 3.01$	< .01
6	674	0.18	[0.11, 0.25]	$t(672) = 4.78$	< .001

To explore an accumulative effect of Mindplay exposure on RIT gains, LXD Research split users into bins of "less than 48 hours", "48-60 hours", "60-72 hours" and "72 or more hours". Each successive bin after 48-60 hours had associated RIT gains (Figure 2). For example, Mindplay users who completed 60-72 hours gained significantly more RIT points than users who only completed 48-60 hours ($t(1343) = 3.0$, $p < .05$, Hedge's g Effect Size = .34). Similarly, students who completed more than 72 hours saw significant gains beyond the 60-72 hour range. ($t(2542) = 2.9$, $p < .05$, Hedge's g Effect Size = .12). This analysis led us to conclude that 60 hours was a critical minimum for above-average growth.

Figure 2. Fall-to-Spring RIT Gains by Mindplay Usage Ranges



When comparing RIT growth for each usage bin with Grade 2-6 norms (combined average of 8.42 RIT points), students who used Mindplay for less than 48 hours saw lower RIT gains (6 points) than the average student (Table 3b). Students who used Mindplay between 48-60 hours had similar RIT gains (7.9 points) to the average student. Students who used Mindplay between 60-72 hours had significantly greater growth (10.0 RIT points) than the average student. Students who used Mindplay more than 72 hours (i.e., the suggested program dosage) had significantly greater growth (11.4 RIT points) than the average student.

Table 3b. Comparison between Mindplay Reading Usage Ranges, Fall-to-Spring RIT Gains, and the National Norm Growth Expectations

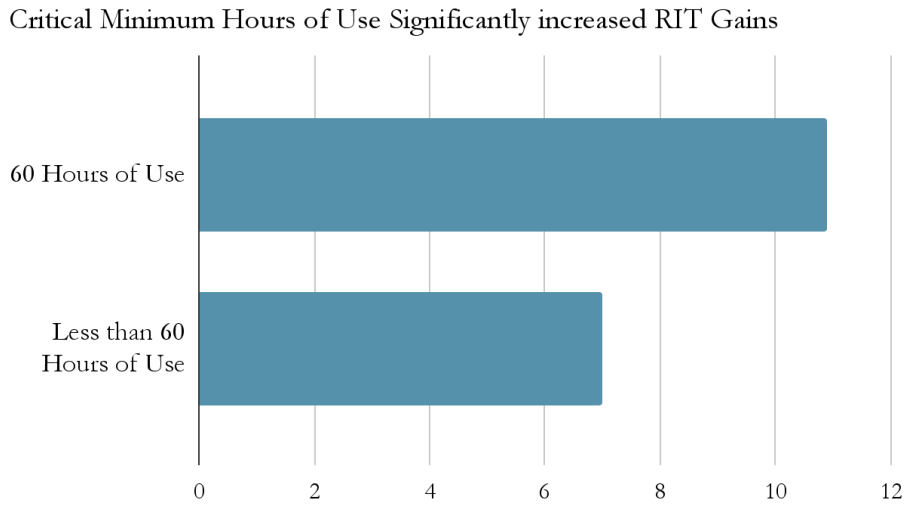
Mindplay Usage Ranges	*N*	Fall to Spring RIT Growth	SD	Significance*	Hedge's g Effect Size
<48 hours	398	6.01	11.38	p <.001	.26
48-60 hours	478	7.9	11.26	*ns*	.05
60-72 hours	927	10.04	11.19	p <.001	.17
72+ hours	1,617	11.38	11.35	p <.001	.32

**Comparing each usage range to Grade 2-6 combined growth norm of 8.42 RIT points and a pooled SD of 9.29.*

Critical Threshold of Use

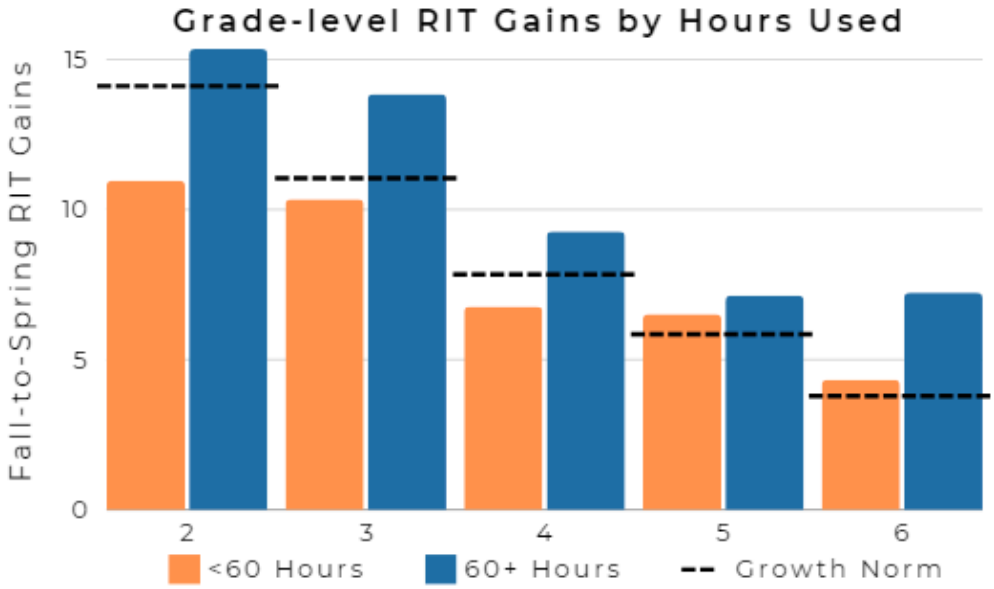
After an exploration of different usage thresholds based on product recommendations and previous research, this study continued to explore the usage threshold of 60 hours a year (20 minutes a day) as a critical minimum. For all Mindplay users in Grades 2-6, using the program for more than 60 hours was associated with significantly greater Fall-to-Spring RIT gains (10.9 points, Figure 3) compared to students who used Mindplay less than 60 hours (7.0 points, p <.001, Hedge's g Effect Size = .34).

Figure 3. Fall-to-Spring RIT Gains by Critical Usage Threshold



Students who used Mindplay less than 60 hours had RIT gains that were slightly lower than the average student (8.4 points, p <.001, Hedge's g Effect Size = .15) while, on average, students who used Mindplay for more than 60 hours exceed national growth norms (p < .001, Hedge's g Effect Size = .26).

Figure 4. RIT Gains by Grade and Critical Usage Threshold compared to Growth Norms



Grade-level Summary

Meeting or exceeding 20 minutes a day of use was necessary for students to exceed a typical year's worth of growth and close skill gaps. It is encouraging that for older students, even using MindPlay for less than 20 minutes a day maintained typical growth. These results suggest that it is important for students who are younger and farther behind to meet the usage criteria to maintain typical growth.

- The 2nd-grade students who used Mindplay for less than 60 hours had RIT gains that were lower than their 2022 grade-level growth norm (Figure 4, Table 4), while 2nd graders who used Mindplay for over 60 hours had RIT gains that exceeded their grade-level norm.
- For all other grades (3-6), students who used Mindplay for less than 60 hours had RIT gains that aligned with grade level norms for 2023, while students in grades 3-6 who used Mindplay for more than 60 hours had average RIT gains that exceeded their grade level growth norms.

Table 4. Comparison between Critical Hours of Use (+/- 60) and Grade-level Growth Norms

Grade	Hours Used	*N*	Fall to Spring RIT Growth	SD	2023 Growth Norm	Significance	Hedge's g Effect Size
2	<60 hours	138	10.96	10.23	14.1*	$p < .001$	.31
	60+ hours	545	15.35	10.91		$p < .01$	.13
3	<60 hours	101	10.34	12.13	11.1	*ns*	.08
	60+ hours	603	13.85	11.63		$p < .001$	.27
4	<60 hours	185	6.77	10.44	7.7	*ns*	.10
	60+ hours	468	9.27	10.23		$p < .01$	.17
5	<60 hours	185	6.52	11.7	5.8	*ns*	.03
	60+ hours	525	7.13	10.61		$p < .01$	.04
6	<60 hours	267	4.33	11.15	3.8	*ns*	.06
	60+ hours	403	7.23	10.11		$p < .001$	.39

**2nd-grade growth norm comes from 2022 data*

Conclusions and Recommendations

In this study, we evaluated the evidence-based MindPlay Reading literacy program by looking a the correlation between usage and end-of-year scores as well as comparing students at different usage levels to the 2023 norms. In sum, the findings support a positive relationship between MindPlay Reading progress and improved literacy skills above the typical for higher usage students. These findings were robust across Grades 2 - 6, after controlling for beginning-of-year scores. Given the statistically significant positive findings, this study provides results to satisfy ESSA evidence requirements for Level III (Promising Evidence). Specifically, this study met the following criteria for Level III:

- ✅ Correlational design
- ✅ Proper design and implementation
- ✅ Statistical controls through covariates
- ✅ At least one statistically significant, positive finding

As such, researchers recommend the following next steps: Identify a site that has yet to use MindPlay Reading in the past to conduct a research study with an experimental or quasi-experimental design to meet ESSA Levels I or II. To mitigate other limitations of this study, it is also recommended that researchers conduct interviews with school leaders and collect feedback from educators to better understand the nature of the implementation to inform future product development and user support tools.

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