THE EDTECH COLLECTIVE
Instructure Partner Ecosystem

MAGMA MATH

ESSA Level II Study (2024–25)

Prepared for:
Magma Math

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EXECUTIVE SUMMARY

Magma Math contracted with Instructure to examine the impact of its platform usage on students' math outcomes. Instructure designed the study to satisfy Level II requirements (Moderate Evidence) according to the Every Student Succeeds Act (ESSA, 2015).

Study Sample and Methodology

This study used data from the 2024–25 school year in a public school district in Ohio. The dataset included 1,686 students in grades 4–8 across 10 elementary schools and 3 middle schools, all of whom had complete achievement and demographic data from i-Ready assessments. The sample consisted of a matched group of 843 *Magma Math* users and 843 non-users.

The sample was predominantly White (40%) and African American (32%), with smaller proportions of students identifying as Two or More races (16%) and Hispanic (11%). Among all students, 15% were identified as English Language Learners (ELL), and 19% had an Individualized Education Plan (IEP).

Researchers used two measures to provide insights into *Magma Math* implementation and potential impacts of *Magma Math* on student math outcomes: *Magma Math* usage data and i-Ready test scores.

Researchers first conducted baseline equivalence tests using linear regression to determine whether *Magma Math* users and non-users were statistically equivalent in their math achievement at baseline, as measured by fall 2024 i-Ready math scores. They then used descriptive statistics to summarize participant characteristics and support analyses of program implementation. Next, linear regressions were conducted to examine the association between *Magma Math* usage and students' math outcomes, specifically its impact on spring 2025 i-Ready math scores. Where appropriate, analyses included student-level covariates to control for potential selection bias. Researchers also calculated standardized effect sizes (e.g., Hedges' *g*) to quantify the difference in math achievement between treatment and comparison groups.

Main Research Findings

Main Research Findings	
	Grades 4–5
+	Grades 4–5 students who used *Magma Math* had higher spring i-Ready Mathematics scores than those who did not (Hedges' g = 0.12). This effect size indicates that an average student at the 50th percentile would be expected to perform at approximately the 55th percentile if they had used *Magma Math*.
–	The total number of *Magma Math* solutions submitted and the average number of strokes per problem were not significantly associated with grades 4–5 students' spring i-Ready Mathematics scores.
	Grades 6–8
+	Grades 6–8 students who used Magma Math had higher spring i-Ready Mathematics scores than those who did not (Hedges' g = 0.07). This result was not statistically significant at the p < .05 level.
–	The total number of *Magma Math* solutions submitted and the average number of strokes per problem were not significantly associated with grades 6–8 students' spring i-Ready Mathematics scores.

Conclusions

Given the positive findings, this study provides results to satisfy ESSA evidence requirements for Level II (Moderate Evidence).

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INTRODUCTION

The teaching approach in math classrooms across the U.S. often focuses on procedural mathematical instruction, emphasizing the repetition and memorization of mathematical procedures rather than interactive, student-driven learning, and discourse. This method promotes rote learning and the repetitive practice of mathematical methods without a deep and thoughtful understanding of mathematical concepts (Boaler, 2015; Dysarz, 2018). *Magma Math* is a digital platform that supports effective, research-based mathematical teaching and learning experiences through student-centered approaches, mathematical discourse, and differentiated instruction based on students' formative assessments and *Magma Math*'s data-driven insights (Appendix A).

As part of their ongoing efforts to demonstrate the effectiveness of their solution, *Magma Math* contracted with Instructure to examine the impact of *Magma Math* on students' math learning outcomes. Using the Every Student Succeeds Act (ESSA) standards as guidance in developing a study design, findings in this report align with Level II requirements (Moderate Evidence). The following research questions guided this study:

Implementation

1. To what extent did students use *Magma Math* during the 2024–25 school year?

Student Outcomes

2. After controlling for fall 2024 math scores, did math achievement on a standardized math assessment vary based on students' usage of *Magma Math* by the end of the 2024–25 school year?
3. How did math achievement on a standardized math assessment for students who used *Magma Math* compare to students who do not use the product?

This report details the study design and methods, implementation, findings, and conclusions.

STUDY DESIGN AND METHODS

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

Study Design

This study used a comparative design to align with ESSA Level II evidence standards. It included all students in the district who used *Magma Math* during the 2024–25 school year.

Setting and Participants

This study used data from the 2024–25 school year in a public school district in Ohio. The dataset included 1,686 students in grades 4–8 across 10 elementary schools and 3 middle schools, all of whom had complete achievement and demographic data from i-Ready assessments. The sample consisted of a matched group of 843 *Magma Math* users and 843 non-users.

The sample was predominantly White (40%) and African American (32%), with smaller proportions of students identifying as Two or More races (16%) and Hispanic (11%). Among all students, 15% were identified as English Language Learners (ELL), and 19% had an Individualized Education Plan (IEP). A detailed breakdown by user group is provided in Appendix B.

Measures

This study included the following measures to provide insights into *Magma Math implementation* and evidence about the potential impacts of *Magma Math* on student math outcomes.

Magma Math Usage Metrics. When students are engaged with problem solving in the *Magma Math* platform, they use the various features in the canvas to demonstrate their problem-solving process, including features designed to solve math problems by hand (Hinkley et al., 2020). Specifically, this process can be captured by the data on the average pen/stylus strokes the students produced on canvas. As such, researchers hypothesized that number of strokes per problem on *Magma Math* strengthens the learning process and operationalizes students' engagement in problem solving (Hinkley et al., 2020; Mangen, & Velay, 2010).

Researchers utilized student-level usage (i.e., total number of problem solutions submitted, average number of strokes made on the canvas per problem). Teachers provide students with assignments that entail problem solving. Students can submit as many solutions as they want per problem. The usage data captures the total number of solutions submitted overall and the average number of strokes made on the canvas per problem. These usage data informed the extent to which students used *Magma Math* during the school year and whether students' use of *Magma Math* related to learning outcomes on i-Ready Mathematics assessments.

Standardized Student Assessments. Student outcomes were measured using Curriculum Associates' i-Ready Mathematics assessments. i-Ready is a computer-adaptive diagnostic designed to assess students' mathematical understanding and growth across key domains from kindergarten through grade 8. For this evaluation, students' fall 2024 i-Ready Mathematics scale scores were used as the baseline measure, and spring 2025 scale scores were used as the outcome measure. The assessment provides a reliable measure of math achievement and

progress, helping to identify students' strengths and instructional needs while aligning with state standards.

Data Analysis

Researchers used a range of quantitative analytic approaches. A matched sample of Magma Math users and non-users was created based on students' i-Ready pretest scores, gender, grade, race, IEP status, and ELL status. Baseline equivalence was then assessed using linear regression to determine whether users and non-users were statistically similar in fall 2024 i-Ready math scores. Descriptive statistics were used to summarize participant characteristics and support analyses of program implementation.

Linear regressions were conducted to examine the association between Magma Math usage and students' spring 2025 i-Ready math outcomes, with student-level covariates included where appropriate to control for potential selection bias. Standardized effect sizes (e.g., Hedges' g) were also calculated to quantify differences in math achievement between the treatment and comparison groups.

IMPLEMENTATION

This section presents descriptive findings related to *Magma Math* implementation. Researchers analyzed usage metrics from the program to determine the extent to which grades 4–8 students used *Magma Math* during the 2024–25 school year (research question 1).

Overall, *Magma Math* usage varied within the platform across both metrics: total number of solutions submitted, and average number of strokes made on the canvas per problem. Overall, students submitted an average total of 543 Magma Math solutions (SD = 711) and made an average of 13 strokes on the canvas per Magma Math problem (SD = 8; Tables 1 and 2).

Table 1. *Magma Math* total number of solutions submitted by grade band

Grade	*n*	Average (# of solutions submitted)	SD	Minimum	Maximum
4–5	430	612	788	1	4,644
6–8	413	471	614	2	4,645

Table 2. *Magma Math* average number of strokes made by grade band

Grade	*n*	Average (average number of strokes made)	SD	Minimum	Maximum
4–5	430	13	8	1	68
6–8	413	13	9	2	59

OUTCOME FINDINGS FOR GRADES 4–8 STUDENTS

The following sections detail the findings and the relationship between *Magma Math* usage and student math achievement on i-Ready Mathematics assessments (research questions 2 and 3). Researchers report statistically significant findings at the $p = 0.05$ level. Additional information on analysis procedures is in Appendix C.

Overall Association Between *Magma Math* Use and Grades 4–8 Students' Math Achievement on i-Ready Mathematics Assessments

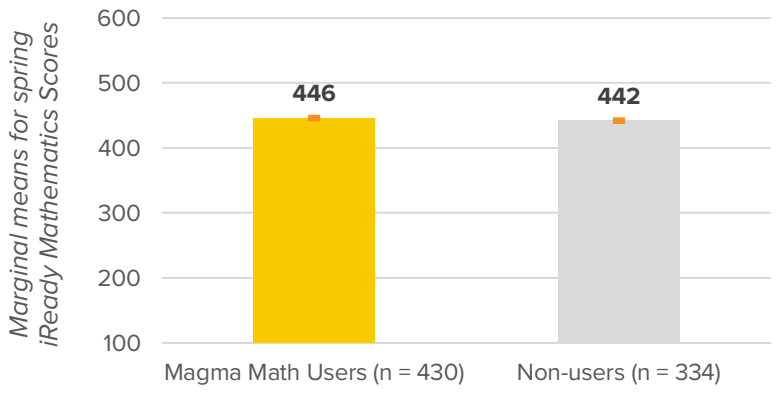
Researchers first examined whether greater use of *Magma Math* was linked to higher spring i-Ready Mathematics scores. Regression models controlled for fall 2024 i-Ready Mathematics achievement, IEP status, and ELL status. Analyses were conducted separately for grades 4–5 and grades 6–8, reflecting differences in the math content. Among students who used *Magma Math* ($n = 843$), spring i-Ready Mathematics scores were not associated with either the total number of *Magma Math* solutions submitted, or the average number of strokes used to solve problems on the platform.

Differences Between Grades 4–8 Students who used *Magma Math* and Those Who Did Not Use the Program at the End of the Year

To meet ESSA Level II requirements, researchers conducted regression analyses to examine whether students who used *Magma Math* showed statistically significant improvements in spring i-Ready Mathematics scores compared to a comparison group, controlling for fall 2024 i-Ready scores and student-level factors (grade level, IEP status, and ELL status). They also calculated standardized effect sizes.

Results showed that grade 4–5 students who used *Magma Math* scored higher on the spring i-Ready assessment than their peers who did not use the program (Hedges' $g = 0.12$, $p = .003$). For grade 6–8 students, those who used *Magma Math* also scored higher than non-users (Hedges' $g = 0.07$), but this difference was not statistically significant.

Grades 4–5 students who used *Magma Math* had higher spring i-Ready Mathematics scores than those who did not (Hedges' $g = 0.12$). This effect size indicates that an average student at the 50th percentile would be expected to perform at approximately the **55th percentile** if they had used *Magma Math*.



Note. The orange vertical lines at the top of each bar represent a 95% confidence interval.

CONCLUSIONS AND RECOMMENDATIONS

Magma Math use was associated with improvements in math achievement for grades 4–5 students. For grades 6–8, differences between users and non-users were smaller and not statistically significant. Importantly, the impact of Magma Math depends on how teachers integrate and orchestrate the program in the classroom, rather than simply on students' activity within the platform.

This study provides results to satisfy ESSA evidence requirements for Level II (Moderate Evidence). Specifically, this study met the following criteria:

- ✔ Proper design and implementation
- ✔ Baseline equivalence for treatment and comparison groups
- ✔ At least 350 students in the analysis sample
- ✔ Representative, multi-site study
- ✔ Statistical controls through covariates
- ✔ At least one statistically significant, positive effect of the intervention on outcomes

Researchers recommend the following next steps:

- **Study implementation to refine usage metrics:** Conduct research on how *Magma Math* is used in classrooms to better define what constitutes meaningful usage, rather than relying solely on platform activity.
- **Focus on early grades:** Continue prioritizing *Magma Math* in grades 4–5, where the program shows measurable benefits.
- **Enhance middle school implementation:** Explore strategies to support teacher facilitation or adapt the program for grades 6–8 to maximize impact.

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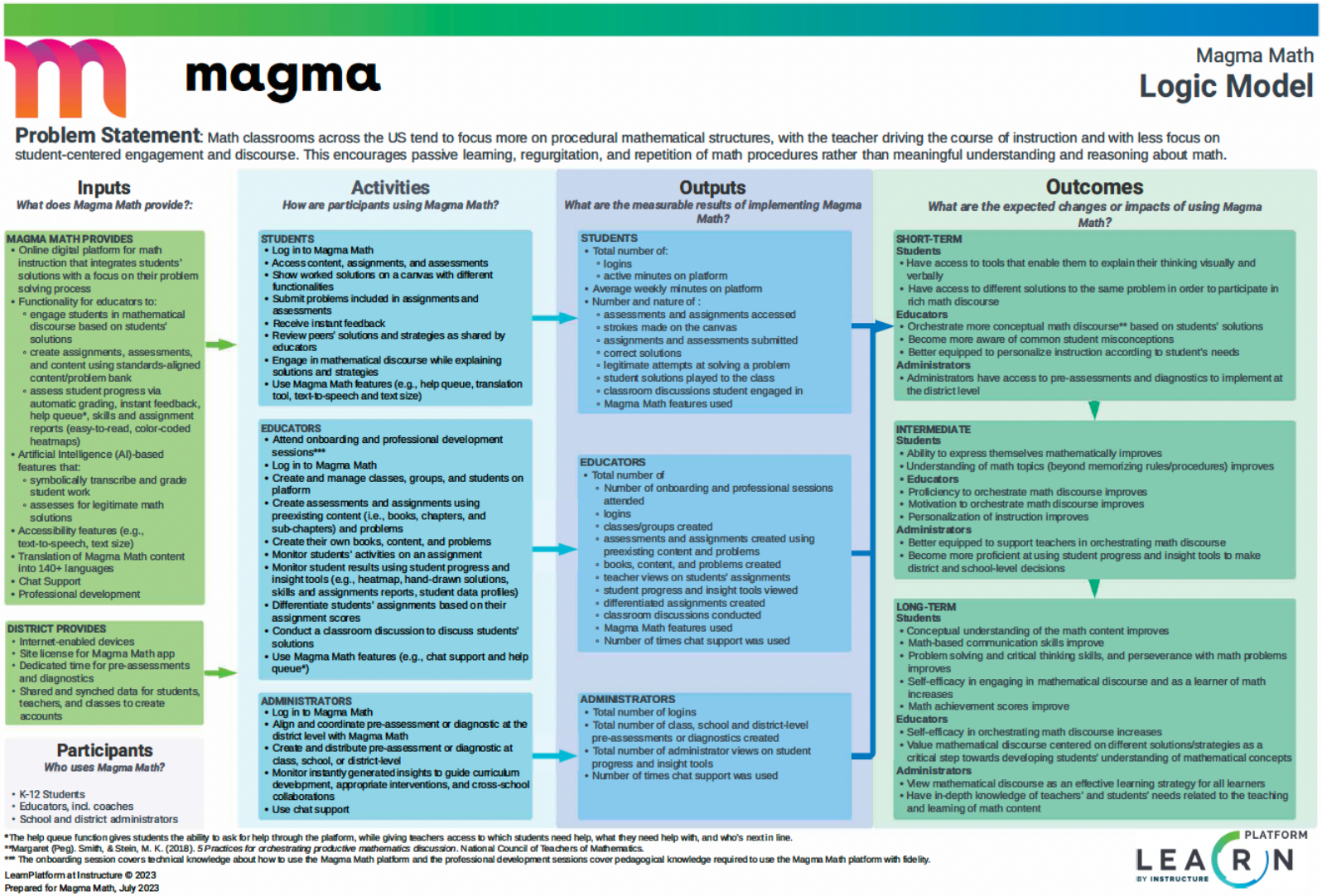
APPENDIX A. MAGMA MATH LOGIC MODEL



APPENDIX B. ADDITIONAL INFORMATION ON STUDY DESIGN AND METHODS

Table B1. Student demographics by group for matched sample

Characteristic	*Magma Math* students (*n* = 843)		Non–users (*n* = 843)		Total sample (*n* = 1,686)	
	Percent	*n*	Percent	*n*	Percent	*n*
Race $\chi^2(6) = 3.55$ $p =. 737$						
Black or African American	33%	278	31%	263	32%	541
Hispanic	10%	88	12%	103	11%	191
Two or more races	16%	138	15%	129	16%	267
White	39%	331	41%	342	40%	673
Gender $\chi^2(1) = 0.61$, $p = .436$						
Female	50%	424	52%	440	51%	864
Male	50%	419	48%	403	49%	822
Individualized Education Program (IEP) $\chi^2(1) = 0.14$, $p = .708$						
Yes	19%	161	18%	155	19%	316
No	81%	682	82%	682	81%	1,370
English Language Learner $\chi^2(1) = 0.78$, $p = .378$						
Yes	14%	122	15%	130	15%	252
No	86%	721	85%	713	85%	1,434

Table B2. Baseline Equivalence of Fall 2024 i-Ready Scores for Grades 4–5

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Treatment Condition (Hedges' $g = 0.00$)	-0.04	2.08	-0.02	.983
Gender	3.83	2.05	1.87	.062
Grade	7.42	2.08	3.57	<.001
Race	0.99	0.53	1.87	.061
IEP	-34.08	2.65	-12.88	<.001
ELL	-30.39	2.99	-10.17	<.001

Table B3. Baseline Equivalence of Fall 2024 i-Ready Scores for Grades 6–8

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Treatment Condition (Hedges' *g* = 0.10)	3.78	2.20	1.72	.086
Gender	5.52	2.15	2.57	.010
Grade	-2.77	1.49	-1.86	.064
Race	1.87	0.53	3.57	<.001
IEP	-40.87	2.78	-14.71	<.001
ELL	-32.79	3.50	-9.36	<.001

APPENDIX C. ADDITIONAL INFORMATION ON OUTCOME FINDINGS FOR 4–8 STUDENTS

Overall Association Between *Magma Math* Use and Grades 4–8 Students' Math Achievement on i-Ready Mathematics Assessments

Table C1. Association between **grades 4–5** students' *Magma Math* Usage (total solutions submitted) and spring i-Ready Mathematics scores

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Total solutions submitted	0.00	0.00	0.44	.663
Fall 2024 i-Ready scores	0.88	0.03	28.49	<.001
IEP Status	-7.79	2.55	-3.06	.002
ELL Status	5.96	2.58	2.31	.021

Table C2. Association between **grades 4–5** students' *Magma Math* Usage (average number of strokes) and spring i-Ready Mathematics scores

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Average number of strokes	-0.08	0.11	-0.70	.482
Fall 2024 i-Ready scores	0.88	0.03	28.51	<.001
IEP Status	-7.92	2.55	-3.10	.002
ELL Status	6.06	2.55	2.38	.018

Table C3. Association between **grades 6–8** students' *Magma Math* Usage (total solutions submitted) and spring i-Ready Mathematics scores

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Total solutions submitted	0.00	0.00	-0.10	.922
Fall 2024 i-Ready scores	0.90	0.04	21.60	<.001
IEP Status	-11.49	3.55	-3.23	.001

Table C4. Association between **grades 6–8** students' *Magma Math* Usage (average number of strokes) and spring i-Ready Mathematics scores

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Average number of strokes	0.04	0.16	0.25	.800
Fall 2024 i-Ready scores	0.90	0.04	21.22	<.001
IEP Status	-11.49	3.55	-3.24	.001

Differences Between Grades 4–8 Students who used *Magma Math* and Those Who Did Not Use the Program at the End of the Year

Table C5. Differences in Spring 2025 i-Ready Scores Between Usage Groups (Grades 4–5)

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Students who used *Magma Math* vs. Students who did not use the program (Hedges' ***g*** = **0.12**)	4.30	1.42	3.03	.003
Fall 2024 i-Ready scores	0.88	0.02	38.87	<.001
Grade	-7.21	1.42	-5.08	<.001
IEP	-7.44	1.91	-3.90	<.001

Table C6. Differences in Spring 2025 i-Ready Scores Between Usage Groups (Grades 6–8)

Predictor	Unstd. Beta Coefficient	Standard Error	Test statistic	*p*-value
Students who used *Magma Math* vs. Students who did not use the program (Hedges' *g* = 0.07)	3.12	1.67	1.87	.062
Fall 2024 i-Ready scores	0.94	0.02	37.84	<.001
Grade	-4.61	1.13	-4.09	<.001
IEP	-8.32	2.29	-3.63	<.001
ELL	8.50	2.63	3.24	.001