



DreamBox Mathematics, South Carolina

Student and Teacher Usage Impact on SC READY Mathematics Scores

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Executive Summary

The purpose of this study was to examine the effect of school-level DreamBox usage levels on mathematics achievement on the statewide South Carolina College-and Career-Ready Assessments (SC READY).

Study Details

- DreamBox student and teacher usage data were provided by Discovery Education and analyzed to determine school-level usage thresholds.
- Aggregated DreamBox usage data were fuzzy matched by school and district name to publicly available data on school-level SC READY mathematics achievement.
- Propensity score matching was employed to compare DreamBox using versus non-using schools with similar student characteristics in a hierarchical linear regression.

Main Findings

- Any usage of Dreambox Math alone does not impact average school-level standardized math achievement.
- Of the specific usage metrics, school-level average student standards completed increases average school-level state standardized math achievement.
- When looking at usage levels, consistent student and teacher usage of DreamBox Math does increase average school-level state standardized math achievement.

Background

Discovery Education (DE) is a for-profit company that creates web-based supplements to traditional classroom instruction. These supplements primarily consist of multimodal resources (e.g., videos, sound clips, interactive modules, etc.) and formative assessments. Grounded in a research-informed theory of action for student learning, the products include evidence-based instructional practices, feature science of learning and universal design for learning, and provide formative assessments and feedback. Users can purchase access to interactive platforms such as the Discovery Education Learning Platform (DE Learning Platform; DEX), and/or content-specific curriculums such as Science (Science Techbook), Mystery Science, Social Studies (Social Studies Techbook), Math (Math Techbook), STEM (STEM Connect), and Coding.

Discovery Education contracted McREL International to examine the impact of DreamBox Mathematics usage on South Carolina school-level performance on standardized state mathematics achievement. Discovery Education was also interested in examining the relationship between different thresholds of usage and student achievement in mathematics.

Methodology

The current study answers the following research questions:

1. Does any usage of DreamBox Mathematics lead to school-level increases in mathematics scores on the South Carolina College- and Career-Ready Assessments (SC READY)? Does this vary by the number of school years with usage?
2. Do specific types of DreamBox usage lead to school-level increases in mathematics scores on SC READY?
3. What thresholds for student and teacher usage lead to school-level increases in mathematics scores on SC READY?

Study Design

To answer these research questions, we used a quasi-experimental design to investigate the impact of usage variables on school-level SC READY mathematics scores. Usage variables included both school-level student and teacher utilization metrics. Schools with DreamBox mathematics usage in school years 2022-2023 and 2023-2024 were compared to schools with no usage in both school years.

Dataset Creation

Fuzzy Matching. DreamBox site usage data were connected with the publicly available school-level achievement data using a “fuzzy match” on school and district name. This

technique identifies school and district names that are similar to one another in each dataset, therefore allowing the data to be merged. Ultimately, 85% of the school sites in the DreamBox usage dataset matched with sites in the publicly available South Carolina standardized achievement dataset.

Propensity Score Matching (PSM)

In the full sample of South Carolina schools, without matching on baseline characteristics, schools who used DreamBox may have differed from those who did not in a way that could bias the analysis. In other words, there may be external factors we are unable to account for that lead to schools not using DreamBox that cause them to be significantly different from schools who did use the platform. PSM, a quasi-experimental technique, allows us to create a statistically matched comparison group of non-users to allow an unbiased examination of differences between the group that received treatment (DreamBox schools) and the (PSM constructed) group that did not (comparison schools). In this study, we compared schools similar on student characteristics including average school-level baseline test scores in SY 2022-2023, grade levels within the school, and demographic characteristics. The PSM method used, nearest neighbor matching, finds the closest matches based on these characteristics, allowing each DreamBox school to be compared to up to four similar comparison schools. This method ensures that differences in the outcome are due to DreamBox usage rather than pre-existing differences among schools. PSM creates a matched sample with weights that measure the probability of a school being part of the usage or no usage group. This sample and the corresponding weights are used in later hierarchical linear regression models which account for district-level variation in school achievement. Descriptive statistics for the raw data sample and the propensity score matched sample are presented in Appendix A.

Measures

SC READY Scale Scores.¹ SC READY is a mandatory statewide assessment in English Language Arts (ELA), mathematics, science, and social studies administered to South Carolina students in grades 3–8. The SC READY test items are aligned to the state standards for each subject and grade level. The mathematics test contains selected response items (grades 3–8), multi-select items (grades 5–8), and technology-enhanced items (grades 6–8). Technology-enhanced items feature drag and drop, hot spot, drop down list, keypad input, and constructed-response options.

Mathematics achievement SC READY data for each year were downloaded from the public South Carolina Department of Education website. These datasets provide grade level

¹ [South Carolina College- and Career-Ready Assessments \(SC READY\) - South Carolina Department of Education - 03/23/2025 4:26 PM](https://www.sde.sc.gov/assessment/sc-ready)

information by school on students' average scores, along with the percentage of students falling into each achievement category. These datasets also provide demographic information, including the number of students in each grade within a school, disaggregated by gender, race, disability status, migrant status, economic status, English proficiency, and gifted and talented identification.

DreamBox in South Carolina. School-level student and teacher DreamBox usage across South Carolina from SY2022-2023 through SY2024-2025 were captured by Discovery Education and provided to McREL International for independent analysis. To answer the first research question, we define schools with *any* DreamBox usage as those who have any level of interaction with the platform for one or two school years. Schools were categorized as those with no usage, one year of usage, or two years of usage. Approximately 39.2% of schools had no usage, 12.6% had one year of usage, and 48.2% had two years of usage.

To answer the second research question, we examined specific usage metrics, including those outlined in Table 1. The school-level average for each usage metric was used in a series hierarchical linear regression models to answer research question two.

Table 1. Student and Teacher Metrics and Definitions

User Category	Metric	Definition
Student	Lessons Completed	Number of lessons completed, aggregated to the school level
Student	Unique Days	Number of unique days students logged in to the platform, aggregated to the school level
Student	Standards Completed	Number of DreamBox standards completed by each student, aggregated to the school level
Teacher	Unique Logins	Number of unique teacher logins to the platform, aggregated to the school level
Teacher	Student Dashboard Views	Number of teacher views of the Student Dashboard to monitor student progress, aggregated to the school level
Teacher	Classroom Dashboard Views	Number of teacher views of the Classroom Dashboard to monitor class progress, aggregated to the school level
Teacher	Unique Assignments Created	Number of unique assignments created by teachers, aggregated to the school level

DreamBox Usage Thresholds. To answer the third research question, we categorized schools based on their levels of student and teacher usage across SY2022-2023 and SY2023-2024. This was done by examining usage quartiles for each usage metric for each year and following the steps outlined in Figure 1. See Appendix B for quartile values for each metric.

Figure 1. Steps for Assigning Treatment Levels by Usage Metrics

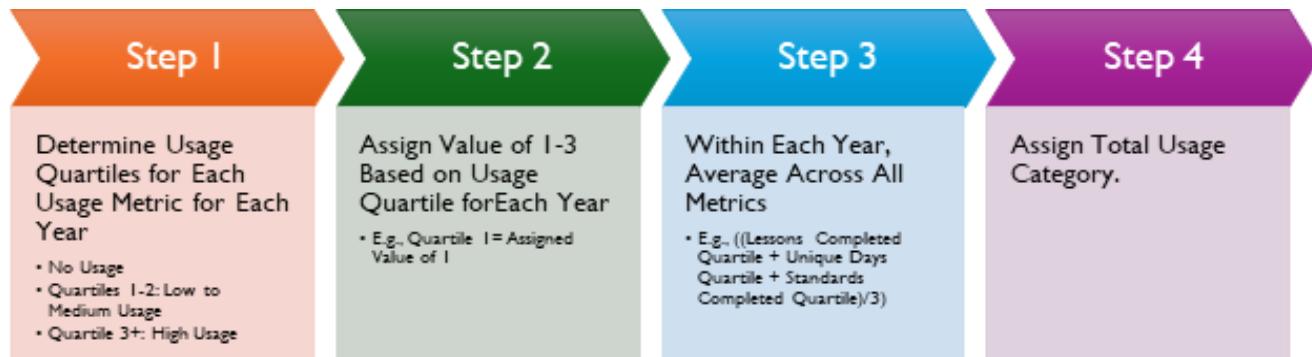


Table 2 shows the treatment levels defined by the total usage category assigned from the steps shown in the Figure. The number of schools in each treatment level are presented in Appendix C.

Table 2. Treatment Levels Tested – Total Usage Categories

Treatment Level	Conditions
0	No usage in SY2022-2023 OR SY2023-2024
1	No usage in SY2022-2023 and low usage (Q1-Q2) in SY2022-2023
2	Low usage (Q1-Q2) for both SY2022-2023 AND SY2023-2024
3	Highest usage SY2022-2023 (Q3-Q4) and low usage in SY2023-2024 (Q1-Q2)
4	No usage in SY2022-2023 and high usage in SY2023-2024 (Q3-Q4)
5	Low usage in SY2022-2023 (Q1-Q2) and high usage in SY2023-2024 (Q3-Q4)
6	Highest usage both years (Q3-Q4 thresholds met for SY2022-2023 AND SY2023-2024)

Analysis

To analyze each research question, we used hierarchical linear regression models that account for the clustering of schools within school districts and employed sample weights

assigned in the propensity score matching process. The outcome variable in each regression model was SC READY mathematics scaled scores.

Results and Discussion

Does any usage of DreamBox Mathematics lead to school-level increases in mathematics scores on the South Carolina College- and Career-Ready Assessments (SC READY)? Does this vary by the number of school years with usage?

Results of the hierarchical linear model testing any DreamBox usage for one or two years did not show a significant relationship between usage and SC READY scale scores. In other words, schools who might just have DreamBox access but engage with it minimally are unlikely to see any impact on SC READY math scaled scores. See Appendix D for full regression results.

Do specific types of DreamBox usage lead to school-level increases in mathematics scores on SC READY?

Results for this research question are presented by usage category: student and teacher.

Student Usage. Of the three student usage metrics (see Table 1), only standards gained increased school-level performance on SC READY mathematics. For each increase in the school-level average number of standards gained by students over the school year, there is a 0.09 point increase in the school-level average SC READY mathematics scale score ($p<0.001$). The Cohen's d effect size for this relationship is small, at 0.02. Results from these regression models are presented in Table 3.

Table 3. Hierarchical Linear Regression of Average School Level Student Usage Metrics on Average School Level Mathematics Scale Score

Variable	Coefficient	SE	t	p	95% Confidence Interval	Effect Size
Number of Lessons Completed	0	0	1.38	0.17	0.00-0.01	
Unique Days	0.03	0.03	0.95	0.34	-0.03-0.09	
Standards Gained	0.09	0.02	3.82	<0.001	0.05-0.14	0.02

NOTE: Coefficients indicate average change in school-level mathematics scale score compared to schools with no lessons completed, unique days in the platform, or standards gained. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true.

Teacher Usage. On their own, none of the five teacher usage metrics (see Table 1) increase school-level performance on SC READY mathematics assessments. Full regression results for these models are presented in Appendix E.

What thresholds for student and teacher usage lead to school-level increases in mathematics scores on SC READY?

Results for this research question are presented by usage category: student and teacher.

Student Usage Findings. To evaluate the impact of the average school-level student usage of average school level mathematics achievement, the team employed a hierarchical linear model that accounted for demographics, socio-economic dynamics, and other school-level factors to control for potential confounding variables.

When examining student usage metrics combined, student usage does increase average school-level state standardized math achievement. As shown in Table 4, schools that reported Dreambox Math student utilization in the highest quartile for two school years increased their average school-level state standardized math achievement by 3.4 points compared to schools with no Dreambox Math usage. The effect size for this relationship is 0.18, which is moderate.² Similarly, schools that reported low usage for two consecutive school years increased their average school-level state standardized math achievement by 3.3 points, compared to schools with no DreamBox Math usage. The Cohen's d effect size for this relationship is 0.08, which is also moderate.

Table 4. Hierarchical Linear Regression of Average School Level Student Usage Levels on Average School Level Mathematics Scale Score

Variable	Coefficient	SE	t	p	95% CI	Effect Size
High usage two years	3.4	1.38	2.37	0.01	0.70-6.1	0.18
Low usage SY22-23 and high usage SY23-24	0.46	1.99	0.23	0.8	-3.5-4.4	
No usage SY22-23 and high usage SY23-24	0.45	2.79	0.16	0.9	-5.0-5.9	
High usage SY22-23 and low usage in SY23-24	1.98	1.84	1.07	0.3	-1.6-5.6	
Low usage two years	3.3	1.35	2.47	0.01	0.69-6.0	0.08
No usage SY22-23 and low usage SY23-24	-2	2.71	-0.74	0.5	-7.3-3.3	

NOTE: Coefficients indicate average change in school-level mathematics scale score compared to schools with no usage.

The no usage category may include licensed schools that have no usage. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true.

² Kraft, M. (2020). Interpreting Effect Sizes of Education Interventions. *Educational Researcher*. <https://doi.org/10.3102/0013189X20912798>

Teacher Usage Findings. To evaluate the impact of the average school-level teacher usage of average school level mathematics achievement, the team employed a hierarchical linear model that accounted for demographics, socio-economic dynamics, and other school-level factors to control for potential confounding variables.

As shown in Table 5, schools who reported Dreambox math teacher utilization in the highest quartile for two school years increased their average school-level state standardized math achievement by 4.8 points ($p<0.001$), compared to schools with no Dreambox Math usage. The Cohen's d effect size for this relationship is moderate (0.19). Additionally, schools who reported Dreambox low math teacher utilization for two school years increased their average school-level state standardized math achievement by 3.2 points ($p<0.001$), compared to schools with no Dreambox Math usage. The Cohen's d effect size for this relationship is moderate (0.13).

Table 5. Hierarchical Linear Regression of Average School Level Teacher Usage Levels on Average School Level Mathematics Scale Score Levels

Variable	Coefficient	SE	t	p	95% CI	Effect Size
High usage two years	4.8	1.32	3.64	<0.001	2.2-7.4	0.19
Low usage SY22-23 and high usage SY23-24	-2.6	1.95	-1.32	0.2	-6.4-1.3	
No usage SY22-23 and high usage SY23-24	-1.6	2.61	-0.6	0.6	-6.7-3.6	
High usage SY22-23 and low usage in SY23-24	1.3	1.78	0.76	0.5	-2.1-4.8	
Low usage two years	3.2	1.42	2.24	0.03	0.39-5.9	0.13
No usage SY22-23 and low usage SY23-24	3.4	4	0.86	0.4	-4.4-11.0	

NOTE: Coefficients indicate average change in school-level mathematics scale score compared to schools with no usage. The no usage category may include licensed schools that have no usage. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true.

Conclusions

There are two primary conclusions that can be drawn from this study. First, having access to DreamBox mathematics is not enough to increase performance on state standardized assessments. Schools with students who complete more standards within the platform are likely to see greater gains than schools with lower student utilization. Second, consistency of implementation is key to seeing gains in school-level achievement. Schools who had consistent high usage for two years, as well as schools with consistent low usage for two years, both showed significant gains in school-level achievement on SC READY.

Limitations

There are some limitations of this study. First, the usage dataset that Discovery Education provided did not include unique school ID numbers, which would simplify matching between DreamBox usage data and South Carolina data. “Fuzzy matching” was employed to join the data together, so it is possible that a small degree of contamination of the comparison group occurred. Second, data are aggregated to the school level rather than using student-level data, which may blur or dilute the potential impact of DreamBox on individual students. The analytic design of the study was a quasi-experimental design, which allowed us to examine causal associations between DreamBox mathematics and SC READY performance. However, a randomized controlled trial may offer a more rigorous test of causal effects, through randomly assignment participants to conditions and further minimizing selection bias.

Appendices

Appendix A: Descriptive Statistics for Raw and Propensity Score Matched Samples

Table A-1. Descriptive Statistics

Variable	Raw Data		Propensity Score Matched Sample		
	Mean/Proportion	SD	Mean/Proportion	SD	SMD
SC READY Math Scale Score SY22-23*	509	70	499	61.7	0.08
SC READY Math Scale Score SY23-24	512	68.9	504	60.5	
Grade Level*					0.08
3	22.2%		24.5%		
4	22.1%		24.9%		
5	21.6%		23.9%		
6	11.8%		10.8%		
7	11.3%		8.5%		
8	11.0%		7.4%		
Percent Female*	49.0%	6.0%	49.0%	5.9%	-0.05
Race/Ethnicity*					
Percent Latino/a	11.8%	11.5%	11.9%	11.5%	0
Percent Native American	0.3%	1.0%	0.3%	1.0%	-0.04
Percent Asian	1.5%	2.7%	1.4%	2.5%	-0.01
Percent Black	35.3%	25.8%	35.3%	25.7%	-0.03
Percent Hawaiian/Pacific Islander	0.1%	0.5%	0.1%	0.5%	-0.01
Percent White	45.3%	25.8%	45.2%	25.6%	0.03
Percent Two or More Races	5.7%	3.6%	5.8%	3.7%	0.01
Percent with a Disability*	15.4%	7.2%	15.7%	6.7%	-0.03
Percent with Limited English Proficiency*	8.6%	1.0%	8.6%	9.9%	0.04
Percent eligible for Free- or Reduced- Price Lunch*	66.2%	21.1%	67.7%	20.1%	0.09
Percent Gifted and Talented*	15.8%	14.4%	14.7%	13.3%	0.03
Any DreamBox Usage					
No Usage	39.2%		41.1%		
One Year	12.6%		5.3%		
Two Years	48.2%		53.6%		
Student Usage Metrics					

Average Total Lessons Completed SY22-23	3409.7	6741.0	4082.0	7222.0	
Average Total Lessons Completed SY23-24	3876.8	7958.2	4725.0	8555.0	
Average Total Unique Days SY22-23	23.5	36.6	27.6	38.4	
Average Total Unique Days SY23-24	23.2	36.8	28.2	38.8	
Average Total Standards Gained SY22-23	15.9	28.1	18.9	29.9	
Average Total Standards Gained SY23-24	24.3	41.5	29.6	44.0	
Teacher Usage Metrics					
Average Total Unique Logins SY22-23	11.8	20.2	13.8	21.3	
Average Total Unique Logins SY23-24	12.8	21.2	15.4	22.4	
Average Total Student Dashboard Views SY22-23	10.8	65.6	13.0	72.2	
Average Total Student Dashboard Views SY23-24	14.0	103.0	17.0	113.0	
Average Total Classroom Dashboard Views SY22-23	11.2	40.2	13.5	44.0	
Average Total Classroom Dashboard Views SY23-24	14.8	70.9	17.8	77.7	
Average Total Report Dashboard Views SY22-23	12.5	44.1	14.8	48.1	
Average Total Report Dashboard Views SY23-24	14.7	47.7	17.9	52.1	
Average Total Unique Assignments Created SY22-23	6.9	22.4	8.3	24.5	
Average Total Unique Assignments Created SY23-24	8.0	32.0	9.7	35.0	
Total Student Usage					
No Usage	35.3%		36.0%		
No usage SY22-23 and low usage SY23-24	8.2%		1.9%		
Low usage two years	20.0%		19.4%		
High usage SY22-23 and low usage in SY23-24	7.9%		7.6%		
No usage SY22-23 and high usage SY23-24	1.8%		2.1%		

<i>Low usage SY22-23 and high usage SY23-24</i>	4.5%		5.9%		
<i>High usage two years</i>	22.3%		27.0%		
Total Teacher Usage					
<i>No Usage</i>	45.1%		42.4%		
<i>No usage SY22-23 and low usage SY23-24</i>	1.1%		0.8%		
<i>Low usage two years</i>	17.6%		14.8%		
<i>High usage SY22-23 and low usage in SY23-24</i>	6.4%		6.2%		
<i>No usage SY22-23 and high usage SY23-24</i>	2.2%		2.7%		
<i>Low usage SY22-23 and high usage SY23-24</i>	3.8%		4.2%		
<i>High usage two years</i>	23.7%		29.0%		
	N = 924		N = 871		

*NOTE: Asterisk indicates the variable was used in the propensity-score match process. SD indicates the standard deviation for each variable. SMD indicates standardized mean difference between the matched sample and the original sample. Values indicate the number of standard deviations difference in means between the two samples.

Appendix B: Student and Teacher Usage Quartiles

Quartiles Assigned in Step 1 were based on the following values for student and teacher metrics.

Table B-1. School-Level Student Usage Quartiles by Year

2022-23			
	Quartile 1	Quartile 2	Quartile 3
Lessons Completed	274.0	4,031.0	10,686.0
Unique Days	6.2	39.7	82.2
Standards Completed	2.2	23.5	52.5
2023-24			
	Quartile 1	Quartile 2	Quartile 3
Lessons Completed	63.8	2,175.0	11,994.0
Unique Days	4.0	31.1	81.9
Standards Completed	0.9	29.6	83.3

Table B-2. School-Level Teacher Usage Quartiles by Year

2022-23			
	Quartile 1	Quartile 2	Quartile 3
Unique Logins	4.0	14.7	34.2
Student Dashboard Views	0.2	1.5	6.1
Classroom Dashboard Views	1.7	5.5	15.9
Report Dashboard Views	1.7	7.3	23.8
Unique Assignments	0.6	3.0	10.4
2023-24			
	Quartile 1	Quartile 2	Quartile 3
Unique Logins	3.0	14.6	40.0
Student Dashboard Views	0.1	0.8	4.1
Classroom Dashboard Views	1.2	4.6	16.5
Report Dashboard Views	1.1	7.9	29.4
Unique Assignments	0.4	2.1	10.3

Appendix C. Number of Schools by Treatment Level

Table C-1. School-Level Student Usage Treatment Levels

Treatment Level	Number of Schools
0	373
1	20
2	201
3	79
4	22
5	61
6	279

*NOTE: Schools may be duplicated as some grade levels may meet different thresholds.

Table C-2. School-Level Teacher Usage Treatment Levels

Treatment Level	Number of Schools
0	378
1	27
2	132
3	55
4	24
5	37
6	258

*NOTE: Schools may be duplicated as some grade levels may meet different thresholds.

Appendix D. Any DreamBox Usage and Average School Level Mathematics Scale Score

Table D-1. Hierarchical Linear Regression of Any DreamBox Usage on Average School Level Mathematics Scale Score

Variable	Coefficient	SE	t	p	95% Confidence Interval
One Year of Dreambox	-0.67	2.58	-0.26	0.79	-5.7-4.4
Two Years Dreambox	0.79	1.53	0.51	0.61	-2.2-3.8

NOTE: Coefficients indicate average change in school-level mathematics scale score compared to schools with no usage. The no usage category may include licensed schools that have no usage. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true.

Appendix E. Teacher Usage Metrics and Average School Level Mathematics Scale Score

Table E-1. Hierarchical Linear Regression of Average School Level Teacher Usage Metrics on Average School Level Mathematics Scale Score

Variable	Coefficient	SE	t	p	95% Confidence Interval
Unique Logins	0.03	0.07	0.47	0.6	-0.10-0.16
Student Dashboard Views	0	0.01	0.00	0.9	-0.03-0.03
Classroom Dashboard Views	0	0.02	0.01	0.8	-0.04-0.04
Report Dashboard Views	-0.01	0.03	-0.49	0.6	-0.07-0.04
Unique Assignments	0	0.04	0.07	0.9	-0.08-0.08

NOTE: Coefficients indicate average change in school-level mathematics scale score compared to schools with no usage.

The no usage category may include licensed schools that have no usage. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true. SE indicates standard error. t refers to the student test coefficient, and p refers to the probability that the null hypothesis (i.e. no relationship) is true.