Curriculum Associates RESEARCH

Achievement and Growth for *i-Ready Classroom Mathematics* in Ohio for Grades 3–5

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Research Report | November 2024

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Summary

i-Ready Classroom Mathematics (iRCL) is a comprehensive Grades K-8 mathematics program that is designed to help teachers foster a strong mathematics learning culture as well as enhance student mathematics engagement, confidence, and achievement. In this study, we evaluated the difference in achievement and growth between students in Grades 3–5 who report using iRCL in the 2022-2023 school year compared to similar students who do not use iRCL on the Ohio's State Tests (OST) in mathematics and the *i-Ready Diagnostic* for Mathematics. iRCL students outperformed non-iRCL students in both OST mathematics scores and proficiency rates while also showing higher achievement and growth on the *i-Ready Diagnostic*. Positive results were maintained among students who identify as Black and Hispanic as well as those classified as economically disadvantaged. Findings support a student-centered approach to mathematics, as represented by iRCL. The rigorous design of this study meets the Every Student Succeeds Act (ESSA) Level 2 evidence criteria.

i-Ready

Introduction

A solid foundation in mathematics is becoming increasingly crucial in today's technology-driven world. According to the US Bureau of Labor Statistics, mathematics-related careers are projected to grow faster than the average occupation, with roles such as data scientists and actuaries expected to increase by 36% and 22%, respectively, by 2033 (Bureau of Labor Statistics, 2024). Developing strong mathematical skills in elementary school is also essential for preparing students to excel in later subjects like algebra, which has been shown to predict a wide range of positive outcomes, including high school and college graduation and improved job prospects (National Mathematics Advisory Panel, 2008; Spielhagen, 2006).

Despite the growing importance of mathematical skills, many students continue to need support. According to the 2022 National Assessment of Educational Progress (NAEP), only 35% of Grade 4 students achieved proficiency in mathematics, while 16% fell below the basic level (National Center for Education Statistics, 2022). Furthermore, students are still recovering from significant learning losses due to school closures, with the most academically vulnerable students being hit the hardest (Curriculum Associates, 2024).

One solution to meet the increasing demand for stronger mathematics education is the implementation of effective mathematics curriculum. When paired with effective instruction, a well-designed curriculum can greatly enhance student performance in mathematics (Bhatt et al., 2013; Cohen et al., 2003; Koedel et al., 2017). High-quality mathematics curriculum plays a critical role in student learning and development, serving not only as a key resource for teachers but also as a means of engaging students (Lyakhova et al., 2019). Beyond teaching mathematical concepts, a robust curriculum fosters problem-solving skills and helps students recognize the real-world relevance of mathematics (Jeannotte & Kieran, 2017). Given its crucial role in shaping student achievement, it is essential to understand the relationship between curriculum design and academic success in mathematics.

This study offers initial insight into the relationship between mathematics curriculum and mathematics achievement by focusing on Curriculum Associates' *i-Ready Classroom Mathematics* (iRCL). iRCL aims to help students deepen mathematical understanding while demonstrating mastery of mathematical concepts. The curriculum aims to connect mathematical learning to real-world situations (NCTM, 2014). In a practical sense, iRCL is a student-centered core mathematics program designed to prepare all students to succeed with grade-level content. Built on the Effective Mathematics Teaching Practices as defined by the National Council of Teachers of Mathematics (NCTM), iRCL supports teachers in identifying where students are in their mathematical understanding to accelerate their progress toward grade level.

Methodology

Research Question

This study was designed to address the following research question:

1. Among students in Grades 3–5, what is the difference in achievement and growth between students who report using iRCL in the 2022-2023 school year compared to similar students who do not use iRCL on the OST in mathematics and the *i-Ready Diagnostic*?

Data

This study used a combination of district-provided student data and information from Curriculum Associates' databases. Ohio districts supplied data on students' racial demographics, English Learner status, disability status, and economically disadvantaged status.

Districts also submitted 2023 spring OST mathematics scale scores. The OST is a standardized statewide assessment taken by all Ohio students each spring. OST mathematics scores range from 587 to 818, varying by grade. The OST also assesses student performance across five standards: Limited, Basic, Proficient, Accomplished, and Advanced. Passing is defined as reaching the Proficient level, with a score of at least 700 in each grade. This study used OST mathematics scores and the percentage of students achieving proficiency as key outcomes. All achievement data were checked to ensure they matched OST validity standards; only valid data within acceptable OST norms were included for the study.

Curriculum Associates' databases provided access to district and school purchase data for iRCL, along with students' fall and spring *i-Ready Diagnostic* mathematics achievement and growth scores.

iRCL is a comprehensive Grades K-8 mathematics program that integrates print and digital resources to help teachers foster a strong culture of mathematical learning as well as help enhance student engagement, confidence, and achievement. iRCL offers a range of tools, including Teacher's Guides, adaptive diagnostic assessments, professional learning support, instructional activities, student worksheets, practice books, and hands-on manipulatives. In this study, students were considered iRCL users if their school or district purchased iRCL in the 2021-2022 school year and again in the 2022-2023 school year. Only student data from the 2022-2023 school year were used to adjust for implementation effects, such as adjusting to a new curriculum. iRCL usage was also confirmed by Curriculum Associates' Implementation Support teams at each site.

The *i-Ready Diagnostic*, developed by Curriculum Associates, is an adaptive online assessment that measures students' placement relative to grade-level standards and national norms in Reading or Mathematics, with scale scores ranging from 100 to 800. All students completed the fall Diagnostic between August 1 and November 15, 2022, during Curriculum

Associates' standard testing window. The strong linking, or correlation, between Diagnostic scores and OST mathematics scores in Grades 3–5 (.86 to .89 depending on grade) made students' fall Diagnostic score a logical pre-achievement measure for this study (Curriculum Associates, 2023).

i-Ready Typical Growth and Stretch Growth® targets were also incorporated. Typical Growth represents the average student growth for each grade, while Stretch Growth targets aim to help below-grade level students reach proficiency and on-grade level students achieve advanced proficiency (Rome & Daisher, 2023). This study measured the percentage of students meeting both their Typical Growth and Stretch Growth targets as outcomes.

Sample

Ohio students in Grades 3–5 during the 2022-2023 school year were eligible for this study. Students were divided into two groups based on an intent-to-treat quasi-experimental design (QED). QEDs analyze all students exposed to an intervention as if they received it, regardless of actual participation (Shadish et al., 2002). Those attending schools that used iRCL in the 2021-2022 and 2022-2023 academic years were assigned to the iRCL treatment group, while those in non-iRCL schools formed the comparison group. 7,280 students out of 24,994 students overall—approximately 30%—were assigned to the iRCL treatment group.

While students in the treatment group were selected based on their school's adoption of iRCL, not all may have used the curriculum. As we lack individual-level iRCL data, such as iRCL-specific quizzes or worksheets, we cannot confirm usage. Thus, some students may be in classrooms that employ a different curriculum despite the school's overall adoption of iRCL. Furthermore, the implementation quality may vary by classroom, influenced by teachers' familiarity and adherence to the curriculum. Therefore, students were assigned to the iRCL or non-iRCL groups based on their opportunity to engage with the curriculum rather than actual usage.

Table 1 displays an overview of the sample descriptive for each group. Overall, both the iRCL and non-iRCL groups in our sample have a higher percentage of economically disadvantaged students, students with disabilities, and English Learners compared to Ohio overall. Additionally, our samples are more diverse, with both iRCL and non-iRCL groups having a greater percentage of students who identify as Black, Hispanic, American Indian/Alaskan Native, and Native Hawaiian/Pacific Islander than the state overall.

When comparing the treatment and comparison groups, the iRCL treatment group included fewer economically disadvantaged, female, and Black students but more students with disabilities and English Learners compared to the non-iRCL comparison group. Additionally, the iRCL group performed slightly better on the fall Diagnostic than the non-iRCL group. Given that these characteristics are linked to spring achievement, to strengthen claims that any achievement difference between the iRCL and non-iRCL groups are related to iRCL usage, propensity score matching (PSM) was employed to reduce sample differences in these key covariates.

Table 1. Sample Descriptive Data before Matching

	iRCL	Non-iRCL	State
Schools *N*	29	121	1,027
Students *N*	7,280	17,714	338,360
Mean Fall Diagnostic Score	436.38	432.82	-
% Economic Disadvantaged	54.66	64.02	47.45
% Disability	20.71	18.2	15.11
% English Learner	11.12	6.4	4.75
% Female	47.72	48.11	48.54
% American Indian/Alaskan Native	.13	.11	< .01
% Asian	2.76	4.08	2.92
% Hispanic	14.88	11.86	6.88
% Black	15.96	29.56	13.89
% White	57.58	44.38	68.60
% Native Hawaiian/Pacific Islander	.04	.09	< .01
% Two or more races	8.65	9.92	6.43

Note: American Indian/Alaskan Native and Native Hawaiian/Pacific Islander groups are excluded from further analyses due to small sample sizes ($n < 10$).

Propensity Score Matching

PSM reduces selection bias in observational studies by matching participants with similar probabilities (i.e., propensities) of receiving a treatment based on observed covariates. This process creates comparable treatment and control groups, minimizing the confounding influence of covariates on the estimated treatment effect (Austin, 2011; Caliendo & Kopeinig, 2008).

All matching was completed using version 4.5.5 of the MatchIt package (Ho et al., 2011) in R, version 4.2.3 (R Core Team, 2023). A systematic series of matching analyses, using various student and school characteristics (see Table 2 for criteria), was conducted to create three matched datasets—one for each Grade 3, 4, and 5—and an additional dataset by pooling Grades 3–5. Among these criteria, the student-level fall Diagnostic for Mathematics was included in each matched analysis.

Table 2. Matching Criteria Considered

Student Characteristics	School Characteristics
Fall Diagnostic for Mathematics scores* Economic Disadvantages English Learner Status Student Race/Ethnicity	School mean fall Diagnostic for Mathematics score Percentage White students Percentage Black students Percentage Hispanic students Percentage Female students Percentage Free and Reduced-Price Lunch

*Students' fall Diagnostic for Mathematics scores were included in each matched analysis.

In our systematic approach, we began by matching students using all potential criteria, excluding those with missing data for any of these characteristics. Starting with all potential criteria allowed the generation of high propensity score matches across all categories. Matching was completed multiple times with varying matching criteria, and the criteria that produced the best match quality was used for analysis. After creating matched samples, we ran descriptive statistics to determine which criteria produced the best match.

We only considered samples with at least 350 students in both treatment and control groups and a standardized difference of < |.25| for the fall Diagnostic for Mathematics score, a common benchmark for assessing group balance in educational QEDs (Evidence for ESSA Standards and Procedures, n.d.; What Works Clearinghouse, 2022). After narrowing down the matched samples, we prioritized those with the most criteria having standardized differences of < |.25|. If multiple samples met the same number of criteria, we selected the one with the largest sample size. Any sample with a standardized difference greater than 1 on any criterion was excluded.

Non-iRCL samples were randomly ordered to optimize the model's ability to identify the best match. This approach was essential, as findings showed slight sensitivity to the dataset order. While reordering the data produced some variation in sample composition and results, testing across different orderings showed only minimal differences. Repeating this process demonstrated that even when more than 25% of the comparison sample differed while adhering to the same matching criteria, the results and sample size remained consistent. Consequently, researchers opted to adhere to random ordering, which produced consistent and replicable results across all models.

Tables 3 and 4 present the differences between the iRCL and non-iRCL groups on key covariates after matching. For all samples, the matching criteria included race/ethnicity, economic disadvantage status, and fall Diagnostic for Mathematics score. After matching, almost all standardized differences were < |.25| for all samples.

Table 3. Sample Descriptive Data after Matching for Grades 3–5

Grades	3			4			5		
	iRCL	Non-iRCL	Std. Diff.	iRCL	Non-iRCL	Std. Diff.	iRCL	Non-iRCL	Std. Diff.
Student Count	2,155	2,155	—	2,177	2,177	—	2,168	2,168	—
School Count	22	94	—	22	96	—	12	85	—
Mean Fall Diagnostic	416.03	416.31	.0100	437.07	437.5	.0143	457.09	457.01	.0024
% Female	48.82	50.58	.0353	48.09	47.96	.0028	48.15	48.06	.0018
% Economically Disadvantaged	54.85	54.90	.0009	53.47	53.47	.0000	54.11	52.86	.0250
% Disability Status	21.97	17.17	.1211	21.13	18.74	.0597	20.42	13.93	.1726
% English Learners	12.16	5.34	.2433	11.35	5.28	.2211	9.92	3.00	.2843
% Black	17.08	18.65	.0412	16.81	18.10	.0339	16.24	18.36	.0561
% White	57.26	62.04	.0975	56.41	60.13	.0755	58.53	65.27	.1390
% Hispanic	14.90	7.15	.2493	14.56	8.27	.1988	14.44	6.41	.2649
% Asian	2.55	2.65	.0058	2.66	2.66	.0000	2.44	1.85	.0414

Note: Matching criteria included the student's race/ethnicity, fall Diagnostic for Mathematics score, and whether the student was classified as economically disadvantaged.

Table 4. Sample Descriptive Data after Matching for Pooled Grades 3–5

Grades	3-5		
	iRCL	Non-iRCL	Std. Diff.
Student Count	6,500	6,500	—
School Count	28	103	—
Mean Fall Diagnostic	436.77	436.91	.004
% Female	48.35	48.97	.0123
% Economically Disadvantaged	54.14	53.22	.0185
% Disability Status	21.16	16.86	.1098
% English Learners	11.14	4.33	.2573
% Black	16.71	18.74	.0532
% White	57.4	63.4	.1229
% Hispanic	14.63	6.86	.2528
% Asian	2.55	1.95	.0404

Note: The matching criteria for pooled Grades 3–5 included race/ethnicity, economic disadvantage status, and fall Diagnostic for Mathematics score.

Analyses

To assess differences between iRCL and non-iRCL users, we conducted independent *t*-tests on OST math scores, spring Diagnostic for Mathematics scores, and the percentage of students meeting Typical Growth and Stretch Growth targets for mathematics. *T*-tests were performed for each grade overall and by subgroup (i.e., Asian, Black, Hispanic, Two or More Races, White, Female, Male, Economically Disadvantaged, English Learner status, and Disability status). All *t*-test assumptions were checked, and no significant violations were identified.

Results

Overall Sample

Overall, students using iRCL outperformed those using other curricula on the OST. In Grades 4 and 5, iRCL users scored an average of 3.39 and 7.66 more points, respectively, on the OST compared to similar students taught with other curricula (see Table 5). A higher percentage of iRCL students were also considered proficient on the OST compared to non-iRCL students. Specifically, in Grades 4 and 5, iRCL users outperformed non-iRCL users, with up to 8-percentage-point differences in Grade 4 (see Table 5). Given the magnitude of the standardized effect sizes, these results represent moderate and educationally meaningful differences (Kraft, 2020).

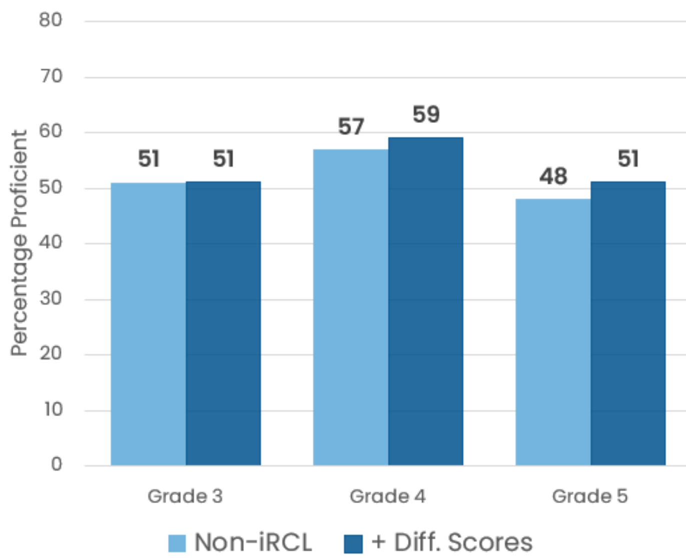
Table 5. Average OST Mathematics Scores and Proficiency Rates for iRCL Users versus Non-iRCL Users in Grades 3–5

		OST Mathematics Score				OST Mathematics Percentage Proficient			
Grade	***N***	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	4,310	704.49	702.06	2.43	.05	53	51	2	.06
4	4,354	720.72	713.06	7.66*	.15	65	57	8*	.17
5	4,336	705.63	702.24	3.39*	.09	53	48	5*	.08

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

To further contextualize these differences, we assessed the potential increase in proficiency among non-iRCL students if their scores rose by the average score difference between iRCL and non-iRCL groups. This adjustment could lead to as much as 3% more students becoming proficient if iRCL were adopted (see Figure 1).

Figure 1. Predicted Increase in Average OST Proficiency Rates for Non-iRCL Users in Grades 3–5



When comparing spring Diagnostic for Mathematics outcomes, iRCL users in Grades 4 and 5 scored an average of 2.37 and 3.13 points higher, respectively, on the spring Diagnostic compared to similar non-iRCL students (see Table 6). A higher percentage of iRCL users also met their Typical Growth and Stretch Growth targets. In Grades 4 and 5, the percentage of iRCL users achieving their Stretch Growth targets surpassed that of non-iRCL users by 5 percentage points. Additionally, in Grades 4 and 5, the percentage of iRCL users who met their Typical Growth targets exceeded non-iRCL users by 4 to 9 percentage points. Furthermore, standardized effect sizes suggest these results represent moderate and educationally meaningful differences (Kraft, 2020).

Table 6. Average Spring Diagnostic for Mathematics Score and Percentage Meeting Stretch Growth and Typical Growth Targets for iRCL Users versus Non-iRCL Users in Grades 3–5

		Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	***N***	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**St. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	4,310	442.70	444.02	-1.32	-.04	21	23	-2	-.04	52	54	-2	-.04
4	4,354	463.68	461.31	2.37*	.07	27	22	5*	.11	61	52	9*	.17
5	4,336	477.70	474.57	3.13*	.09	26	21	5*	.11	58	54	4*	.08

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Subgroup Analyses

Tables 7 and 8 present the average OST mathematics scores for iRCL users versus non-iRCL users across subgroups (i.e., Black students, Hispanic students, economically disadvantaged students, students with disabilities, and English Learners). In most grades, iRCL users scored descriptively higher than non-iRCL users among Black and Hispanic students. Specifically, Black iRCL users in Grades 3 and 4 scored an average of 7.79 to 8.15 points higher than their non-iRCL counterparts, while Hispanic iRCL users outperformed non-iRCL users in Grades 4 and 5, including a mean increase of 10.35 points in Grade 5. Additionally, the standardized effect sizes indicate that these results reflect educationally meaningful differences, ranging from moderate to large in magnitude (Kraft, 2020).

Table 7. Average OST Mathematics Scores for iRCL Users versus Non-iRCL Users in Grades 3–5 for Black and Hispanic Students

	Black				Hispanic			
Grade	**iRCL (*n*)**	**Non-iRCL (*n*)**	**Diff.**	**Std. Effect Size**	**iRCL (*n*)**	**Non-iRCL (*n*)**	**Diff.**	**Std. Effect Size**
3	681.22 (368)	673.43 (368)	7.79*	.19	686.10 (321)	683.18 (321)	2.92	.07
4	697.01 (366)	688.86 (366)	8.15*	.20	701.01 (317)	691.59 (317)	9.42*	.22
5	684.54 (352)	684.65 (364)	-.11	-.01	696.08 (313)	685.73 (274)	10.35*	.34

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Among students considered economically disadvantaged, iRCL users in Grades 3–5 scored an average ranging from 3.89 to 9.40 points higher than non-iRCL users on the OST across all grades (see Table 8). Additionally, the standardized effect sizes indicate that these results reflect educationally meaningful differences, ranging from moderate to large in magnitude (Kraft, 2020). However, among English Learners, although iRCL users had higher scores overall in Grades 4 and 5, all results only approached significance. Furthermore, for students with disabilities, although iRCL students had higher scores overall, only iRCL students in Grade 5 scored significantly higher—an average of 6.89 points—than their non-iRCL peers.

Table 8. Average OST Mathematics Scores for iRCL Users versus Non-iRCL Users in Grades 3–5 For Students Considered Economically Disadvantaged, Students with Disabilities, and English Learners

	Economically Disadvantaged				Disability				English Learner			
Grade	**iRCL (*n*)**	**Non-iRCL (*n*)**	**Diff.**	**Std. Effect Size**	**iRCL (*n*)**	**Non-iRCL (*n*)**	**Diff.**	**Std. Effect Size**	**iRCL (*n*)**	**Non-iRCL (*n*)**	**Diff.**	**Std. Effect Size**
3	687.40 (1,182)	683.51 (1,183)	3.89*	.09	671.11 (413)	669.45 (370)	1.66	.04	669.85 (262)	672.63 (115)	-2.78	-.08
4	704.61 (1,164)	695.21 (1,164)	9.40*	.21	684.11 (409)	681.03 (408)	3.08	.07	683.35 (247)	680.12 (115)	3.23	.07
5	693.88 (1,173)	688.57 (1,146)	5.31*	.17	683.17 (392)	676.28 (302)	6.89*	.24	678.20 (215)	673.37 (65)	4.83	.20

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Tables 9 and 10 present the average percentage of students scoring proficient on the OST, average spring Diagnostic scores, and percentages meeting Stretch Growth and Typical Growth targets for iRCL versus non-iRCL users in our pooled Grades 3–5 sample. Among Hispanic and economically disadvantaged students, a higher percentage of iRCL users were deemed proficient by the OST. Students meeting OST proficiency standards in the iRCL group were 7 percentage points greater than the non-iRCL group. Additionally, iRCL users outperformed similar non-iRCL users in Diagnostic scores by an average of 1.77 points among economically disadvantaged students. Additionally, standardized effect sizes of these results reflect moderate and educationally meaningful differences (Kraft, 2020).

When considering Stretch Growth and Typical Growth targets, among Hispanic students and students considered economically disadvantaged, a greater percentage of iRCL users met their Stretch Growth and Typical Growth targets compared to their non-iRCL counterparts. Among Hispanic students, more iRCL users met their Stretch Growth and Typical Growth targets by 4 and 5 percentage points, respectively. Similarly, among economically disadvantaged students, more iRCL users met their Stretch Growth and Typical Growth targets by 1 and 2 percentage points, respectively. Standardized effect sizes of these results reflect moderate and educationally meaningful differences (Kraft, 2020).

Table 9. Average OST Mathematics Percentage Proficient and Spring Diagnostic for Mathematics Scores for iRCL Users versus Non-iRCL Users in Grades 3–5 for Black Students, Hispanic Students, Students Considered Economically Disadvantaged, Students with Disabilities, and English Learners

	Sample Size		**OST Mathematics Percentage Proficient**				**Spring Diagnostic for Mathematics**			
Subgroup	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
Black	1,086	1,1127	35	31	4	.08	445.16	445.12	.04	.00
Hispanic	951	847	44	37	7*	.14	449.99	447.63	2.36	.07
Economically Disadvantaged	3,519	3,459	44	37	7*	.14	450.93	449.16	1.77*	.05
Disability	1,214	1,096	27	24	3	.06	433.4	430.4	3	.08
English Learner	724	281	23	24	-1	-.02	433.89	436.88	-2.99	-.09

Note: **p* < .05; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 10. Average Percentage Meeting Mathematics Stretch Growth and Typical Growth Targets for iRCL Users versus Non-iRCL Users in Grades 3–5 for Black Students, Hispanic Students, Students Considered Economically Disadvantaged, Students with Disabilities, and English Learners

	Sample Size		**Meeting Stretch Growth Target (%)**				**Meeting Typical Growth Target (%)**			
Subgroup	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
Black	1,086	1,1127	15	14	1	.05	49	46	3	.06
Hispanic	951	847	22	18	4*	.12	56	51	5*	.10
Economically Disadvantaged	3,519	3,459	19	18	1*	.05	52	50	2*	.05
Disability	1,214	1,096	16	15	1	.01	47	46	1	.02
English Learner	724	281	15	19	-4	-.09	51	59	-8*	-.16

Note: **p* < .05; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Conclusion

This study compared students in Grades 3–5 who used iRCL during the 2022-2023 school year with similar students who did not, focusing on achievement and growth on the OST for mathematics and the *i-Ready Diagnostic* for Mathematics. The rigorous matching process and controls in this study meet ESSA Level 2 evidence criteria. In general, iRCL students outperformed non-iRCL students in both OST mathematics scores and proficiency rates. Similarly, iRCL students scored higher on the spring Diagnostic and had a greater percentage meeting their Stretch Growth and Typical Growth targets.

Positive results were maintained among students who identify as Black and Hispanic as well as classify as economically disadvantaged. Across these student populations, iRCL students generally scored higher on the OST. Among students considered economically disadvantaged, iRCL users outperformed non-iRCL counterparts in OST mathematics scores and in spring Diagnostic for Mathematics scores. Furthermore, a higher percentage of iRCL users met OST proficiency standards compared to non-iRCL users, and a greater percentage of iRCL users met their Stretch Growth and Typical Growth goals. Similarly, a greater percentage of Hispanic iRCL users achieved OST proficiency and met growth targets than their non-iRCL counterparts. These findings support a student-centered approach to mathematics, as represented by iRCL.

While we found positive results for students who identify as Black and Hispanic, as well as students who classify as economically disadvantaged, there was no consistent difference between iRCL and non-iRCL performance for students with disabilities and students who are English Learners. This may not be surprising, as iRCL is designed for the general student population. However, it underscores the need to adapt mathematics curricula to be more inclusive and accessible, especially for students with disabilities and English Learners.

Limitations and Opportunities for Future Research

Due to data constraints, we could only assess students who had the opportunity to use iRCL, without confirming actual use or the fidelity of iRCL instruction. Incorporating implementation fidelity can clarify null or mixed results by determining whether a program was delivered as intended or if other factors (e.g., curriculum flaws, misalignment with local contexts) were involved (Hill & Erickson, 2019; Mowbray et al., 2003). Therefore, future research should incorporate implementation data when evaluating iRCL and other comparable mathematics curricula.

Another limitation is that the study only considers student characteristics, overlooking important teacher, school, and neighborhood factors that significantly impact student growth and achievement. Future research should include these additional factors to better understand the influence of mathematics curriculum on student outcomes.

In addition, the study also only focused on Grades 3–5, and hence findings may not generalize to students in Grades 6–8, particularly due to differences in the curriculum and resources not investigated in this report. For instance, support like Curriculum Associates' Fluency Flight, available in Grades 3–5 but not in middle school, could lead to different results in Grades 6–8. Future research should continue to explore how to replicate the growth and achievement in Grades 3–5 through Grades 6–8.

This study also only includes Ohio students, and hence the findings may not generalize to other states. As implementation and curriculum use can vary by state due to differing policies, future research should replicate this study in other states and districts with diverse student populations to gain a broader understanding of how iRCL impacts student skills, growth, and achievement.

Lastly, although we conducted subgroup analyses by race and gender, we did not examine these results through an intersectional lens (e.g., comparing Black females versus Black males). Given previous research on differences in mathematics achievement, beliefs, and identity among intersectional groups (Douglas et al., 2024; Hsieh et al., 2021; Riegle-Crumb, 2006), future studies should explore the effects of iRCL using more intersectional approaches (e.g., race–gender, race–class subgroups) to better understand its impact on students.

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Appendix

Table 1A. Sample Size Breakdown

	Overall		Black		Hispanic		Economically Disadvantaged		Disability		English Learners	
Grade	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**	**iRCL**	**Non-iRCL**
3	2,155	2,155	368	368	321	321	1,182	1,183	413	370	262	115
4	2,177	2,177	366	366	317	317	1,164	1,164	409	408	247	115
5	2,168	2,168	352	364	313	274	1,173	1,146	392	302	215	65
3–5	6,500	6,500	1,086	1,127	951	847	3,519	3,459	1,214	1,096	724	281

Table 2A. Average OST Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Black Students in Grades 3–5

	OST Mathematics Score				OST Mathematics Proficient (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	681.22	673.43	7.79*	.19	30	25	5	.11
4	697.01	688.86	8.15*	.20	48	39	9*	.2
5	684.54	684.65	-.11	-.01	26	28	-2	-.05
3–5	687.62	682.96	4.66*	.12	35	31	4	.08

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 3A. Average *i-Ready* Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Black Students in Grades 3–5

	Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	428.59	428.53	.06	.00	15	14	1	.04	47	45	2	.03
4	449.34	446.86	2.48	.08	17	14	3	.08	53	43	10*	.20
5	458.26	459.77	-1.51	-.04	15	14	1	.02	48	49	-1	-.02
3–5	445.16	445.12	.04	.00	15	14	1	.05	49	46	3	.06

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 4A. Average OST Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Hispanic Students in Grades 3–5

	OST Mathematics Score				OST Mathematics Proficient (%)			
Grade	iRCL	Non-iRCL	Diff.	Std. Effect Size	iRCL	Non-iRCL	Diff.	Std. Effect Size
3	686.1	683.18	2.92	.07	37	34	3	.07
4	701.01	691.59	9.42*	.22	50	40	10*	.20
5	696.08	685.73	10.35*	.34	44	31	13*	.26
3-5	694.36	688.65	5.71*	.14	44	37	7*	.14

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 5A. Average *i-Ready* Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Hispanic Students in Grades 3–5

	Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	iRCL	Non-iRCL	Diff.	Std. Effect Size	iRCL	Non-iRCL	Diff.	Std. Effect Size	iRCL	Non-iRCL	Diff.	Std. Effect Size
3	431.15	432.98	-1.83	-.06	18	19	-1	-.01	50	50	0	.00
4	450.18	448.57	1.61	.05	23	17	6*	.16	58	52	6	.13
5	469.32	458.91	10.41*	.31	25	15	10*	.26	61	55	6	.13
3-5	449.99	447.63	2.36	.07	22	18	4*	.12	56	51	5*	.10

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 6A. Average OST Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Students Who Are Economically Disadvantaged in Grades 3–5

	OST Mathematics Score				OST Mathematics Proficient (%)			
Grade	iRCL	Non-iRCL	Diff.	Std. Effect Size	iRCL	Non-iRCL	Diff.	Std. Effect Size
3	687.40	683.51	3.89*	.09	38	35	3	.07
4	704.61	695.21	9.40*	.21	54	42	12*	.23
5	693.88	688.57	5.31*	.17	39	32	7*	.16
3-5	695.25	689.19	6.06*	.15	44	37	7*	.14

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 7A. Average *i-Ready* Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Students Who Are Economically Disadvantaged in Grades 3–5

	Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	432.30	433.77	-1.47	-.05	16	19	-3	-.07	48	51	-3	-.06
4	453.72	450.67	3.05*	.09	22	15	7*	.17	56	46	10*	.21
5	467.08	463.52	3.56*	.10	20	17	3*	.09	53	52	1	.02
3-5	450.93	449.16	1.77*	.05	19	18	1*	.05	52	50	2*	.05

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 8A. Average OST Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Students with a Disability in Grades 3–5

	OST Mathematics Score				OST Mathematics Proficient (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	671.11	669.45	1.66	.04	23	24	-1	-.02
4	684.11	681.03	3.08	.07	33	30	3	.05
5	683.17	676.28	6.89*	.24	25	17	8*	.19
3-5	679.39	675.00	4.39*	.11	27	24	3	.06

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 9A. Average *i-Ready* Mathematics Outcomes for iRCL Users versus Non-iRCL Users for Students with a Disability in Grades 3–5

	Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	416.30	419.98	-3.68	-.10	14	18	-4	-.09	41	46	-5	-.10
4	435.44	436.15	-.71	-.02	17	13	4	.11	52	47	5	.10
5	449.48	441.80	7.68*	.21	16	14	2	.06	47	45	2	.04
3-5	433.40	430.40	3.00	.08	16	15	1	.01	47	46	1	.02

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 10A. Average OST Mathematics Outcomes for iRCL Users versus Non-iRCL Users for English Learners in Grades 3–5

	OST Mathematics Score				OST Mathematics Proficient (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	669.85	672.63	-2.78	-.08	20	19	1	.03
4	683.35	680.12	3.23	.07	31	27	4	.07
5	678.20	673.37	4.83	.2	17	18	-1	-.05
3-5	676.94	677.12	-.18	-.01	23	24	-1	-.02

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.

Table 11A. Average *i-Ready* Mathematics Outcomes for iRCL Users versus Non-iRCL Users for English Learners in Grades 3–5

	Spring Diagnostic for Mathematics				Meeting Stretch Growth Target (%)				Meeting Typical Growth Target (%)			
Grade	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**	**iRCL**	**Non-iRCL**	**Diff.**	**Std. Effect Size**
3	418.62	424.28	-5.66	-.19	14	23	-9	-.24	47	58	-11*	-.22
4	436.23	439.19	-2.96	-.11	17	15	2	.04	53	62	-9	-.19
5	449.83	444.69	5.14	.16	14	6	8*	.24	54	56	-2	-.05
3-5	433.89	436.88	-2.99	-.09	15	19	-4	-.09	51	59	-8*	-.16

Note: *$p < .05$; Diff. represents the difference in the outcome values between iRCL and non-iRCL.