



# **Correlational Evaluation of DreamBox Reading Plus in South Carolina District**

Prepared by McREL for Discovery Education

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## Executive Summary

The goal of this study is to understand how a district's use of the DreamBox Learning by Discovery Education (hereafter, Dreambox) reading program (Reading Plus) is related to both students' level in Reading Plus grade level and their standardized test scores on the South Carolina College- and CAREER READY Assessments (SC READY). Data for this study included demographic and outcome data from 9,319 students during School Year (SY) 2022-23 provided by a South Carolina school district. Dreambox merged these data with students' Reading Plus profiles. This study examines the association between DreamBox Reading Plus and ELA growth outcomes for key subgroups.\* Note that the findings presented in this report are correlational (examining how Reading Plus use and SC Ready outcomes are related) and should not be interpreted as causal. Drawing causal inferences would require the inclusion of achievement data from a comparison group of students who did not have access to DreamBox.

### Results Overview

Research Question 1: How is the use of DreamBox Reading Plus associated with fall to spring growth on SC READY?

**Finding: Completing more lessons in Reading Plus is associated with higher growth in SC READY scores. This finding is true across subgroups.**

Research Question 2: How is the use of DreamBox Reading Plus associated with students meeting or exceeding their added value target (AVT) on the SC READY exam?

**Finding: Completing more lessons in Reading Plus is associated with a higher probability of meeting or exceeding the added value target. This finding is true across subgroups.**

Research Question 3: What percent of students that grew in Reading Plus by 1-2 levels also grew 1-2 achievement levels in SC READY?

**Finding: Growth in Reading Plus reading grade levels is associated with achievement level growth on the SC READY exam. This finding is true across subgroups, with 18 to 63% of students who grew in Reading Plus grade levels also growing in SC READY.**

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\* Subgroups include grade bands, special designations, gender, and race.

## District Overview

- The school district has been using DreamBox Reading Plus for several years.
- Each year, district leadership begins all students with the Fall InSight assessment, and encourages following up with Winter and Spring benchmarks, especially for monitoring intervention students.
- With their designated Partner Success team, the school district designed weekly student implementation goals of 3-4 lessons and 1-2 combos, as well as weekly teacher implementation goals of 2 logins per week.
- The Reading Plus staff supports the district by providing school usage and growth updates to celebrate school and student usage.
- Building-level leaders in the district check in regularly to coordinate PD, incentivize students with exciting monthly challenges, and work towards these implementation goals district-wide.

## Research Question 1: How is the use of DreamBox Reading Plus associated with Fall to Spring growth on SC READY?

To answer this research question, hierarchical linear modelling (HLM) was used to account for the correlations of students' growth in test scale scores (SC READY Growth) and DreamBox Reading Plus Lessons, controlling for prior achievement (Fall SC READY). In the model, the students are nested within schools. The estimation strategy is the following:

$$\text{Level 1 (student): } SC\ READY\ Growth_{ijk} = \pi_{0jk} + \pi_{1jk} (DreamBox\ Lessons) + \pi_{2jk} (Fall\ SC\ READY) + \pi_{3jk} (Covariates) + e_{ijk}$$

$$\text{Level 2 (school): } \pi_{0jk} = \beta_{00k} + r_{ijk}$$

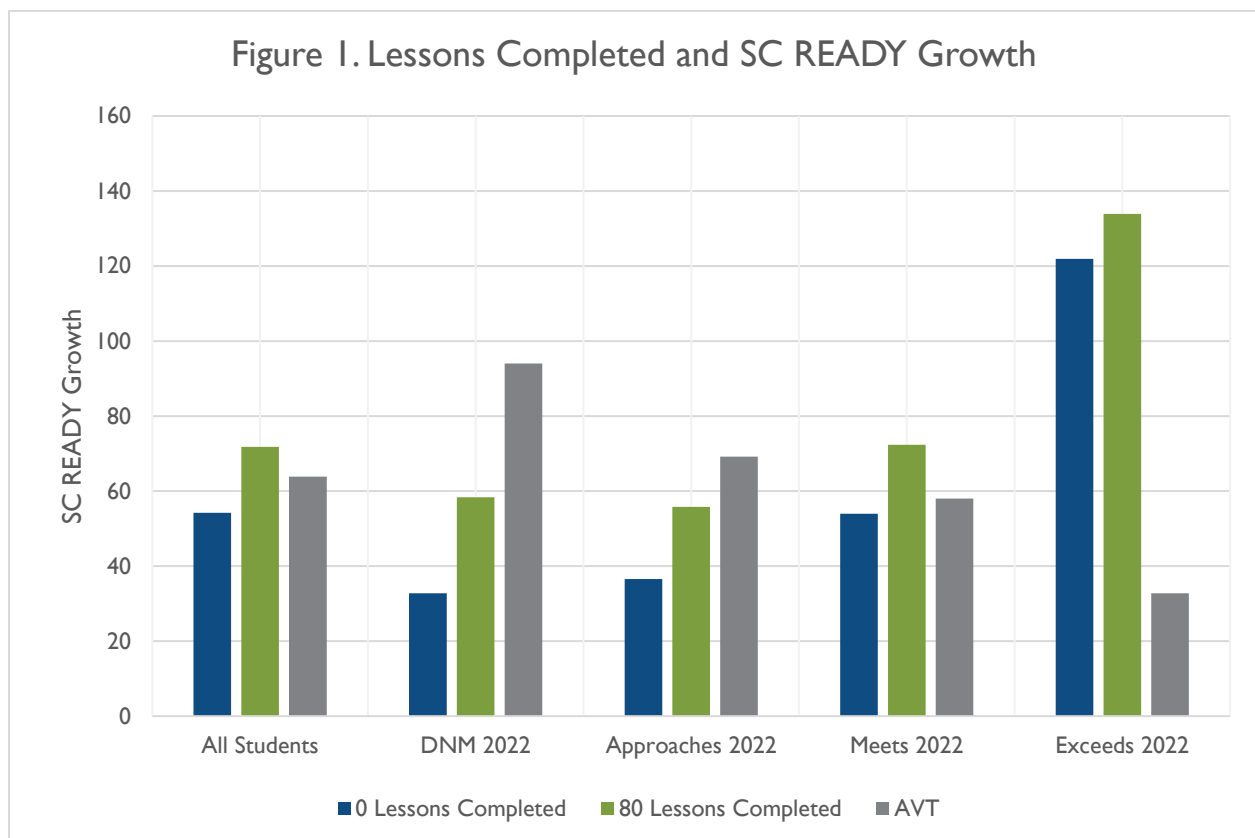
where *DreamBox Lessons* is the effect of completing one additional DreamBox Reading Plus lesson.

### Finding: Completing more lessons in Reading Plus is associated with higher growth in SC READY ELA scores.

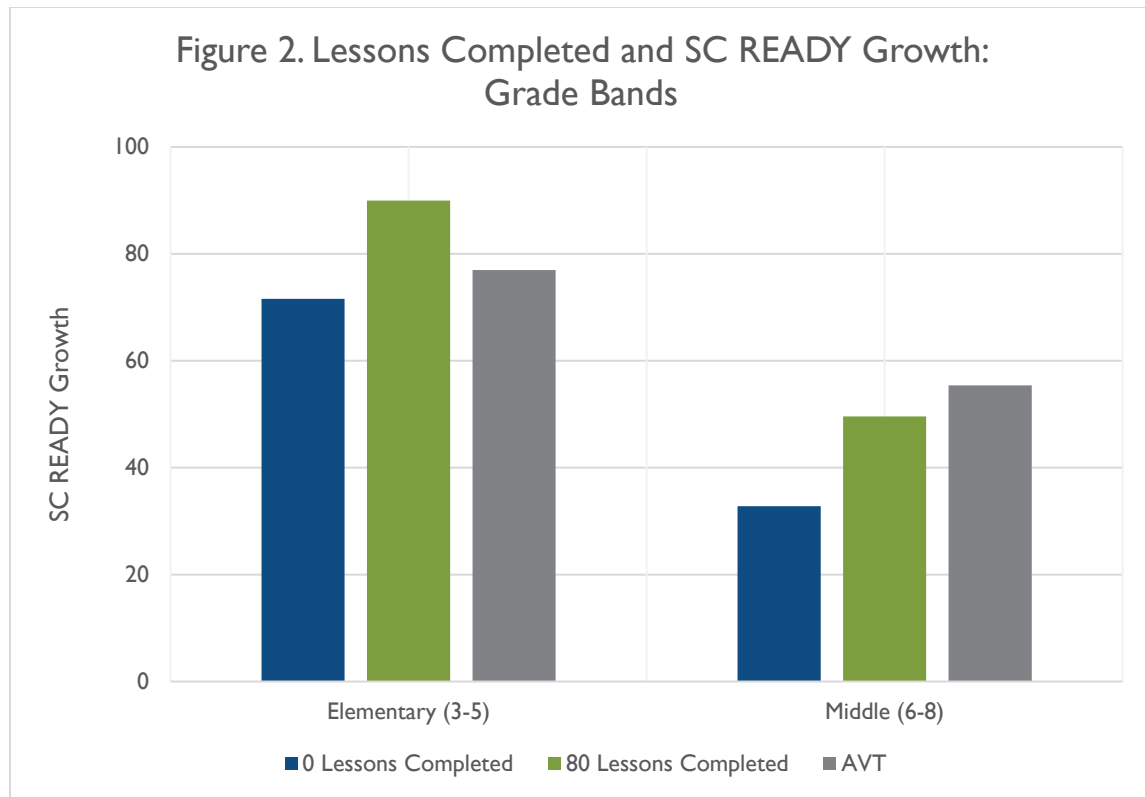
- Figures 1-5 show the SC READY growth associated with the different levels of completed lessons in Reading Plus for key subgroups.
- For each graph, the blue bar represents the growth associated with completing 0 lessons, the green bar represents the growth associated with completing 80 lessons, and the grey bar represents the average added value target (AVT) for the respective group.
- Table 2 displays the results for all subgroups. The intercept represents the growth associated with completing 0 lessons, while the coefficient represents the increase in SC READY Growth associated with each additional lesson completed. The raw effect of 80 lessons multiplies the coefficient by 80 to understand the growth associated with completing 80 lessons. The effect size represents the effect of 1 standard deviation of lessons completed. The standardized 80-lesson effect represents the raw effect of 80 lessons relative to the standard deviation, which represents a meaningful difference with the SC READY growth for the subgroup.
- 16 of the 17 80-lessons effects reported here meet or exceed recommendations for what is generally considered a meaningful effect size based on education research. Specifically, effect sizes of 0.20 or 0.25 are considered “of policy interest” (Hedges & Hedberg, 2007, p.77), “substantively important” (WWC, 2017, p.77) or of “educational significance” (Bloom et al., 2008, p.295). In addition, Lipsey and his colleagues assert unequivocally that effect sizes of 0.25 in education research should be considered “large” (Lipsey et al., 2012, p.4).

## What does recommended usage mean in terms of time?

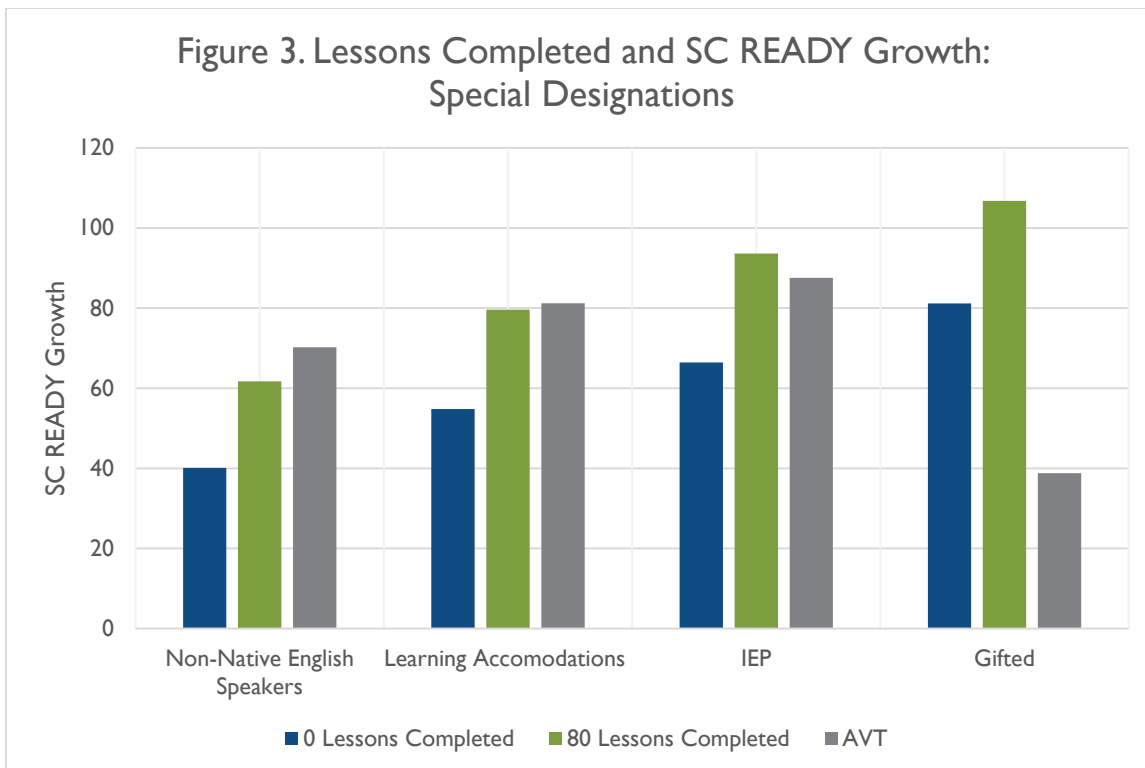
- The average minutes per lesson for the total student sample is 20.85, meaning that 80 lessons would equal approximately 28 hours of time spent learning on the platform.
- This translates into less than 1 hour of learning per week throughout the school year.
- Note this number is slightly lower for younger students and higher for older students. Please see table A.2 for the average minutes per lesson broken down by grade.



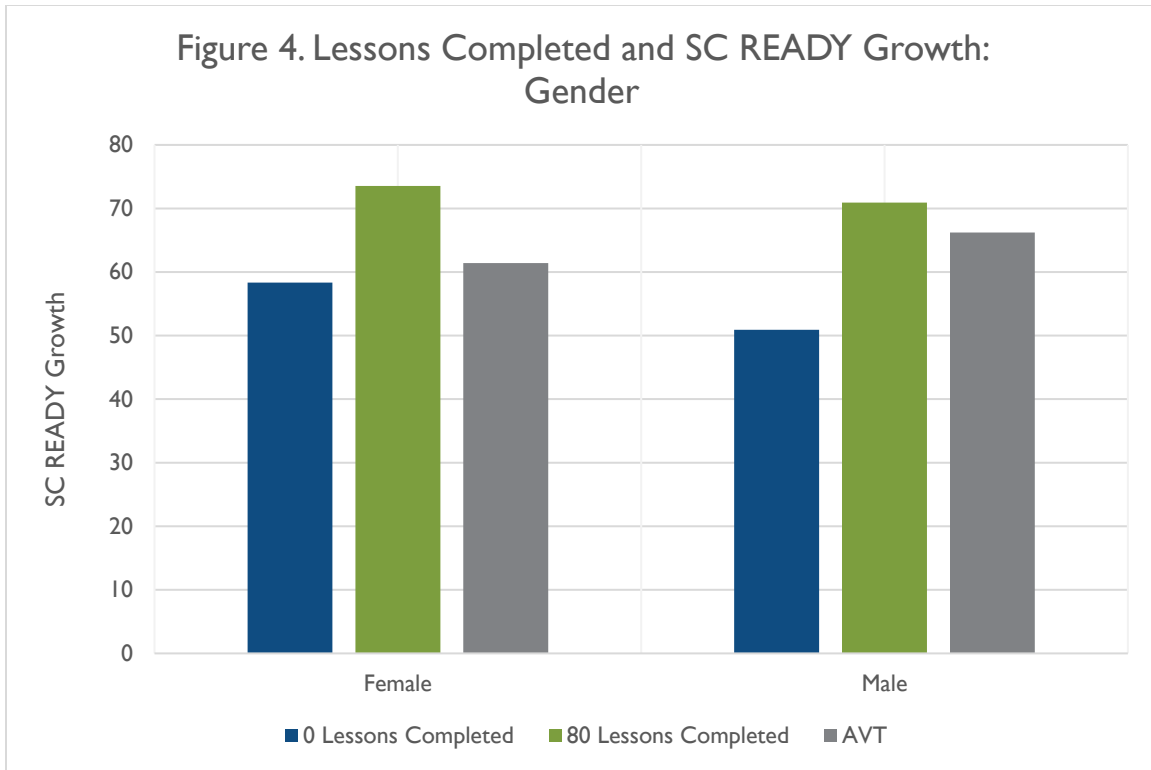
Note: AVT represents the average added value target for the group. DNM 2022 is a subgroup of students who did not meet standards on the SC READY ELA assessment in 2022. Likewise, the other designations indicate student performance level in the year prior. To see the growth distribution for each achievement group please see Figures A.1-A.5.



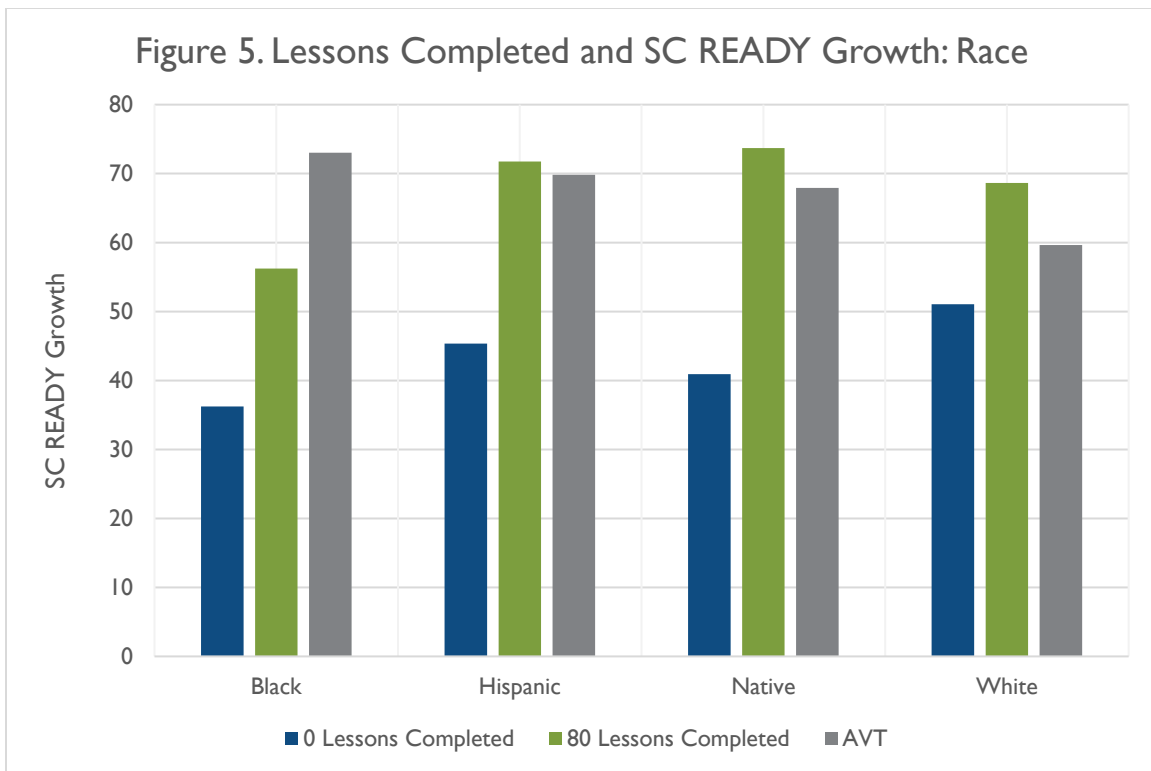
Note: AVT represents the average added value target for the group.



Note: AVT represents the average added value target for the group. IEP stands for Individualized Education Plan.



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Note: AVT represents the average added value target for the group.



**Table 1. Research Question 1 Results**

- The intercept represents the growth associated with completing 0 lessons.
- The completed lessons coefficient represents the association between SC READY growth and 1 completed lesson in RP.
- The raw effect of 80 lessons multiplies the coefficient by 80. Note that these numbers match the graphs above.
- The effect size represents the effect of 1 standard deviation of lessons completed, which ranged from 27-60 lessons for different groups of students (see Table A.3).
- The standardized effect of 80 lessons represents the raw effect of 80 lessons (80 \* coefficient) relative to the standard deviation, which represents a meaningful difference with the SC READY growth for the subgroup.

Students	Intercept	Completed Lessons Coefficient	Raw Effect of 80 Lessons	Effect Size	Effect Size (80 Lessons)
<b>All</b> (n = 3,335)	54.21 (4.13)	.22*** (.03)	17.6	.14	.28
<b>DNM 2022</b> (n = 811)	32.76 (13.34)	.32*** (.06)	25.6	.17	.40
<b>Approaches 2022</b> (n = 1,026)	36.58 (10.1)	.24*** (.05)	19.2	.14	.31
<b>Meets 2022</b> (n = 800)	53.95 (11.62)	.23*** (.06)	18.4	.15	.29
<b>Exceeds 2022</b> (n = 698)	121.91 (15.6)	.15*** (.06)	12	.10	.19
<b>Elementary</b> (n = 500)	71.57 (12.1)	.23*** (.06)	18.4	.22	.29
<b>Middle</b> (n = 2,835)	32.8 (4.85)	.21*** (.04)	16.8	.12	.27
<b>Non-Native English Speakers</b> (n = 870)	40.1 (11.23)	.27*** (.06)	21.6	.14	.34

<b>Learning Accommodations</b> (n = 414)	54.82 (14.96)	.31*** (.08)	24.8	.20	.39
<b>IEP</b> (n = 309)	66.45 (23.20)	.34*** (.09)	27.2	.21	.44
<b>Gifted</b> (n = 706)	81.19 (11.12)	.32*** (.08)	25.6	.18	.39
<b>Female</b> (n = 1,620)	58.35 (5.68)	.19*** (.04)	15.2	.12	.24
<b>Male</b> (n = 1,715)	50.92 (5.78)	.25*** (.04)	20	.15	.31
<b>White</b> (n = 1,972)	51.05 (3.53)	.22*** (.04)	17.6	.14	.27
<b>Black</b> (n = 1,112)	36.24 (10.42)	.25*** (.05)	20	.16	.33
<b>Asian/Pacific Islander</b> (n = 109)	.	.			.
<b>Hispanic</b> (n = 967)	45.35 (4.98)	.33*** (.06)	26.4	.18	.42
<b>Native American</b> (n = 347)	40.91 (10.78)	.41*** (.12)	32.8	.18	.53

Note: DNM stands for Does Not Meet. RP stands for Reading Plus. IEP stands for Individualized Education Plan. The Asian/Pacific Islander subgroup had too few students to accurately perform the analysis. Significance levels are denoted as follows: \*\*\*  $p < .01$ , \*\*  $p < .05$ , and \*  $p < .1$ .

### Interpreting Raw Results and Effect Size by Row

- For students in the total sample, completing 0 lessons was associated with a growth of 54.21 points, while completing 80 lessons was associated with a growth of 71.81 points. The difference of 17.6 points, relative to the group's standard deviation of 63.16 points, corresponds to an 80-lesson effect of 0.28 standard deviations.
- For students identified as DNM in 2022, completing 0 lessons was associated with a growth of 32.76 points, while completing 80 lessons was associated with a growth of 58.36 points. The difference of 25.6 points, relative to the group's standard deviation of 63.21 points, corresponds to an 80-lesson effect of 0.40 standard deviations.
- For students identified as Approaches in 2022, completing 0 lessons was associated with a growth of 36.58 points, while completing 80 lessons was associated with a growth of 55.78

points. The difference of 19.2 points, relative to the group's standard deviation of 61.12 points, corresponds to an 80-lesson effect of 0.31 standard deviations.

- For students identified as Meets in 2022, completing 0 lessons was associated with a growth of 53.95 points, while completing 80 lessons was associated with a growth of 72.35 points. The difference of 18.4 points, relative to the group's standard deviation of 62.38 points, corresponds to an 80-lesson effect of 0.29 standard deviations.
- For students identified as Exceeds in 2022, completing 0 lessons was associated with a growth of 121.91 points, while completing 80 lessons was associated with a growth of 133.91 points. The difference of 12 points, relative to the group's standard deviation of 64.31 points, corresponds to an 80-lesson effect of 0.19 standard deviations.
- For students in the elementary grade band, completing 0 lessons was associated with a growth of 71.57 points, while completing 80 lessons was associated with a growth of 89.97 points. The difference of 18.4 points, relative to the group's standard deviation of 63.17 points, corresponds to an 80-lesson effect of 0.29 standard deviations.
- For students in the middle grade band, completing 0 lessons was associated with a growth of 32.8 points, while completing 80 lessons was associated with a growth of 49.6 points. The difference of 16.8 points, relative to the group's standard deviation of 61.56 points, corresponds to an 80-lesson effect of 0.27 standard deviations.
- For students identified as non-native English speakers, completing 0 lessons was associated with a growth of 40.1 points, while completing 80 lessons was associated with a growth of 61.7 points. The difference of 21.6 points, relative to the group's standard deviation of 63.05 points, corresponds to an 80-lesson effect of 0.34 standard deviations.
- For students with learning accommodations, completing 0 lessons was associated with a growth of 54.82 points, while completing 80 lessons was associated with a growth of 79.62 points. The difference of 25.6 points, relative to the group's standard deviation of 63.08 points, corresponds to an 80-lesson effect of 0.39 standard deviations.
- For students with IEPs, completing 0 lessons was associated with a growth of 66.45 points, while completing 80 lessons was associated with a growth of 93.65 points. The difference of 27.2 points, relative to the group's standard deviation of 61.86 points, corresponds to an 80-lesson effect of 0.44 standard deviations.
- For students identified as gifted, completing 0 lessons was associated with a growth of 81.19 points, while completing 80 lessons was associated with a growth of 106.79 points. The difference of 25.6 points, relative to the group's standard deviation of 66.08 points, corresponds to an 80-lesson effect of 0.39 standard deviations.
- For students identified as female, completing 0 lessons was associated with a growth of 58.35 points, while completing 80 lessons was associated with a growth of 73.55 points. The difference of 15.2 points, relative to the group's standard deviation of 62.41 points, corresponds to an 80-lesson effect of 0.24 standard deviations.
- For students identified as male, completing 0 lessons was associated with a growth of 50.92 points, while completing 80 lessons was associated with a growth of 70.92 points. The difference of 20 points, relative to the group's standard deviation of 63.88 points, corresponds to an 80-lesson effect of 0.31 standard deviations.
- For students identified as White, completing 0 lessons was associated with a growth of 51.05 points, while completing 80 lessons was associated with a growth of 68.65 points. The difference of 17.6 points, relative to the group's standard deviation of 64.48 points, corresponds to an 80-lesson effect of 0.27 standard deviations.

- For students identified as Black, completing 0 lessons was associated with a growth of 36.24 points, while completing 80 lessons was associated with a growth of 56.24 points. The difference of 20 points, relative to the group's standard deviation of 61.38 points, corresponds to an 80-lesson effect of 0.33 standard deviations.
- For students identified as Hispanic, completing 0 lessons was associated with a growth of 45.35 points, while completing 80 lessons was associated with a growth of 71.75 points. The difference of 25.6 points, relative to the group's standard deviation of 63.43 points, corresponds to an 80-lesson effect of 0.42 standard deviations.
- For students identified as Native American, completing 0 lessons was associated with a growth of 40.41 points, while completing 80 lessons was associated with a growth of 73.71 points. The difference of 33.3 points, relative to the group's standard deviation of 62.98 points, corresponds to an 80-lesson effect of 0.53 standard deviations.

## Research Question 2: How is the use of DreamBox Reading Plus associated with students meeting or exceeding their added value target (ATV)?

According to the SC Education Oversight Committee, the targets for added growth are based on what is needed to get all students to meet grade-level expectations in ELA and math by the end of 8th grade. Therefore, the growth targets are larger for students with lower prior achievement. To answer this question, hierarchical linear modelling (HLM) was used to account for the correlations of students' growth in meeting or exceeding their AVT and DreamBox Reading Plus Lessons, controlling for prior achievement (Fall SC READY), with students nested in schools. The estimation strategy is the following:

Level 1 (student):  $AVT\ Met_{ijk} = \pi_{0jk} + \pi_{1jk}(DreamBox\ Lessons) + \pi_{2jk}(Fall\ SC\ READY) + \pi_{3jk}(Covariates) + e_{ijk}$

Level 2 (school):  $\pi_{0jk} = \beta_{00k} + r_{ijk}$

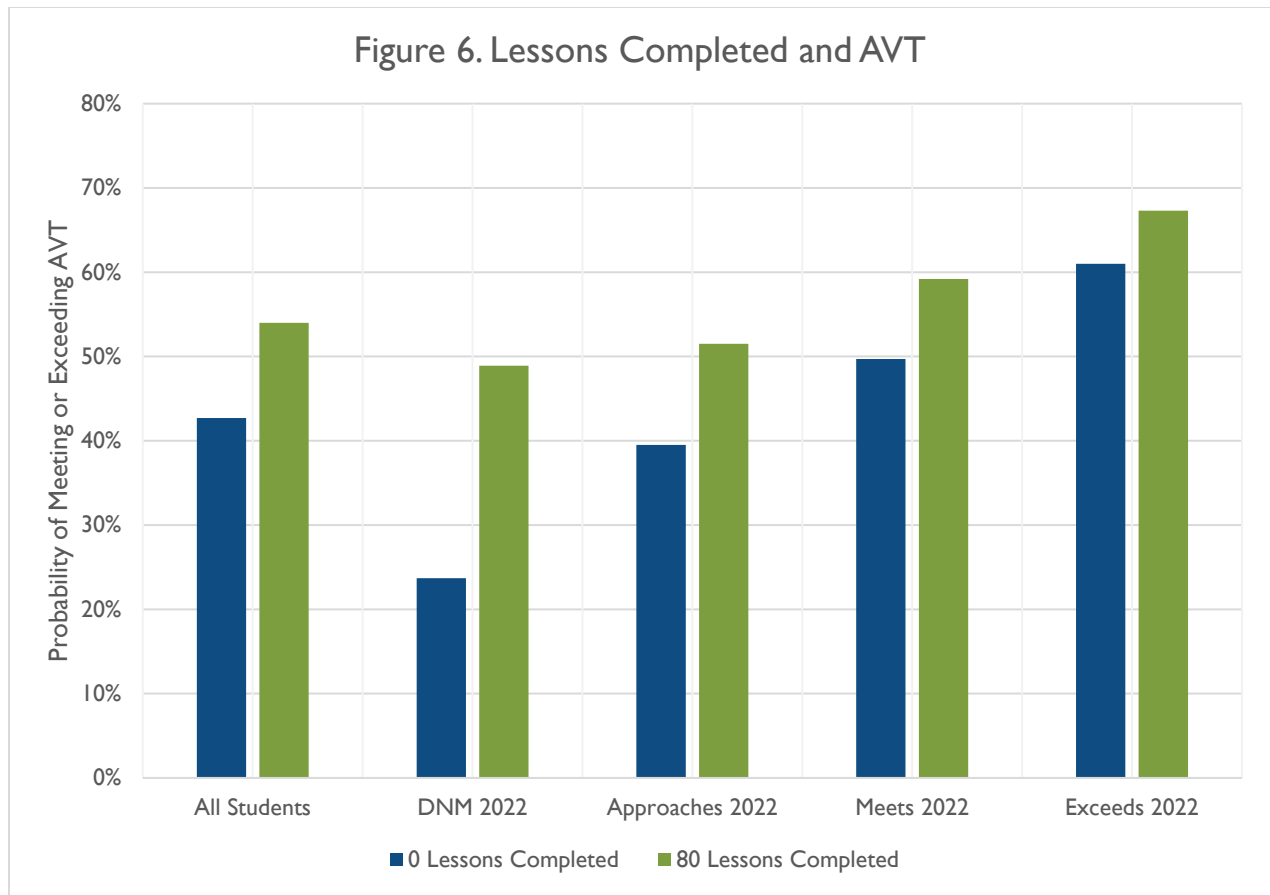
Once the model was fitted, average predictions were calculated.

**Finding: Completing more lessons in Reading Plus is associated with a higher probability of meeting or exceeding the added value target.**

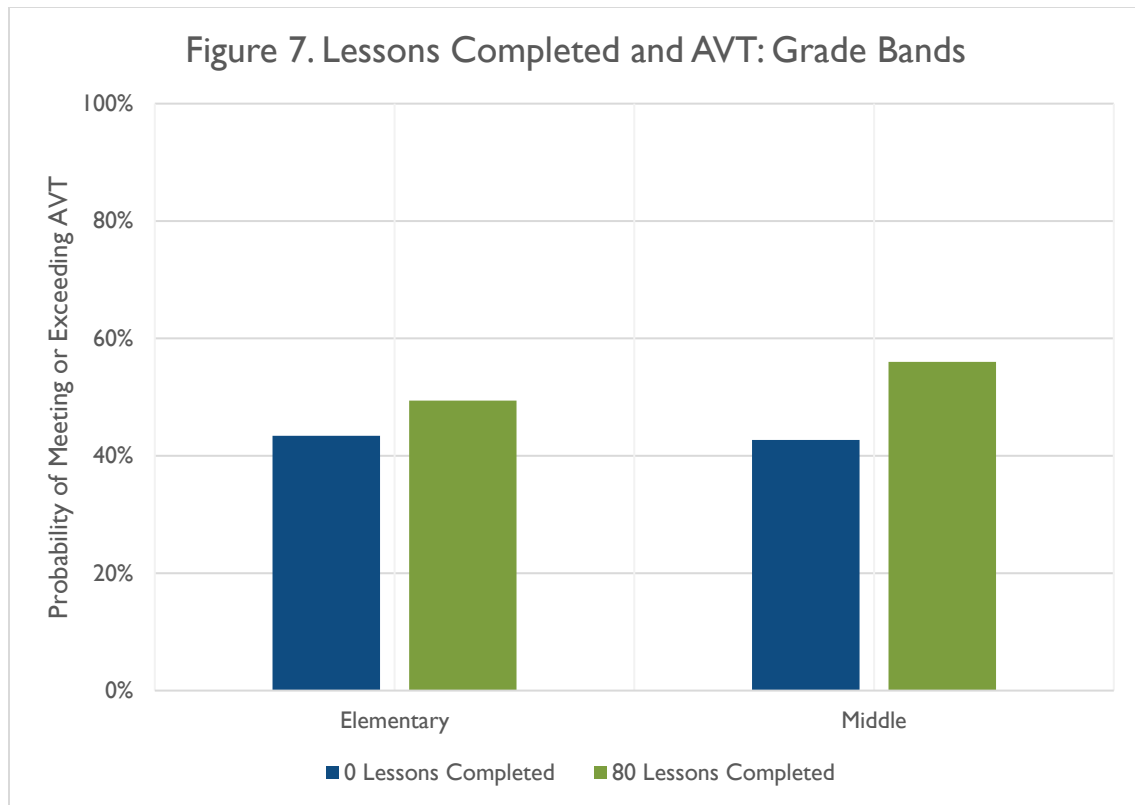
- Figures 6-10 show the probabilities of meeting or exceeding the AVT associated with the different levels of completed lessons in Reading Plus for key subgroups.
- For each graph, the blue bar represents the probability for completing 0 lessons, the green bar represents the probabilities associated with completing 80 lessons.
- For example, Figure 6 shows that completing 80 lessons is associated with around a ten-percentage point increase in the probability of meeting or exceeding the AVT, which goes from 42.7% to 54%.
- All the results are significant at the  $p < .05$  level unless otherwise noted.

**What does recommended usage mean in terms of time?**

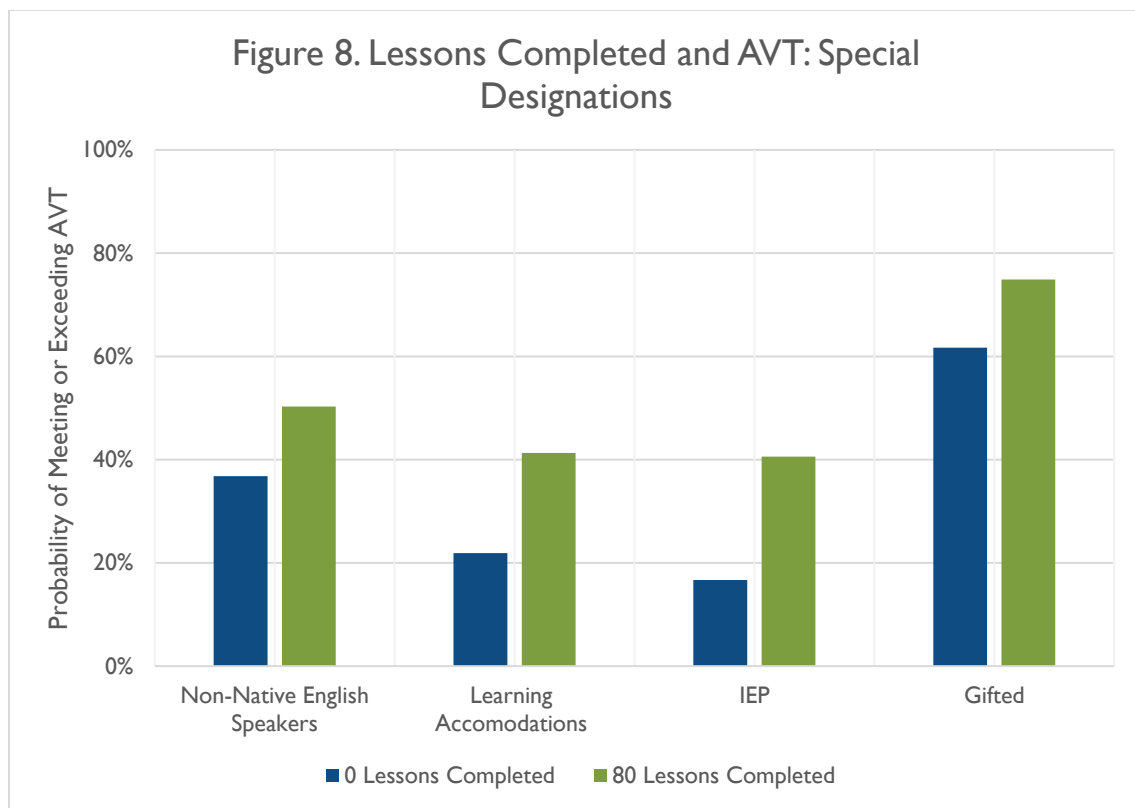
- The average minutes per lesson for the total student sample is 20.85, thus 80 lessons accounts for approximately 28 hours of time spent learning on the platform.
- This translates into less than 1 hour of learning per week throughout the school year.
- Note this number is slightly lower for younger students and higher for older students. Please see table A.2 for the average minutes per lesson broken down by grade.



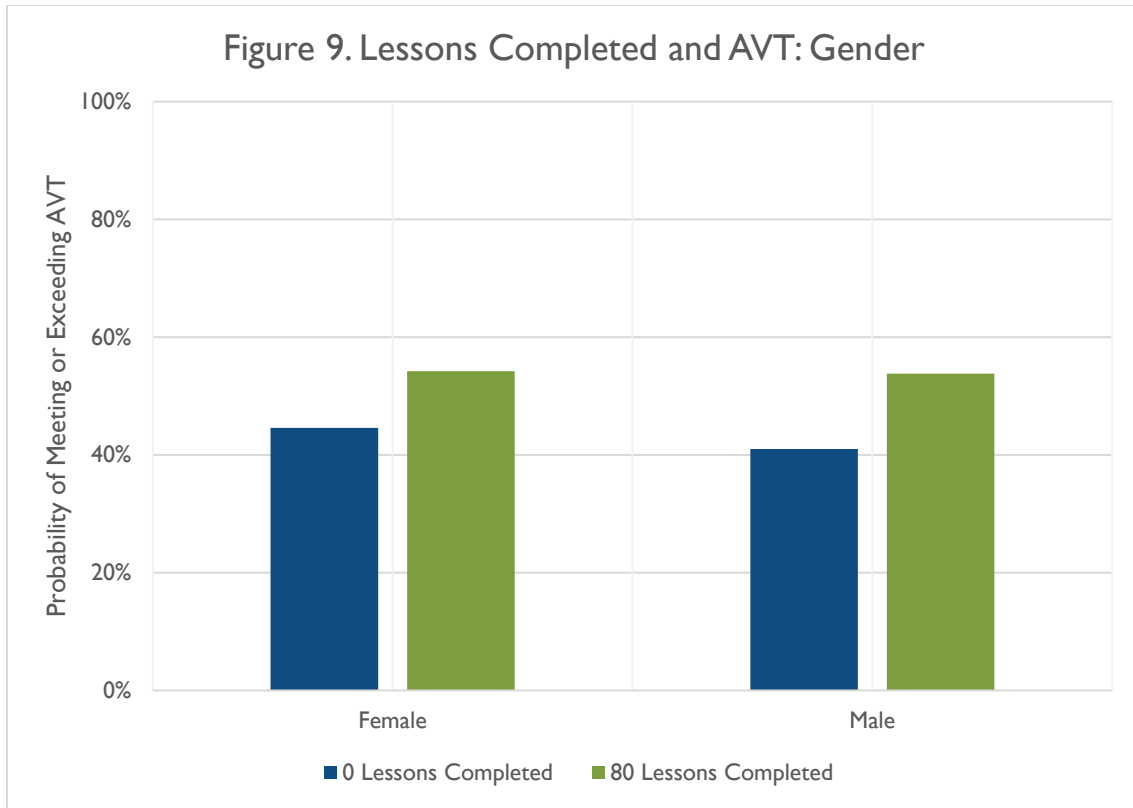
Note: AVT stands for added value target. The Exceeds 2022 group is significant with a  $p$ -value  $> 0.05$  and  $< 0.1$ .



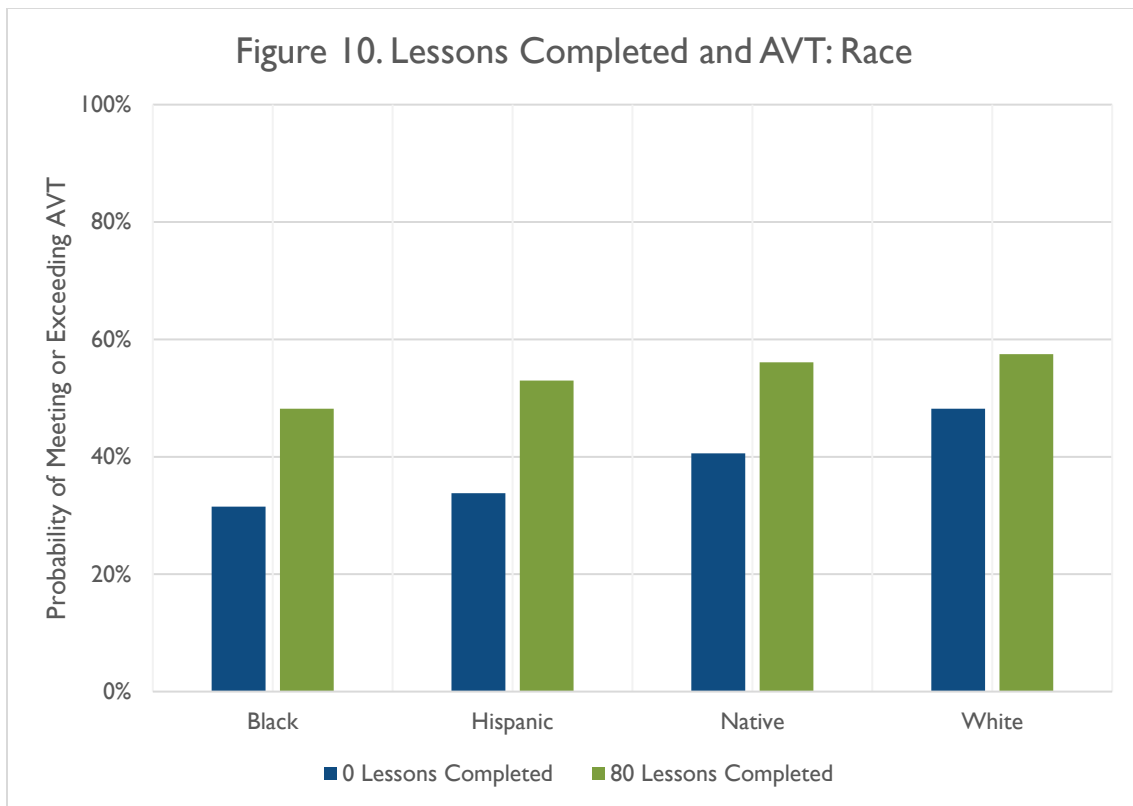
Note: AVT stands for added value target. The Elementary group is significant with a  $p$ -value  $> 0.05$  and  $< 0.1$ .



Note: AVT stands for added value target.



Note: AVT stands for added value target.



Note: AVT stands for added value target. The Native American group was not statistically significant.



### Research Question 3: What percent of students that grew in Reading Plus by 1-2 grade levels also grew 1-2 achievement levels in SC READY?

To answer the third question, researchers calculated descriptive statistics to determine the percent of students that grew in SC READY achievement levels after growing 1-2 grade levels in DreamBox Reading Plus. The results are disaggregated by achievement levels in SC READY from the previous year. The four achievement levels are “Does Not Meet,” “Approaches,” “Meets,” and “Exceeds.”<sup>1</sup> The research team also examined data disaggregated by student subgroups.<sup>2</sup>

**Finding: Growth in Reading Plus is associated with ELA achievement level growth on the SC READY exam.**

For the total student sample:

- Of those identified as **“Does Not Meet”** in 2022, **47.3%** that grew 1-2 levels in Reading Plus also grew 1-2 levels in SC READY. By comparison, only 31% that grew 0 levels in Reading Plus grew 1-2 levels in SC READY.
- Of those identified as **“Approaches”** in 2022, **37.2%** that grew 1-2 levels in Reading Plus also grew 1-2 levels in SC READY. By comparison, only 29.5% that grew 0 levels in Reading Plus grew 1-2 levels in SC READY.
- Of those identified as **“Meets”** in 2022, **41.4%** that grew 1-2 levels in Reading Plus also grew 1 level in SC READY. By comparison, only 31% that grew 0 levels in Reading Plus grew 1 level in SC READY.
- Table 2 shows the results for the different subgroups, broken down by each of the relevant 2022 achievement levels.
- Note that the number of observations in each cell represents the numbers of students within the subgroups who grew to 1-2 levels in Reading Plus.
- To see the full breakdown of 2022 achievement levels by subgroups please see table A.1.

<sup>1</sup> Note that students identified as “Meets” are only capable of growing one additional level. Students identified as “Exceeds” are incapable of increasing levels and as such are excluded for the RQ3 analysis.

<sup>2</sup> Note that subgroups of students with fewer than ten observations are not presented.

Table 2. Research Question 3 Results

Student Characteristic	Percent of students labelled <b>DNM</b> in 2022 that grew 1-2 levels in RP and also grew 1-2 levels in SC READY	Percent of students labelled <b>Approaches</b> in 2022 that grew 1-2 levels in RP and also grew 1-2 levels in SC READY	Percent of students labelled <b>Meets</b> in 2022 that grew 1-2 levels in RP and also grew 1 level in SC READY
<b>All</b>	47.3% (n = 165)	37.2% (n = 304)	41.4% (n = 210)
<b>Elementary (Grades 3-5)</b>	63% (n = 27)	40.6% (n = 32)	47.1% (n = 17)
<b>Middle (Grades 6-8)</b>	44.2% (n = 138)	36.8% (n = 272)	41% (n = 193)
<b>Non-Native English Speakers</b>	50% (n = 50)	28% (n = 82)	34.6% (n = 52)
<b>Learning Accommodations</b>	39.6% (n = 48)	30% (n = 30)	28.6% (n = 14)
<b>IEP</b>	38.1% (n = 42)	18.2% (n = 22)	•
<b>Gifted</b>	•	50% (n = 16)	62.3% (n = 53)
<b>Female</b>	47.3% (n = 74)	45.2% (n = 157)	40.1% (n = 109)
<b>Male</b>	47.3% (n = 91)	28.6% (n = 147)	42.6% (n = 101)
<b>White</b>	51.9% (n = 54)	49.3% (n = 150)	48% (n = 123)
<b>Black</b>	45.3% (n = 95)	28.2% (n = 124)	25% (n = 60)
<b>Asian/Pacific Islander</b>	•	•	•
<b>Hispanic</b>	50.9% (n = 55)	28.9% (n = 97)	33.3% (n = 57)
<b>Native American</b>	52%	25%	40%

**Reading Plus Correlational Evaluation**

	(n = 25)	(n = 44)	(n = 30)
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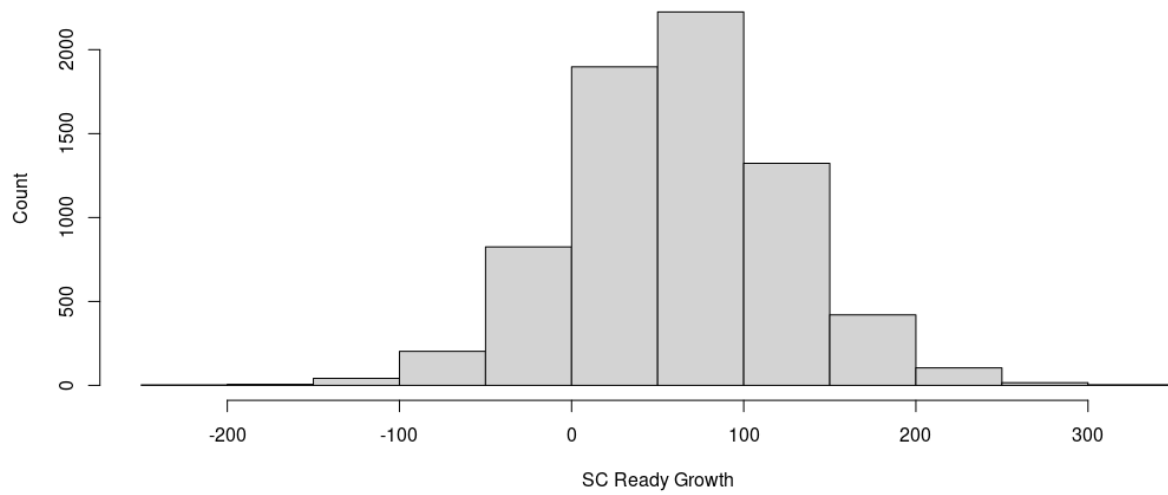
Note: Cells with fewer than ten students are indicated by “.” DNM stands for Does Not Meet. RP stands for Reading Plus. IEP stands for Individualized Education Plan.

## Appendix

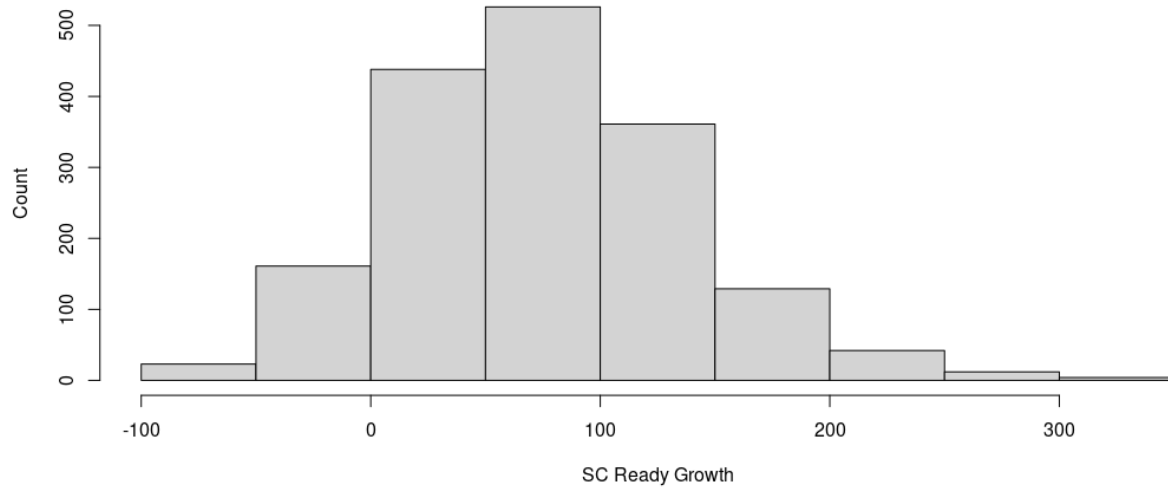
Table A.1 2022 SC READY Achievement Levels

Student Characteristic	Does Not Meet	Approaches	Meets	Exceeds
<b>All</b>	<i>n</i> = 1,703	<i>n</i> = 1,995	<i>n</i> = 1,719	<i>n</i> = 1,666
<b>Elementary</b>	<i>n</i> = 760	<i>n</i> = 618	<i>n</i> = 628	<i>n</i> = 775
<b>Middle</b>	<i>n</i> = 943	<i>n</i> = 1,377	<i>n</i> = 1,091	<i>n</i> = 891
<b>Non-Native English Speakers</b>	<i>n</i> = 641	<i>n</i> = 601	<i>n</i> = 445	<i>n</i> = 284
<b>Learning Accommodations</b>	<i>n</i> = 573	<i>n</i> = 221	<i>n</i> = 94	<i>n</i> = 85
<b>IEP</b>	<i>n</i> = 530	<i>n</i> = 157	<i>n</i> = 44	<i>n</i> = 23
<b>Gifted</b>	<i>n</i> = 31	<i>n</i> = 96	<i>n</i> = 374	<i>n</i> = 978
<b>Female</b>	<i>n</i> = 732	<i>n</i> = 957	<i>n</i> = 874	<i>n</i> = 914
<b>Male</b>	<i>n</i> = 970	<i>n</i> = 1,038	<i>n</i> = 845	<i>n</i> = 752
<b>White</b>	<i>n</i> = 798	<i>n</i> = 1,169	<i>n</i> = 1,217	<i>n</i> = 1,392
<b>Black</b>	<i>n</i> = 777	<i>n</i> = 725	<i>n</i> = 425	<i>n</i> = 206
<b>Asian/Pacific Islander</b>	<i>n</i> = 25	<i>n</i> = 46	<i>n</i> = 66	<i>n</i> = 102
<b>Hispanic</b>	<i>n</i> = 656	<i>n</i> = 660	<i>n</i> = 526	<i>n</i> = 324
<b>Native American</b>	<i>n</i> = 162	<i>n</i> = 181	<i>n</i> = 126	<i>n</i> = 66

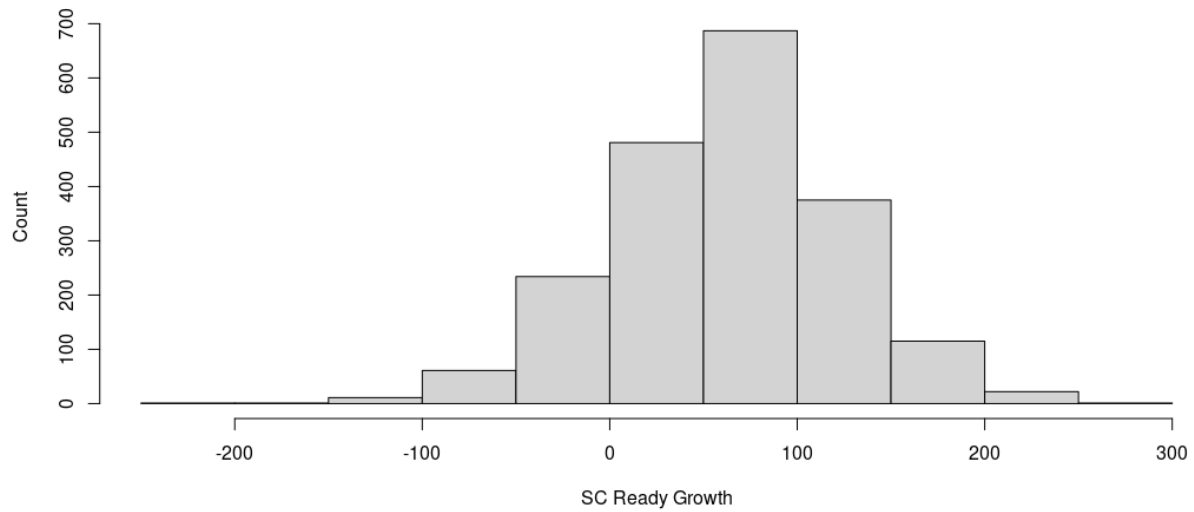
**Figure A.1 SC READY Growth Distribution: All Students**



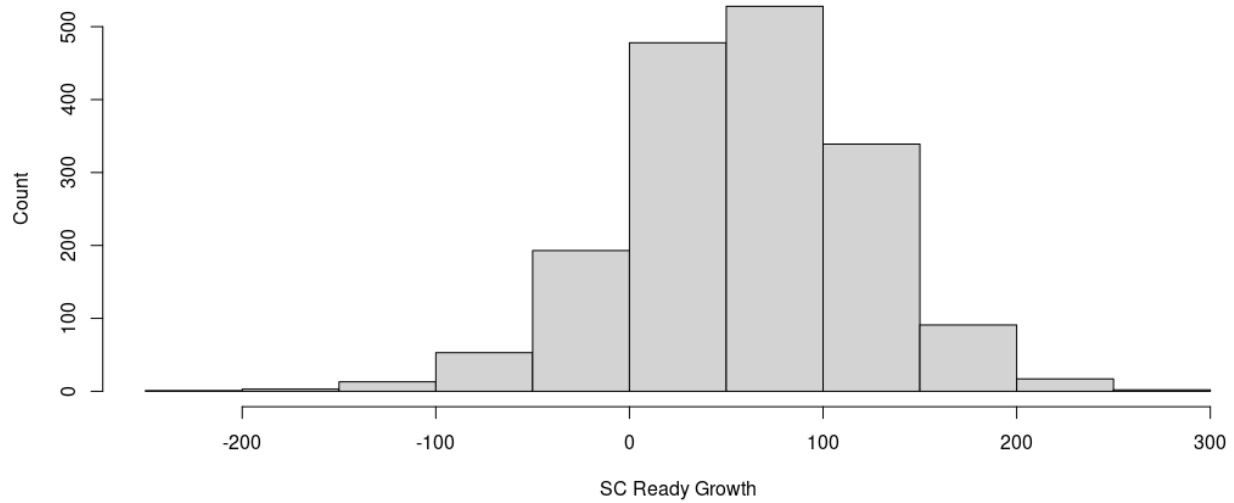
**Figure A.2 SC READY Growth Distribution: DNM 2022**



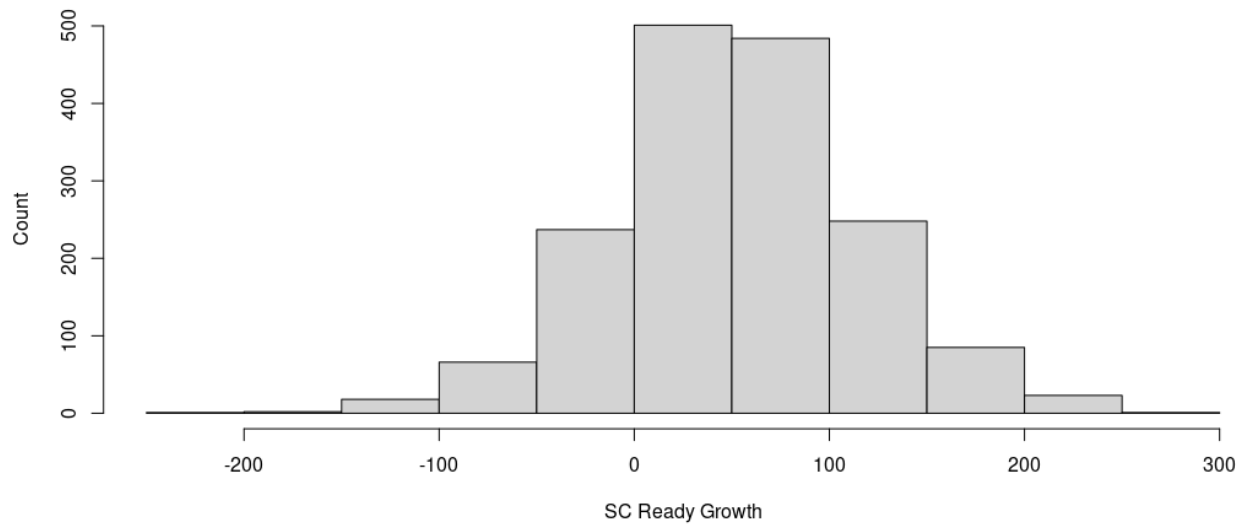
**Figure A.3 SC READY Growth Distribution: Approaches 2022**



**Figure A.4 SC READY Growth Distribution: Meets 2022**



**Figure A.5 SC READY Growth Distribution: Exceeds 2022**



**Table A.2 Average Time per Reading Plus Lesson**

Student Group	Average Minutes per Lesson
All	20.85
Grade 3	14.5
Grade 4	17.87
Grade 5	18.21
Grade 6	19.7
Grade 7	22.43
Grade 8	22.73

**Table A.3 Mean and Standard Deviation of Growth and Lessons Completed by Group**

<b>Students</b>	<b>Mean Growth</b>	<b>Standard Deviation of Growth</b>	<b>Mean Lessons Completed</b>	<b>Standard Deviation of Lessons Completed</b>
<b>All</b>	63	63.16	35.12	39.09
<b>DNM in 2022</b>	75.22	63.21	25.03	33.23
<b>Approaches in 2022</b>	63.14	61.12	33.90	36.19
<b>Meets in 2022</b>	60.46	62.38	38.13	40.76
<b>Exceeds in 2022</b>	53.02	64.31	45.17	43.21
<b>Elementary</b>	76.68	63.17	49.21	59.41
<b>Middle</b>	54.15	61.56	32.66	33.74
<b>Non-Native English Speakers</b>	60.18	63.05	27.03	31.96
<b>Learning Accommodations</b>	60.46	63.08	31.29	39.71
<b>IEP</b>	60.56	61.86	30.42	38.57
<b>Gifted</b>	66.08	65.42	38.2	37.52
<b>Female</b>	63.36	62.41	36.95	39.56
<b>Male</b>	62.64	63.88	33.37	38.58
<b>White</b>	63.79	64.48	36.48	40.5
<b>Black</b>	62.51	61.38	34.3	38.76
<b>Asian/Pacific Islander</b>	76.34	63.12	44.9	42.68
<b>Hispanic</b>	59.86	63.43	28.92	34.84
<b>Native American</b>	59.23	62.98	27.96	27.58



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