Impact Evaluation of Imagine IM in Cecil County Public Schools, Maryland

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imagine learning

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Abstract

This prospective quasi-experimental study evaluated the efficacy of Imagine IM on student math achievement in Grades K–5 in Cecil County Public Schools during the 2024–2025 school year. To assess the program's impact, multiple outcome measures were analyzed, including Acadience Math, NWEA MAP Growth Math, and MCAP Math assessments. Propensity score matching and multiple linear regression were used to establish baseline equivalence and isolate treatment effects respectively. Results showed that students who used Imagine IM scored, on average, 15.003 points higher on the spring 2025 Acadience Math assessment ($p < .001$). Significant grade-level interactions were observed, showing particularly strong effects in Grade 2 ($\beta = 11.30$, $p = 0.03$), Grade 3 ($\beta = 28.59$, $p = 0.003$) and Grade 5 ($\beta = 22.23$, $p = 0.01$). On the NWEA MAP Growth Math assessment, Imagine IM users scored 7.04 points higher than similar peers who did not use the program ($p = 0.01$). Although the MCAP Math results were positive, they were not statistically significant ($\beta = 0.37$, $p = .70$). Effects were directionally consistent across measures. Taken together, findings provide evidence that Imagine IM supports measurable improvements in students' math proficiency. These findings support the use of Imagine IM as a high-quality instructional material that can advance mathematics achievement in elementary grades.

Introduction

Proficiency in early mathematics forms a critical foundation for later academic achievement and career opportunities (National Research Council, 2012; Claessens & Engel, 2013; Shanley et al., 2017). High-quality mathematics instruction supports students in developing conceptual understanding, procedural fluency, and problem-solving skills (National Council of Teachers of Mathematics [NCTM], 2014). Imagine IM by Imagine Learning is a certified Illustrative Mathematics curriculum optimized by Imagine Learning for engagement, accessibility, and usability. The curriculum offers high-quality K–12 core mathematics instruction that is driven by student discourse and problem-based instructional design (EdReports, 2022).

This study aimed to evaluate the efficacy of Imagine IM by addressing the research question: how does use of Imagine IM impact student achievement in mathematics? To accomplish this, Imagine Learning partnered with Cecil County Public Schools (CCPS) which implemented Imagine IM in multiple schools with the intent to improve student math performance. Reported study results demonstrate how this program impacted students' Acadience Math, NWEA MAP Growth Math, and MCAP Math performance by comparing the performance of Imagine IM students to a highly similar group of students who did not use Imagine IM.

Methods

POPULATION

Imagine Learning partnered with CCPS to evaluate how Imagine IM impacted student success. During the 2024–2025 school year, Imagine IM was made available to students in Kindergarten through Grade 5 across 2 schools in Maryland. In these schools, Imagine IM was used for core math instruction throughout the entire school year. A total of 508 students in those schools used the program. Conversely, there were 5,623 students in other schools within the same district who did not use Imagine IM.

RESEARCH DESIGN

This study was conducted using a prospective, quasi-experimental design with data from the 2024–2025 school year to evaluate differences in mathematics achievement between students in treatment and comparison schools. The analytic sample was defined at baseline and included all students with available pretest data in the participating schools, regardless of posttest availability. Treatment students attended two elementary schools that implemented Imagine IM during the 2024–2025 school year, while comparison students attended schools that did not implement Imagine IM during the same period.

Assignment to treatment and comparison groups were not random; therefore propensity score matching based on baseline achievement and student demographic characteristics was used to establish baseline equivalence between groups. Students without posttest outcome data

were retained in the analytic sample for purposes of attrition assessment and excluded only at the outcome analysis stage. Because implementation occurred at the school level, statistical models accounted for clustering to adjust standard errors for school-level effects.

INTERVENTION

Imagine IM is a problem-based math curriculum that supports all learners through a coherent progression of mathematics based on content standards, mathematical practices, and research-based learning trajectories. Each Imagine IM lesson consists of a warm-up, classroom activities, synthesis, and cool-down, with the expectation that students work independently and collaboratively in every lesson. Teachers have access to a variety of print and digital resources through the Imagine Learning Classroom.

MEASURES

Multiple data sources were compiled to describe students, their performance, and their work in Imagine IM. Student math proficiency outcomes were determined using standardized progress monitoring and state assessments appropriate to each grade level. Student demographic data was collected to provide additional information on student characteristics that may impact measures of learning outcomes. These data sources are reviewed in more detail below.

Math Proficiency

Student math proficiency was measured using one of three standardized assessments, depending on grade level. For all measures, fall or prior-year scores were used to establish baseline equivalence between study groups, and spring scores were used to estimate the effect of Imagine IM participation on math achievement.

Acadience Math. Acadience Math is a curriculum-based progress monitoring tool assessing foundational math skills. Composite scores from fall 2024 and spring 2025 were used to measure student growth across the school year for grades K–5.

Northwest Evaluation Association Measures of Academic Progress Growth (NWEA MAP Growth). The NWEA MAP Growth test is a nationally normed adaptive assessment of math achievement. NWEA MAP Growth RIT Scores were collected in fall 2024 and spring 2025 to assess gains in overall math proficiency for Grade 2.

Maryland Comprehensive Assessment Program (MCAP) Mathematics. The MCAP is a state summative assessment evaluating student mastery of grade-level mathematics standards. MCAP scale scores from spring 2025 were used to assess math proficiency in Grades 4 and 5.

Student Demographics

Information was collected on individual student demographic characteristics including grade level, gender, race/ethnicity, student disability status (SWD), English learner status (EL), and economically disadvantaged status (ED).

ANALYTICAL SAMPLES

To ensure comparability between treatment and comparison students, 1:1 nearest neighbor propensity score matching without replacement was used to construct analytic samples for each outcome measure. For each analysis, the analytic sample was defined at baseline and included all students with available pretest and demographic data. Propensity scores were estimated using baseline achievement and student demographic characteristics, including gender, student disability status, English learner status, race/ethnicity, grade level, and economically disadvantaged status.

After the conclusion of the school year, students without posttest outcome data were retained in the baseline-defined analytic samples for purposes of attrition assessment and excluded only at the outcome analysis stage. **Tables 1–3** present descriptive statistics and baseline equivalence diagnostics for the matched analytic samples corresponding to each outcome measure.

Acadience Math

The baseline analytic sample included 4,563 Grade 1–5 students with available fall 2024 Acadience pretest data. Prior to matching, two comparison students with missing grade information were excluded because grade level was used as a baseline matching covariate. Propensity score matching was then conducted using baseline achievement and student demographic characteristics. The matched Acadience sample included 760 students: 396 Imagine IM users and 364 non-users. Of the 760 students in the original matched Acadience sample, 28 students were missing spring Acadience outcome data at the end of the school year and were excluded at the outcome analysis stage (3.68% overall attrition). Attrition differed by study group: 25 of 364 comparison students (6.87%) and 3 of 396 Imagine IM users (0.76%) were missing spring outcome data, resulting in a differential attrition rate of -6.11 percentage points (treatment minus comparison). The final Acadience analytic sample included 732 students: 393 Imagine IM users and 339 non-users.

Post-match balance diagnostics indicated strong baseline equivalence between treatment and comparison groups. All standardized mean differences for baseline covariates were below 0.05, including gender, student disability status, English learner status, economically disadvantaged status, race/ethnicity indicators, grade level, and fall 2024 Acadience composite scores. The largest residual difference was observed for student disability status (SMD = 0.04), which remained well below conventional thresholds for baseline imbalance. There were no statistically significant differences between treatment and comparison groups on any baseline covariate.

NWEA MAP Growth

The NWEA MAP Growth mathematics assessment was administered only to students in Grade 2; therefore, the NWEA analyses were restricted to Grade 2 students. Of the 1,014 Grade 2 students enrolled during the 2024–2025 school year, 974 students had available fall 2025 NWEA pretest scores and were included in the baseline analytic sample.

Propensity score matching was conducted using baseline achievement and student demographic characteristics. Matching was performed using 1:1 nearest neighbor matching with replacement, exact matching on grade, and Mahalanobis distance on fall 2025 NWEA scores within a propensity score caliper. The matched NWEA sample included 140 students: 74 Imagine IM users and 66 comparison students. Of the 140 students in the original matched NWEA sample, 7 students were missing spring 2025 NWEA scores at the end of the school year (5.0% overall attrition). This attrition differed by study group. Among comparison students, 7 of 66 students (10.61%) were missing spring 2025 NWEA outcomes, whereas none of the 74 Imagine IM users were missing posttest data. This resulted in a differential attrition rate of -10.61 percentage points. The final NWEA sample included 59 comparison students and 74 treatment students.

Post-match balance diagnostics indicated strong baseline equivalence between treatment and comparison groups. All standardized mean differences for baseline covariates were below 0.05, including gender, student disability status, English learner status, economically disadvantaged status, race/ethnicity indicators, grade level, and fall 2025 NWEA MAP Growth RIT scores. The largest residual difference was observed for student disability status (SMD = 0.03), which remained well below conventional thresholds for baseline imbalance.

MCAP

The MCAP mathematics assessment was administered to students in Grades 4 and 5; therefore, the MCAP analyses were restricted to students in these grade levels. Of the 2,095 Grade 4 and 5 students enrolled during the 2024–2025 school year, 1,926 students had available 2024 MCAP scores and were included in the baseline analytic sample.

Propensity score matching was conducted using baseline achievement and student demographic characteristics. Matching was implemented using 1:1 nearest neighbor matching without replacement, with exact matching on grade level and Mahalanobis distance on 2024 MCAP scale scores within a propensity score caliper. The matched MCAP sample included 322 students: 161 Imagine IM users and 159 comparison students. Of the 322 students in the original matched MCAP sample, 8 students were missing spring 2025 MCAP outcome data and were excluded at the outcome analysis stage (2.48% overall attrition). Attrition in the matched sample differed by study group: 4 of 161 comparison students (2.48%) and 4 of 161 Imagine IM users (2.48%) were missing spring outcomes, resulting in a differential attrition rate of 0.00 percentage points (treatment minus comparison).

Post-match balance diagnostics indicated strong baseline equivalence between treatment and comparison groups. All standardized mean differences for baseline covariates were below 0.05, including baseline MCAP achievement, grade level, gender, student disability status, English learner status, economically disadvantaged status, and race/ethnicity indicators. The largest residual difference was observed for gender (SMD = 0.03), which remained well below conventional thresholds for baseline imbalance.

Table 1: Student Characteristics of the Acadience Math Analytic Sample

Group	Comparison Students	Imagine IM Students	*p*-value	Standardized Mean Difference (SMD)
n	364	396		
Average (SD) Fall 2024 Acadience Composite Score	53.14 (51.40)	51.24 (48.41)	0.60	-0.01
Grade			0.93	-0.02
Grade 1	68	77		
Grade 2	61	72		
Grade 3	88	86		
Grade 4	68	77		
Grade 5	79	84		
Gender			1.00	0
Female	183	199		
Male	181	197		
Race/Ethnicity			0.83	0.01
Black/African American	13	15		
American Indian/Alaskan Native	2	1		
Asian	3	1		
Caucasian/White	303	326		
Latino/Hispanic	14	20		
Multi-Racial	29	33		
Program Eligibility				
Students with Disabilities	49	70	0.05	0.04
English Learner	11	16	0.34	0.01
Economically Disadvantaged	195	222	0.19	0.03

Table 2: Student Characteristics of the NWEA MAP Growth Analytical Sample

Group	Comparison Students	Imagine IM Students	*p*-value	Standardized Mean Difference (SMD)
n	66	74		
Average (SD) Fall 2025 NWEA RIT Score	166.08 (14.52)	165.39 (14.78)	0.78	0.01
Gender			0.94	0.01
Female	37	43		
Male	29	31		
Race/Ethnicity			0.83	0.01
Black/African American	4	0		
American Indian/Alaskan Native	2	0		
Asian	56	64		
Caucasian/White	3	2		
Latino/Hispanic	1	8		
Multi-Racial	29	33		
Program Eligibility				
Students with Disabilities	9	10	1.00	0.03
English Learner	6	6	1.00	0.00
Economically Disadvantaged	35	41	0.91	0.01

Table 3: Student Characteristics of the MCAP Analytical Sample

Group	Comparison Students	Imagine IM Students	*p*-value	Standardized Mean Difference (SMD)
n	157	157		
Average (SD) 2024 MCAP Scale Score	742.17 (17.50)	742.06 (17.50)	0.96	-0.01
Grade			1.00	0
Grade 4	77	75		
Grade 5	80	80		
Gender			0.73	0.05
Female	87	83		
Male	87	83		
Race/Ethnicity			0.99	0.00
Black/African American	6	6		
Caucasian/White	132	130		
Latino/Hispanic	9	9		
Multi-Racial	10	12		
Program Eligibility				
Students with Disabilities	24	27	0.76	0.05
English Learner	4	5	1.00	0.04
Economically Disadvantaged	79	84	0.65	0.06

ANALYTICAL APPROACH

Multiple linear regressions were used to evaluate the differences in math achievement between Imagine IM users and non-users, controlling for previous year math achievement and other covariates (including grade level, gender, race/ethnicity, SWD, EL status, and ED indicator). An indicator of whether a student was a control or treatment student was included in the regression as the primary predictor variable. Using multiple linear regressions after propensity score matching ensures that any remaining differences in the underlying treatment and control samples are controlled for by the regression model, effectively isolating the impact of Imagine IM. Because implementation occurred at the school level, statistical models accounted for clustering to adjust standard errors for school-level effects.

Results

PROGRAM IMPACT ON ACADIENCE ACHIEVEMENT

Overall, use of Imagine IM was found to generate a positive and statistically significant impact on students' spring 2025 Acadience performance. Specifically, students who used Imagine IM scored an average of 15.003 points higher on the spring 2025 Acadience Math assessment than otherwise similar non-user students, $\beta = 15.003$, $SE = 3.92$, $t = 3.83$, $p < .001$. Program usage and the other covariates in the model accounted for 51% of the variance found in Spring 2025 scores, $R^2 = .51$, $F(15, 716) = 49.64$, $p < .001$. The Hedges' g effect size of Imagine IM program usage is 0.26.[1] **Table 4** summarizes the results of the multiple linear regression. The covariate-adjusted mean spring 2025 score was 82.4 for Imagine IM users and 67.4 for non-users. Descriptive tables of unadjusted average fall 2024 and spring 2025 Acadience composite scores can be found in **Appendix A**.

Table 4: Overall Impact of Imagine IM on Spring 2025 Acadience Math Scores

Coefficients	Estimate	Standard Error	*p*-value
Intercept	41.91	10.52	<.001
Imagine IM User Indicator	15.003	3.92	<.001
Grade-Level Indicator (ref = Grade 1)			
2	-49.00	7.04	<.001
3	41.74	7.44	<.001
4	47.02	3.00	<.001
5	36.21	5.90	<.001
Fall 2024 Acadience Score	0.53	0.06	<.001
Gender (ref = Male)	-5.89	1.72	<.001
Race/Ethnicity Indicator			
American Indian/Alaskan Native	21.82	19.20	0.26
Asian	19.82	20.58	0.34
Caucasian/White	7.46	8.92	0.40
Latino/Hispanic	12.64	9.90	0.20
Multi-racial	5.84	12.74	0.65
Program Eligibility			
Students with Disabilities	-28.18	3.24	<.001
English Learner	-9.82	9.28	0.29
Economically Disadvantaged	-12.19	2.67	<.001

[1]The effect size is calculated using Hedges' g computation following What Works Clearinghouse's Procedures and Standards Handbook, Version 5.0.

DIFFERENTIAL IMPACT BY GRADE LEVEL

A series of analyses were further conducted to examine whether the effects of Imagine IM varied across grade level. Descriptive tables of unadjusted average Acadience Math scores by grade can be found in **Appendix A**. Imagine IM users had statistically significantly higher spring 2025 Acadience scores than comparable non-users for students in Grades 2, 3, and 5 **(Table 5)**. Complete regression results can be found in **Appendix B**.

Table 5: Impact of Imagine IM on Spring 2025 Acadience Math Scores by Grade Level

Grade Level	Estimate on Imagine IM Indicator Variable	Standard Error	*p*-value
Grade 1	-0.005	2.43	1.00
Grade 2	11.29	4.10	0.01
Grade 3	28.58	9.22	0.002
Grade 4	8.83	6.14	0.15
Grade 5	22.23	7.51	0.003

PROGRAM IMPACT ON NWEA MAP GROWTH ACHIEVEMENT

Overall, use of Imagine IM was found to generate a positive and statistically significant impact on students' spring 2025 NWEA MAP Growth Math performance. Specifically, students who used Imagine IM scored an average of 7.04 points higher on the spring 2025 NWEA MAP Growth Math assessment than otherwise similar non-user students, $\beta = 7.04$, $SE = 2.71$, $t = 2.60$, $p = .01$. Program usage and the other covariates in the model accounted for 71% of the variance found in Spring 2025 scores, $R^2 = .72$, $F(10, 122) = 30.60$, $p < .001$. The Hedges' g effect size of Imagine IM program usage is 0.39.[2] **Table 6** summarizes the results of the multiple linear regression. The covariate-adjusted mean spring 2025 RIT score was 184 for Imagine IM users and 177 for non-users.

[2]The effect size is calculated using Hedges' *g* computation following What Works Clearinghouse's Procedures and Standards Handbook, Version 5.0.

Table 6: Overall Impact of Imagine IM on Spring 2025 NWEA MAP Growth Math RIT Scores

Coefficients	Estimate	Standard Error	*p*-value
Intercept	44.45	18.27	0.02
Imagine IM User Indicator	7.04	2.71	0.01
Fall 2025 RIT Score	0.82	0.10	<.001
Gender (ref = Male)	-0.28	1.76	0.87
Race/Ethnicity Indicator			
Caucasian/White	6.49	3.87	0.10
Latino/Hispanic	16.38	5.76	<.01
American Indian/Alaskan Native	6.14	8.50	0.47
Multi-Racial	5.32	5.84	0.36
Program Eligibility			
Students with Disabilities	-6.36	2.89	0.03
English Learner	-9.50	3.67	0.01
Economically Disadvantaged	-3.15	1.70	0.07

PROGRAM IMPACT ON MCAP ACHIEVEMENT

Overall, use of Imagine IM was found to generate a positive but statistically nonsignificant impact on students' spring 2025 MCAP performance. Specifically, students who used Imagine IM scored an average of 0.67 points higher on the spring 2025 MCAP Math assessment than otherwise similar non-user students, although this difference was not statistically significant $\beta = 0.67$, $SE = 0.98$, $t = 0.68$, $p = 0.49$. Program usage and the other covariates in the model accounted for 68% of the variance found in Spring 2025 scores, $R^2 = 0.68$, $F(10, 303) = 63.63$, $p < .001$. The Hedges' g effect size of Imagine IM program usage is .04.[3] **Table 7** summarizes the results of the multiple linear regression. The covariate-adjusted mean Spring 2025 score was 742 for Imagine IM users and 742 for non-users. Descriptive tables of unadjusted average Spring 2024 and Spring 2025 MCAP Scale scores can be found in **Appendix A**.

[3]The effect size is calculated using Hedges' *g* computation following What Works Clearinghouse's Procedures and Standards Handbook, Version 5.0.

Table 7: Overall Impact of Imagine IM on Spring 2025 MCAP Math Scores

Coefficients	Estimate	Standard Error	*p*-value
Intercept	252.87	26.37	<.001
Imagine IM User Indicator	0.67	0.98	0.50
Grade-Level Indicator (ref = Grade 4)			
5	-2.19	1.02	0.03
Spring 2024 MCAP Score	0.65	0.04	< .001
Gender (ref = Male)	0.39	1.04	0.71
Race/Ethnicity Indicator			
Caucasian/White	6.33	2.60	0.02
Latino/Hispanic	7.81	3.88	0.05
Multi-racial	5.41	3.19	0.10
Program Eligibility			
Students with Disabilities	-3.49	1.58	0.03
English Learner	-0.95	4.17	0.82
Economically Disadvantaged	-1.58	1.06	0.14

Conclusion

This study provides evidence of the efficacy of Imagine IM on student math achievement for students in Grades 1–5 by comparing students who participated in Imagine IM with those who did not during the 2024–2025 school year. Results show that students who participated in Imagine IM scored 15.003 points higher on the spring 2025 administration of the Acadience math test and 7.04 points higher on the NWEA MAP Growth Math assessment than did similar comparison students. There was not a statistically significant difference in performance on the MCAP math assessment between Imagine IM users and non-users. Thus, this study provides evidence that the use of Imagine IM supports students' mathematics achievement.

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Appendix A

Table A1: Unadjusted Mean Acadience Math Composite Scores by Grade Band

Grade Level	Fall 2024 (SD)	Spring 2025 (SD)	Mean Change
Grade 1			
Imagine IM (*n* = 77)	29.92 (24.23)	58.55 (25.28)	28.62
Comparison (*n* = 70)	28.93 (21.11)	56.50 (26.06)	27.57
Grades 2			
Imagine IM (*n* = 71)	111.82 (68.81)	59.10 (32.26)	-52.72
Comparison (*n* = 68)	105.41 (62.65)	51.53 (33.74)	-53.88
Grade 3			
Imagine IM (*n* = 86)	23.13 (15.52)	107.47 (47.65)	84.34
Comparison (*n* = 80)	23.13 (15.52)	107.47 (47.65)	84.34
Grade 4			
Imagine IM (*n* = 75)	36.89 (22.67)	113.20 (41.40)	76.31
Comparison (*n* = 62)	41.02 (28.05)	109.03 (47.53)	68.02
Grade 5			
Imagine IM (*n* = 83)	60.95 (33.37)	122.92 (56.18)	61.96
Comparison (*n* = 78)	62.64 (35.86)	106.88 (52.78)	44.24
All Students			
Imagine IM (*n* = 392)	51.17 (48.31)	93.46 (50.46)	42.30
Comparison (*n* = 358)	51.46 (46.68)	78.12 (47.81)	26.66

Table A2: Unadjusted Mean NWEA Map Growth RIT Scores by Grade Band

Grade Level	Fall 2024 (SD)	Spring 2025 (SD)	Mean Change
All Students (Grade 2)			
Imagine IM (*n* = 71)	165.61 (14.96)	191.17 (15.15)	25.56
Comparison (*n* = 64)	166.72 (14.32)	182.86 (15.57)	16.14

Table A3: Unadjusted Mean MCAP Scale Scores by Grade Band

Grade Level	Fall 2024 (SD)	Spring 2025 (SD)	Mean Change
Grade 4			
Imagine IM (*n* = 78)	741.24 (20.03)	737.97 (14.98)	-3.27
Comparison (*n* = 78)	741.26 (19.94)	736.96 (16.24)	-4.29
Grade 5			
Imagine IM (*n* = 82)	737.10 (17.33)	738.54 (14.48)	1.44
Comparison (*n* = 82)	737.06 (17.35)	737.22 (13.72)	0.16
All Students			
Imagine IM (*n* = 160)	739.12 (18.75)	738.26 (14.68)	-0.86
Comparison (*n* = 160)	739.11 (18.72)	737.09 (14.96)	-2.01

Appendix B

Acadience Grade Level Regression Results

Coefficients	Estimate	Standard Error	*p*-value
Intercept	49.34	7.59	<.001
Imagine IM User Indicator	-0.005	2.43	1.00
Grade-Level Indicator (ref = Grade 1)			
2	-54.55	7.55	<.001
3	26.96	5.90	<.001
4	42.43	5.63	<.001
5	24.54	7.42	<.001
Fall 2024 Acadience Score	0.53	0.07	<.001
Gender (ref = Male)	-6.23	1.67	<.001
Race/Ethnicity Indicator			
American Indian/Alaskan Native	24.73	18.04	0.17
Asian	19.33	19.42	0.32
Caucasian/White	8.39	9.06	0.35
Latino/Hispanic	12.67	10.40	0.22
Multi-racial	6.54	12.84	0.61
Eligibility			
Students with Disabilities	-27.90	3.17	<.001
English Learner	-8.88	9.22	0.34
Economically Disadvantaged	-12.39	2.76	<.001
User x Grade 2	11.30	5.09	0.03
User x Grade 3	28.59	9.60	0.003
User x Grade 4	8.83	5.72	0.12
User x Grade 5	22.23	7.84	0.005

$F(19, 712) = 40.78$, $p < .001$, $R^2 = 0.52$, *Adj.* $R^2 = 0.51$