Branching Minds MTSS Platform

Study Type: ESSA Level II

Prepared for:
Branching Minds

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BRANCHING MINDS

Executive Summary

The following research, conducted by third-party learning analysts at The University of Wisconsin-Madison, examines the relationship between using the Branching Minds' MTSS platform and student success. The study was designed to meet Level II requirements (Moderate Evidence) in alignment with the Every Student Succeeds Act (ESSA). Specifically, the study addressed whether tracking student intervention(s) on the Branching Minds MTSS platform impacted student academic success on NWEA MAP Growth Reading and Math assessments.

Sample and Research Design

The study included de-identified data for the 2022-2023 school year for schools that submitted Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) Growth Reading and Math assessment scores to the Branching Minds MTSS platform. NWEA MAP Growth scores were used across all analyses as the student achievement outcome. Students were included in analyses if their fall NWEA MAP Growth score was at or below the 20th percentile, indicating low achievement and need for additional academic support. The sample included 188 schools with 35,047 unique students represented. The study used propensity score matching to create balanced and equivalent treatment (students with an intervention(s)) and comparison (students without an intervention(s)) groups. Analyses included descriptive statistics, correlation tests, multiple regression models, and multilevel models to assess differences in NWEA MAP Growth achievement for students with and without a tracked intervention(s) on the Branching Minds MTSS platform.

Impacts of Tracking Student Interventions on the Branching Minds MTSS Platform

Results showed that students in grades 3-5 who received reading or math interventions tracked on the Branching Minds MTSS platform during the 2022-2023 school year showed a small statistically significant increase in spring NWEA MAP Growth Reading or Math scores compared to the comparison sample of students without a tracked intervention.

Conclusions

The results of these analyses enforce the importance of tracking interventions and the value of using additional resources to support teachers in supporting their students with interventions. The study was designed to meet ESSA evidence requirements for Level II (Moderate Evidence). The results satisfy ESSA Level II requirements in the following ways: quasi-experimental research design using propensity score matching; established baseline equivalency; statistical controls; had over 350 students across multiple educational sites; and had two statistically significant, positive findings.

Introduction

Branching Minds was designed to support schools in implementing Multi-Tiered Systems of Support (MTSS) and make personalized learning sustainable for schools and teachers. By bringing together all the data and providing teachers with actionable insights, Branching Minds does the heavy lifting in enabling instructors to tailor instruction to meet the unique learning needs, strengths, and challenges of each student in their class. (About - Branching Minds - MTSS Software, n.d.). Branching Minds provides an MTSS/RTI software product to schools that allow teachers and administrators to feed student data into the system and receive insights and recommendations grounded in research and MTSS best practices.

The following research, conducted by third-party learning analysts at The University of Wisconsin-Madison, examines the relationship between the use of Branching Minds' MTSS platform and student success. The study was designed to meet Level II requirements (Moderate Evidence) in alignment with the Every Student Succeeds Act (ESSA). Specifically, the study addressed the following research question:

Research Question

1. Did students whose reading or math intervention(s) were tracked on Branching Minds' MTSS platform during the 2022 - 2023 school year demonstrate greater academic achievement on Spring NWEA MAP Growth Reading or Math assessments compared to similar students who did not have a tracked intervention(s)?

Methods

Study Design

The study used descriptive statistics, correlation tests, and a quasi-experimental design to assess the impact of tracking student intervention(s) with Branching Minds' MTSS platform on NWEA MAP Growth Reading and Math spring assessment scores. Descriptive statistics and correlation tests were used to evaluate the sample before propensity score matching and subsequent analysis of the matched sets. Given that fall and spring assessments were administered before this study, the results are considered post hoc analysis. A randomized control trial would be an ideal method to determine the impact of tracking student interventions on academic achievement. However, conducting randomized control trials (RCTs) can be challenging when studying large-scale systemic program implementations that typically require district-wide training and implementation. Propensity score estimates and matching were used in this analysis to create balanced treatment and comparison groups for students with or without a tracked intervention. Propensity score weights were calculated for students with a tracked intervention(s) (treatment) vs. students without a tracked intervention(s) (comparison) for 2022-2023 math and reading. Propensity scores were then used to create a balanced quasi-experimental subset. Treatment and comparison subsets were analyzed using descriptive statistics. Subsequent analysis included t-tests, linear regression models, and multilevel regression models with fixed and random effects.

Data Structure

Data used in this study was obtained via a secure cloud link shared by Branching Minds. The datasets included de-identified student data, intervention data, and NWEA MAP Growth assessment data for districts and schools with an established data-sharing agreement with Branching Minds. Students in grades K-12 with NWEA MAP Growth assessment scores during the 2022-2023 school year were included in the initial datasets. A separate file detailed student interventions that were tracked on the Branching Minds MTSS platform during the 2022-2023 school year. A final data file contained student demographic data for the students represented across the other datasets. Complete variable descriptions for all datasets can be found in Appendix A.1. To structure the datasets for

propensity score matching, the datasets were cleaned and joined in RapidMiner to create a unique dataset for each subject. Students were included if they had both a fall and spring NWEA MAP Growth score, performed at or below the 20th percentile on their fall assessment, and had all key covariates (See Appendix A.2). Students in the sample may have received no intervention, one intervention focused on Reading, Math, or social-emotional learning (SEL), or a combination of multiple interventions.

The final sample included 48 school districts and 188 schools with 35,047 unique students across grades K-12. One-third of students (33%) in the sample had at least one tracked intervention on the Branching Minds platform. The student sample was gender balanced (41.09% Female), and racially diverse (49.9% Hispanic, 23.5% White, 19% Black, 11% missing, 3.2% multiracial, 2.1% Asian, 0.2% American Indian, 0.03% Pacific Islander). However, race and ethnicity were not included in propensity score matching and regression analysis due to missing race data which can lead to potential biases or errors in the matching process. Approximately one-third (30%) of students had a mandated learning plan, and 34.7% were designated English Language Learners.

Measures

Analysis conducted in this study focused on factors that could influence a student's spring NWEA MAP Growth assessment score. NWEA MAP Growth scores are measured on a scale of 95 to 300 for Reading and Math assessments across all grade levels. Students were grouped by grade level to align with NWEA MAP Growth assessment designs Kindergarten - Grade 2, Grade 3 - Grade 5, Grade 6 - Grade 12; NWEA, 2019). Students were included in the analysis if their fall percentile score was less than or equal to 20 percent, indicating a need for targeted and/or individualized academic support. Covariates used for propensity score matching can be reviewed in Appendix A.1. Explanatory variables used to predict NWEA MAP Growth spring scores can be reviewed in Appendix A.3.

Data Analysis

Data Exploration and Descriptive Statistics

Before propensity score matching, an analysis of covariance was conducted to examine potential disparities in baseline characteristics between students with and without a tracked intervention. Mean values of covariates, including fall scores, grade level, and mandated learning plan status, were computed using the dplyr package in R. Descriptive statistics were evaluated using visual inspection in box plots and bar charts.

Propensity Score Estimation

To create a treatment (has a tracked intervention) and comparison group (does not have a tracked intervention), and to mitigate potential confounding effects, propensity scores were estimated for each grade-level subset using binary logistic regression models. These propensity scores predict the likelihood of receiving a tracked intervention in Reading or Math, given the students' fall score in Reading or Math, grade level, and mandated learning plan status. The binary logistic regression models were repeated with specifications for each subject (math or reading). The binary logistic regression models used for estimating propensity scores are as follows:

$\widehat{p}_{k\text{-}2} = \beta_0 + \beta_1 \text{Fall Score} + \beta_2 \text{Grade} + \beta_1 \text{Mandated Learning Plan Status}$

$\widehat{p}_{3\text{-}5} = \beta_0 + \beta_1 \text{Fall Score} + \beta_2 \text{Grade} + \beta_1 \text{Mandated Learning Plan Status}$

$\widehat{p}_{6\text{-}12} = \beta_0 + \beta_1 \text{Fall Score} + \beta_2 \text{Grade} + \beta_1 \text{Mandated Learning Plan Status}$

Matching Procedure

Propensity score matching was performed within each grade-level stratum utilizing the MatchIt package in R. Optimal matching techniques were employed for fall scores, with exact matching on grade and mandated learning

plan variables to ensure comparability between students with and without a tracked intervention. Replacement was not allowed, meaning that students with or without an intervention were only matched once, creating equal sample sizes between the two groups.

Baseline Equivalence

Following propensity score matching, balance diagnostics were conducted to evaluate the equivalence of covariate distributions between students with a tracked intervention and students without a tracked intervention. Due to equal-sized treatment and control groups, Cohen's d effect sizes were computed for each grade-level subset to determine the baseline equivalency necessary for ESSA Level II standards. For Cohen's d, results were considered equivalent below .5, which indicates a small effect size. The results of the baseline equivalence analysis are shown in Table 1. All matched sets demonstrated baseline equivalency and were included in subsequent analyses.

Table 2. 2022 - 2023 school year propensity score matches based on fall score, grade level, and mandated learning plan (yes, no).

2022-2023 NWEA MAP Growth Assessment and Grade Range	Comparison Mean	Treatment Mean	Cohen's d	Equivalent for Analysis?
Reading				
K - 2	143.37 (n = 1,912)	143.32 (n = 1,912)	-0.0045	Yes
3 - 5	168.58 (n = 2,895)	168.50 (n = 2,895)	-0.0075	Yes
6-12	186.32 (n = 2,056)	186.63 (n = 2,056)	-0.0035	Yes
Math				
K - 2	143.68 (n = 1,647)	143.67 (n = 1,647)	-0.0003	Yes
3 - 5	175.45 (n = 2,828)	175.45 (n = 2,828)	-0.0002	Yes
6-12	196.96 (n = 2,054)	197.52 (n = 2,054)	0.0504	Yes

Descriptive Statistics: Treatment vs. Comparison Groups.

The matched sets were evaluated using descriptive statistics and visual inspection through box plots and bar charts. Reported spring scores on Reading and Math assessments were visualized in box plots. Distributions of grade level and race/ethnicity groups were also visualized to assess the balance between treatment and comparison groups.

Statistical Analyses

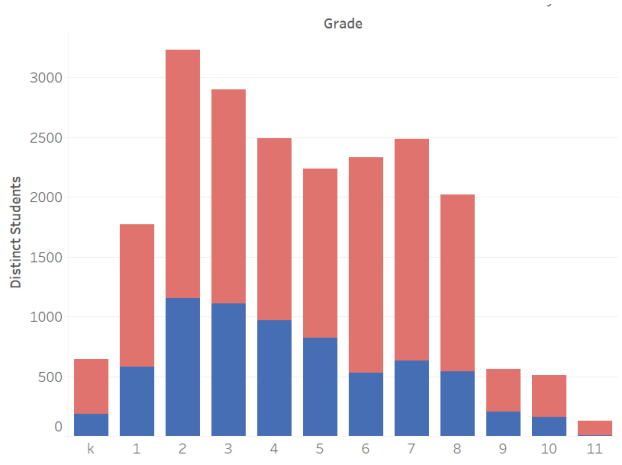
Independent samples t-tests were conducted within each grade-level stratum and subject to compare mean scores on the spring assessment between treatment and control groups. Additionally, multiple regression analyses were employed to explore the relationships between outcome variables and predictor variables. Linear mixed-effects models were fitted for each grade-level subset using the lme4 package in R. District identification was incorporated as a random effect to account for potential clustering effects within districts, thus enhancing the robustness of the statistical models. Ninety-five percent confidence intervals were computed for the estimated coefficients derived from linear mixed effects models, aiding in the precise estimation of intervention effects and enhancing the interpretability of study findings.

Results

Descriptive Statistics: Reading

Descriptive statistics for key covariates, fall and spring NWEA MAP Growth Reading scores, grade level, mandated learning plan status, and intervention status were explored using visual inspection. The selected sample for Reading included 21,308 distinct students across grades K-11. The majority (84.7%) of interventions were tracked in Grades 1-9. Of the students in the sample, 27.1 % had a mandated learning plan.

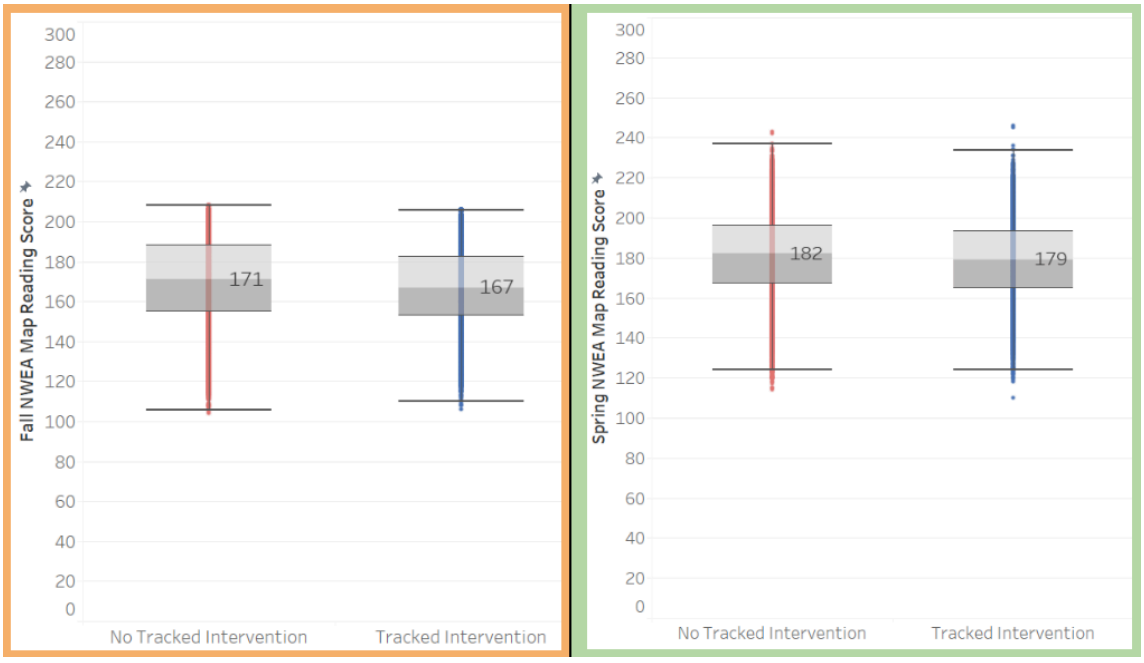
Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform by Grade Level



Distribution of Students With or Without a Mandated Learning Plan by Grade Level

Fall and spring scores on the NWEA MAP Growth Reading assessment were inspected to determine the distribution of student scores before matching. Students without a tracked reading intervention had a higher median NWEA MAP Growth Reading score in both the fall and spring.

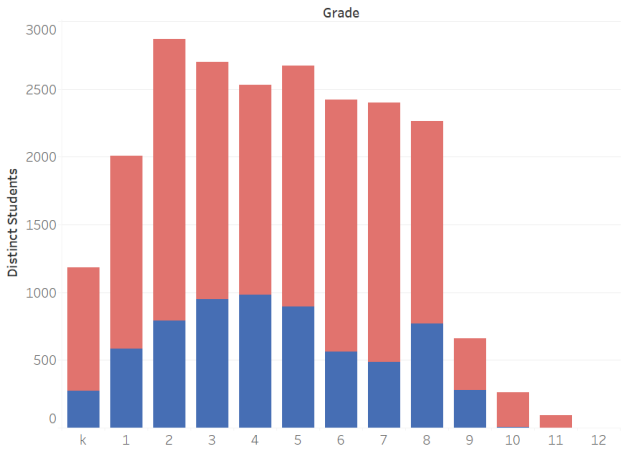
Distribution of Fall NWEA MAP Growth Reading Scores vs. Spring for Students With or Without a Tracked Reading Intervention on the Branching Minds Platform.



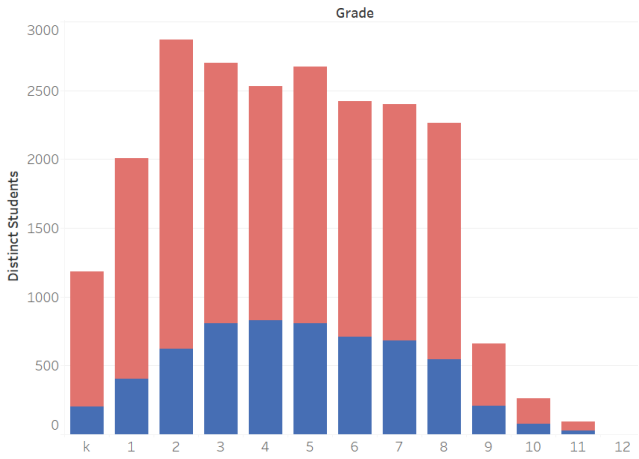
Descriptive Statistics: Math

Descriptive statistics for key covariates, fall and spring NWEA MAP Growth Math scores, grade level, mandated learning plan status, and intervention status were explored using visual inspection. The selected sample for Math included 22,069 distinct students across grades K-12. The majority (91.4%) of interventions were tracked in Grades 1-8. Of the students in the sample, 26.8 % had a mandated learning plan.

Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform by Grade Level.

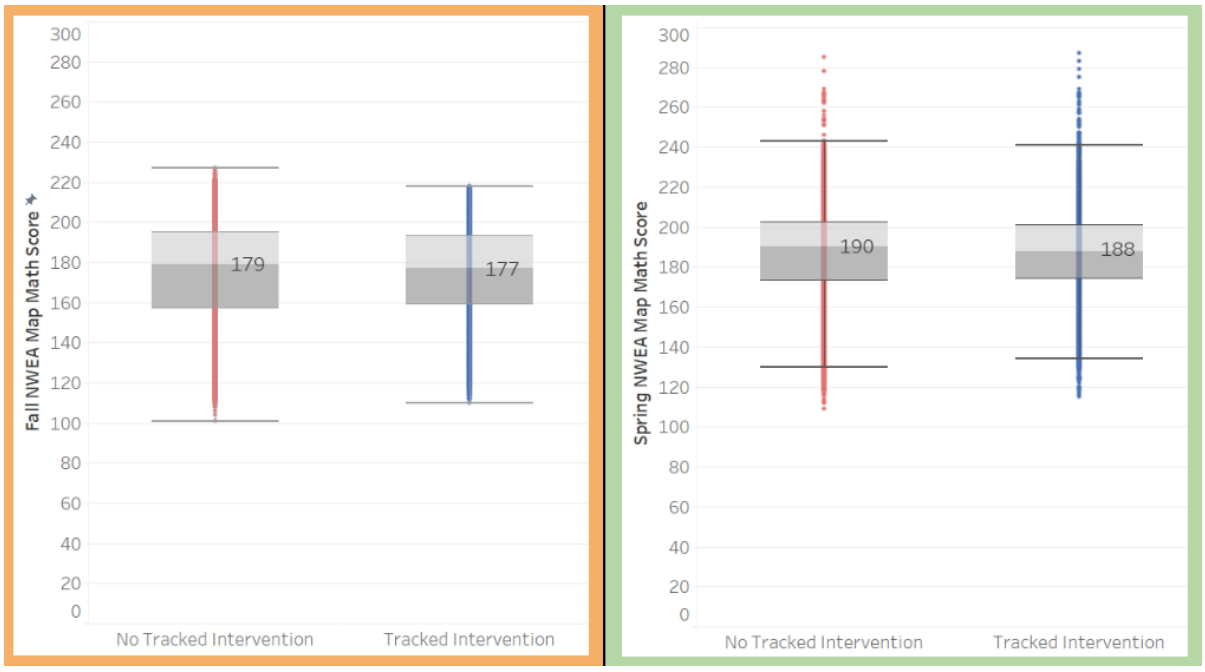


Distribution of Students With or Without a Mandated Learning Plan by Grade Level.



Fall and spring scores on the NWEA MAP Growth Math assessment were inspected to determine the distribution of student scores before matching. Students without a tracked math intervention had a higher median NWEA MAP Growth Math score in both the fall and spring.

Distribution of Fall NWEA MAP Math Scores vs. Spring for Students With or Without a Tracked Math Intervention on the Branching Minds Platform.



Propensity Score Matching

Propensity score matching and subsequent baseline assessments showed a favorable balance between the treatment and control groups. All covariates had effect size differences, measured with Cohen's d close to zero, indicating good balance after matching. Although we saw small effect sizes, it's important to note that even small effect sizes can have important practical implications, especially in fields where small differences are meaningful or expected. Overall, the balance diagnostics suggest that the propensity score matching has achieved a good balance between the treated and control groups on the observed covariates.

Reading: Treatment vs. Comparison Group Descriptive Statistics Results

Grade subsets were evaluated after propensity score matching to understand the distribution of key covariates (See Appendix B). Exact matching without replacement was used to ensure the number of students within each grade level was equal across the treatment and control groups. Race/ethnicity distributions were also visualized to inspect the balance of students across racial and ethnic groups. In all matched sets, Hispanic students were the largest group in the sample. However, students with or without a reading intervention were balanced within each race/ethnic group. Average spring scores reported to Branching Minds were visualized for students within the treatment and comparison group for each grade subset. Small differences in spring scores were noted, but differences could not be easily explained. As a result, multiple regression and multilevel regression models were created to understand effects and variance in the data that cannot be captured with descriptive statistics.

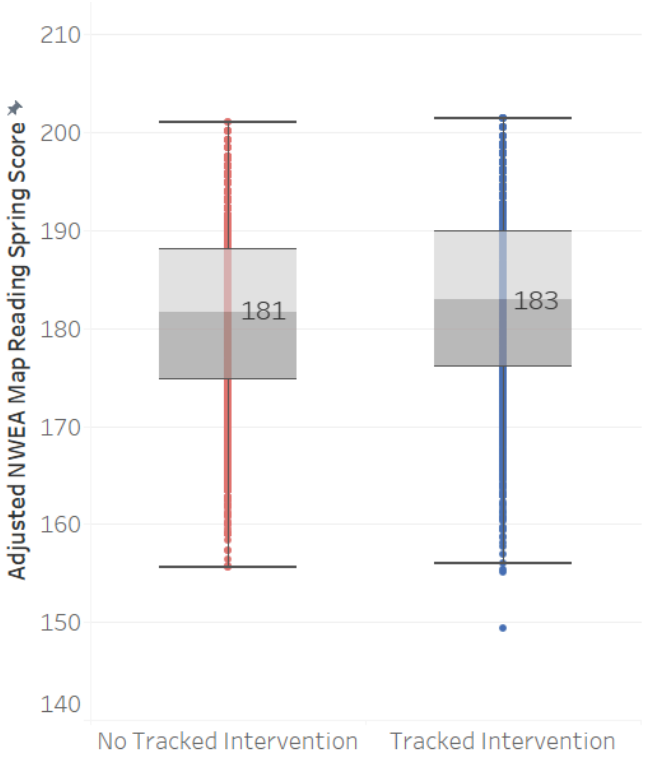
Math: Treatment vs. Comparison Group Descriptive Statistics Results

Grade subsets were evaluated after propensity score matching to understand the distribution of key covariates (See Appendix B). Exact matching without replacement was used to ensure the number of students within each grade level was equal across the treatment and control groups. Race/ethnicity distributions were also visualized to inspect the balance of students across racial and ethnic groups. In all matched sets, Hispanic students were the largest group in the sample. However, students with or without a math intervention were balanced within each race/ethnic group. Average spring scores reported to Branching Minds were visualized for students within the treatment and comparison group for each grade subset. Small differences in spring scores were noted, but differences could not be easily explained. As a result, multiple regression and multilevel regression models were created to understand effects and variance in the data that cannot be captured with descriptive statistics.

Reading Outcomes

Analyses showed a small positive effect on spring NWEA MAP Growth Reading scores for students with a tracked intervention compared to students without a tracked intervention. Adjusted spring scores were calculated for students using fixed effects coefficients and predictor variables from a mixed effects linear regression model. Adjusted NWEA MAP Growth Reading spring scores are displayed below with upper and lower quartile ranges and median scores labeled. Results show that the median score for students with a tracked intervention is approximately two points higher (183) than for students without a tracked intervention (181).

Adjusted Spring NWEA MAP Growth Reading Score for Students **With** or **Without** a Tracked Reading Intervention in Grades 3-5



Multiple regression and multilevel models were created to examine the impact of tracking students' reading interventions on the Branching Minds MTSS platform during the 2022-2023 school year. Multilevel regression models were identified as the best model, given the hierarchical nature of the dataset consisting of students, schools, and districts. Results showed a positive statistically significant impact of tracking reading interventions with the Branching Minds MTSS platform on spring NWEA MAP Growth Reading assessment scores in Grades 3-5. Model IV indicates that tracking Grade 3-5 reading interventions results in a 1.27 ($p < .001$) point increase in spring Reading scores compared to a control group of students without a tracked intervention.

The effect of a tracked reading intervention on students' adjusted scores was analyzed using Cohen's d to quantify the magnitude of the difference between the intervention group and the control group. The calculated Cohen's d was 0.131, indicating a small effect size. This translates to an increase of approximately 5.2 percentile points, based on the standardized improvement index for effect size interpretation in a normal distribution (What Works Clearinghouse, 2022.). This means the intervention is expected to move an average student from the 50th percentile to about the 55.2nd percentile compared to students who did not receive the intervention.

Table 3. Regression Models Predicting Spring NWEA MAP Growth Reading Assessment Scores for Students in Grades 3-5

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
III	0.90 ***	-0.01	-1.09 ***	-2.09 ***		0.39	44920.49
IV	0.86 ***	1.27 ***	-0.72 **	-2.79 ***	n = 46	0.37	44695.34

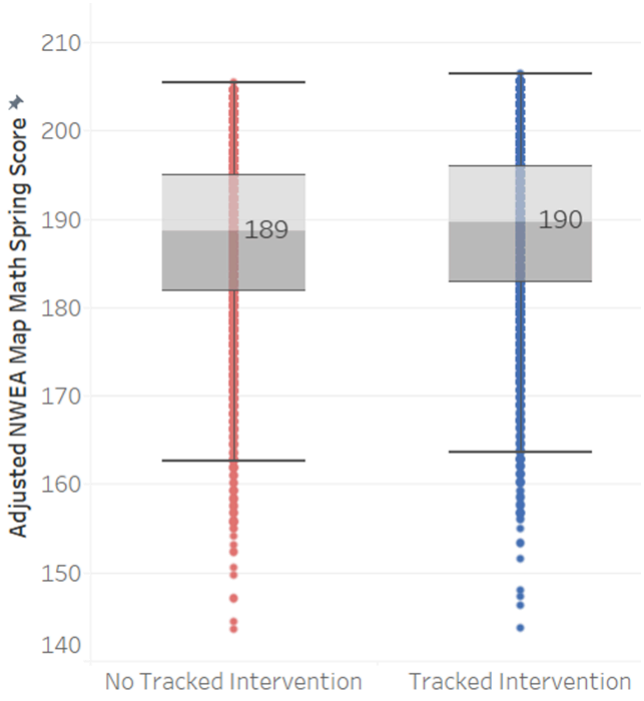
*** = p < .001, ** = p < .01, * = p < .05, n = 5,790

Mixed effects linear regression results were not significant for students in Grades K-2 and 6-12. Further longitudinal research and student-level data collection are needed to determine the impact of tracking reading interventions in these grade levels.

Math Outcomes

Analyses showed a small positive effect on spring NWEA MAP Growth Math scores for students with a tracked intervention compared to students without a tracked intervention. Adjusted spring scores were calculated for students using fixed effects coefficients and predictor variables from a mixed effects linear regression model. Adjusted NWEA MAP Growth Math spring scores are displayed below with upper and lower quartile ranges and median scores labeled. Results show that the median score for students with a tracked intervention is approximately one point higher (190) than for students without a tracked intervention (189).

Adjusted Spring NWEA MAP Growth Math Score for Students With or Without a Tracked Intervention in Grades 3-5



Multiple regression and multilevel models were created to examine the impact of tracking students' Math interventions on the Branching Minds MTSS platform during the 2022-2023 school year. Multilevel regression models were identified as the best model, given the hierarchical nature of the dataset consisting of students, schools, and districts. Results showed a positive statistically significant impact of tracking Math interventions with the Branching Minds MTSS platform on spring NWEA MAP Growth Math assessment scores in Grades 3-5. Model X indicates that tracking Grade 3-5 Math interventions results in a .97 ($p < .01$) point increase in spring Math scores compared to a control group of students without a tracked intervention.

The effect of a tracked math intervention on students' adjusted scores was analyzed using Cohen's d to quantify the magnitude of the difference between the intervention group and the control group. The calculated Cohen's d was 0.098, indicating a small effect size. This translates to an increase of approximately 4 percentile points, based on the standardized improvement index for effect size interpretation in a normal distribution (What Works Clearinghouse, 2022.). This means the intervention is expected to move an average student from the 50th percentile to about the 54th percentile compared to students who did not receive the intervention.

Table 4. Regression Models Predicting Spring NWEA MAP Growth Math Assessment Scores for Students in Grades 3-5

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
IX	0.88 ***	-0.09	1.75 ***	-1.67 ***		0.51	41733.17
X	0.87 ***	0.97 **	-1.64 ***	-2.66 ***	n = 44	0.49	41552.48

*** = $p < .001$, ** = $p < .01$, * = $p < .05$, n = 5,656

Mixed effects linear regression results were not significant for students in Grades K-2 and 6-12. However, multiple linear regression models showed a positive statistically significant impact of tracking math interventions with the Branching Minds MTSS platform on spring NWEA MAP Growth Math assessment scores in grades 6-12. Model XI indicates that tracking of Math interventions in Grades 6-12 resulted in a .78 ($p < .05$) point increase in spring Math scores compared to a control group of students without a tracked intervention (See Appendix E.3).

Discussion

The results of this study show that students in Grades 3-5 with tracked Reading or Math interventions on the Branching Minds MTSS platform in the 2022-2023 school year outperformed peers, on average, on the spring NWEA MAP Growth assessments. Given that this study specifically targeted students with a fall NWEA MAP Growth percentile of 20% or less, all students in this analysis demonstrated a need for targeted or individualized academic support. The results of these analyses support the importance of tracking interventions and the value of using an education technology tool to help support the implementation of academic interventions. Although the adjusted predicted spring scores were no more than 1-2 points greater for students with a tracked intervention, that degree of change year over year can be significant for a student and impact long-term academic success.

This study was designed and executed to align with ESSA Tier II requirements. Based on statistically significant results identified in Grades 3-5 with tracked reading and math interventions, this study meets ESSA Tier II requirements through the following specifications:

- ✔ Clearly defined research protocol and implementation, with the use of Quasi-Experimental design and propensity score matching without replacement.
- ✔ Established baseline equivalence for treatment and comparison groups.
- ✔ Use of meaningful covariates in propensity score matching and analyses
- ✔ At least 350 students were in the sample, after propensity score matching.
- ✔ A representative analystic sample with more than two educational sites.
- ✔ At least one statistically significant, positive finding from analyses.

Limitations

Despite a thorough design process and analysis, some limitations need to be considered in the context of this study. First, the lack of access to important covariates in understanding academic achievement across diverse student groups is an important limitation. Specifically, socioeconomic status (SES) was unavailable for analysis and was not included in this study. Given that propensity score matching and subsequent analysis were not conducted with SES variables, there may be elements of student achievement that are not accounted for in this study. In addition, race/ethnicity were not included in this study due to inconsistent reporting. Future research should include key demographic factors to better understand the efficacy and impact of MTSS programs and platforms for all students.

A second limitation is the lack of multi-year student data. This study focused on student achievement across one school year. It is important to understand how gains in student achievement are maintained across years as well as the outcomes for students requiring targeted interventions and supports across multiple school years.

Finally, due to sample sizes within grade levels, students in middle (Grades 6-8) and high (Grades 9-12) schools were included in one group. The findings for this grade band were not statistically significant. MTSS implementation may differ across the upper grades. Therefore, future research should examine the outcomes for these grade levels separately to understand if intervention tracking leads to academic gains for older students. ,

Recommendations

Academic achievement is critical in K-12 education, and tools that provide additional support to teachers and schools serving low-achieving students are worthwhile investments, especially if these tools can aid students in continued academic success. Results of this study showed statistically significant positive effects of tracking Reading and Math interventions on the Branching Minds MTSS platform for students in Grades 3-5 during the 2022-2023 school year. Additional research and large sample sizes are necessary to identify if similar results exist across other grade levels, subjects, and school years. Additional student-level covariates should be included to create a more comprehensive picture of student experiences and allow for more robust matching protocols and multilevel models. Ideally, a randomized controlled trial is recommended to properly assess the impacts of tracking student interventions on the Branching Minds MTSS platform.

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Appendix A

Appendix A.1. Complete list of variables in original datasets before cleaning and structuring

Variable	Student Info	Districts	NWEA Math	NWEA Reading	Interventions
1	Student id		Student id	Student id	Student id
2	district id	district id	District id	District id	district id
3	school_id	school_id	school_id	school_id	school_id
4	Grade 2024	onboard date	School year	School year	Intervention name
5	Gender		Window (fall, winter, spring)	window(fall, winter, spring)	brm intervention
6	Race ethnicity		Assessment name	Assessment name	school year
7	Mandated learning plan		Measure	Measure	Essa level
8	gifted program		Subject	Subject	subject
9	English language learner		Score	Score	start week
10			Percentile	Percentile	End week
11			Growth Percentile	Growth Percentile	Week count
12					Planned minutes
13					Delivered minutes

Appendix A.2. Covariates used in propensity score matching. Missing values removed.

Variable Name	Description	Limitations	Purpose in analysis
NWEA MAP Growth Math Score Fall	Students score on the NWEA math assessment during the fall window.	Based on RIT score which is an adaptive scaled score provided by NWEA MAP. This is grade dependent and should not be compared across grades.	Allowed creation of propensity score matches between students without a support plan and students with a support plan based on their fall score.
NWEA MAP Growth	Students score on the	Based on RIT score	Allowed creation of

Reading Score Fall	NWEA reading assessment during the fall window.	which is an adaptive scaled score provided by NWEA MAP. This is grade dependent and should not be compared across grades.	propensity score matches between students without a support plan and students with a support plan based on their fall score.
Grade Level	Student grade level during the year of the assessment.	This variable is historical, and may have some degree of error.	Allowed creation of propensity score matches between students without a support plan and students with a support plan based on their grade level.
NWEA MAP Growth Math Score Percentile Fall	The nationally normed percentile provided by NWEA MAP. It ranks their performance in fall to that of their peers		Allowed analytic sample to be limited to students performing in the 20th percentile or lower on their fall assessment.
NWEA MAP Growth Reading Score Percentile Fall	The nationally normed percentile provided by NWEA MAP. It ranks their performance in fall to that of their peers		Allowed analytic sample to be limited to students performing in the 20th percentile or lower on their fall assessment.
Mandated Learning Plan	Status of if the student is receiving a federally required learning plan because they have been classified as having a disability that impacts their ability to have access to education under standard conditions (e.g., a learning disability, physical impairment, emotion regulation issues, etc). The type of learning plan is categorized as IEP or 504 which can be collapsed into a variable of "yes" for a mandated learning plan for matching purposes.		Allowed matching of students based on whether or not the student had a mandated learning plan. This means that a student without a support plan, but with a mandated learning plan was matched to a student with a support plan who also had a mandated learning plan.

Appendix A.3. Covariates included in mixed effects linear model. Missing values removed.

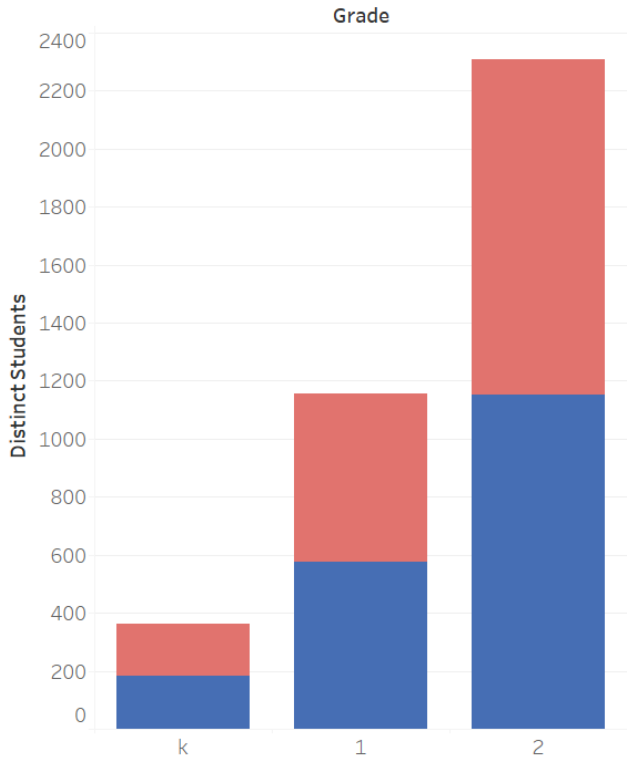
Variable Name	Description	Limitations	Purpose in analysis
NWEA MAP Growth Math Score Spring	Students score on the NWEA math assessment	Based on RIT score which is an adaptive	Allowed comparison of spring scores for matched

	during the spring window.	scaled score provided by NWEA MAP. This is grade dependent and should not be compared across grades.	students to see if receiving a support plan had an impact on academic achievement over time.
NWEA MAP Growth Reading Score Spring	Students score on the NWEA reading assessment during the spring window.	Based on RIT score which is an adaptive scaled score provided by NWEA MAP. This is grade dependent and should not be compared across grades.	Allowed comparison of spring scores for matched students to see if receiving a support plan had an impact on academic achievement over time.
District ID	A de-identified district ID number.		District ID is used as a random effects factor in the mixed effects linear regression models. This formulation allows the model to account for potential variability in spring assessment scores between different districts.
School ID	A de-identified school ID number.		School ID is used as a random effects factor in the mixed effects linear regression models. This formulation allows the model to account for potential variability in spring assessment scores between different schools.

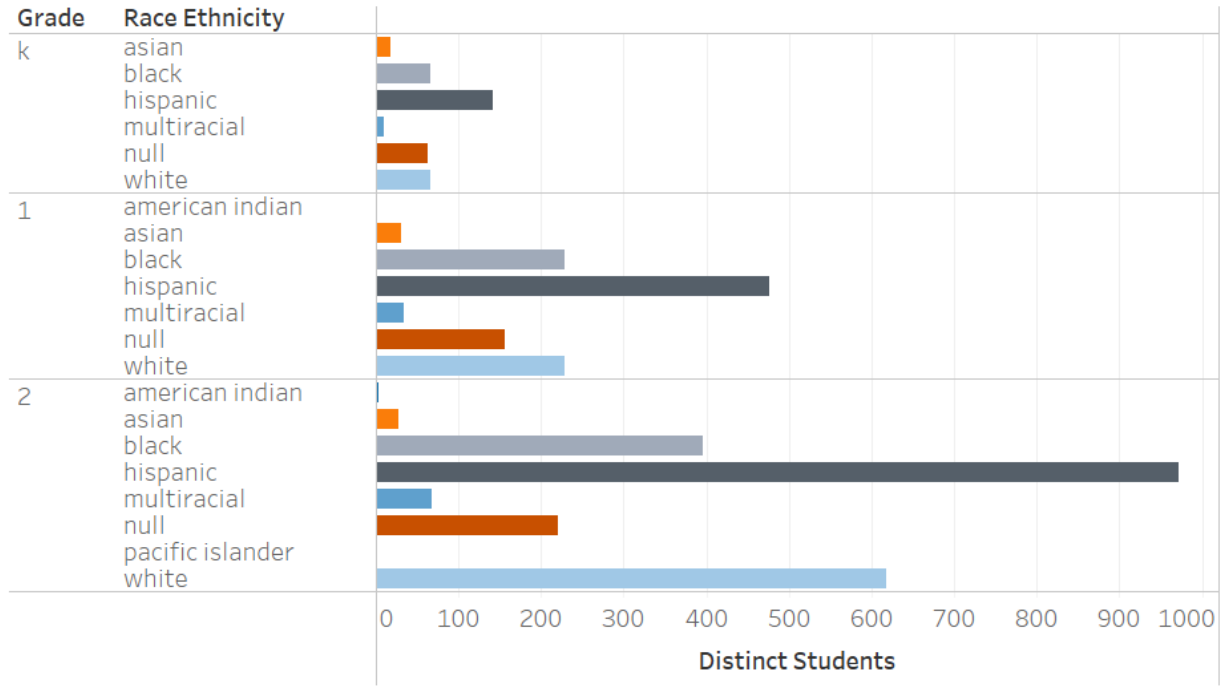
Appendix B - Reading: Treatment vs. Comparison Group Descriptive Statistics Results

B.1 Reading Matched Sample Visualizations Grades K-2

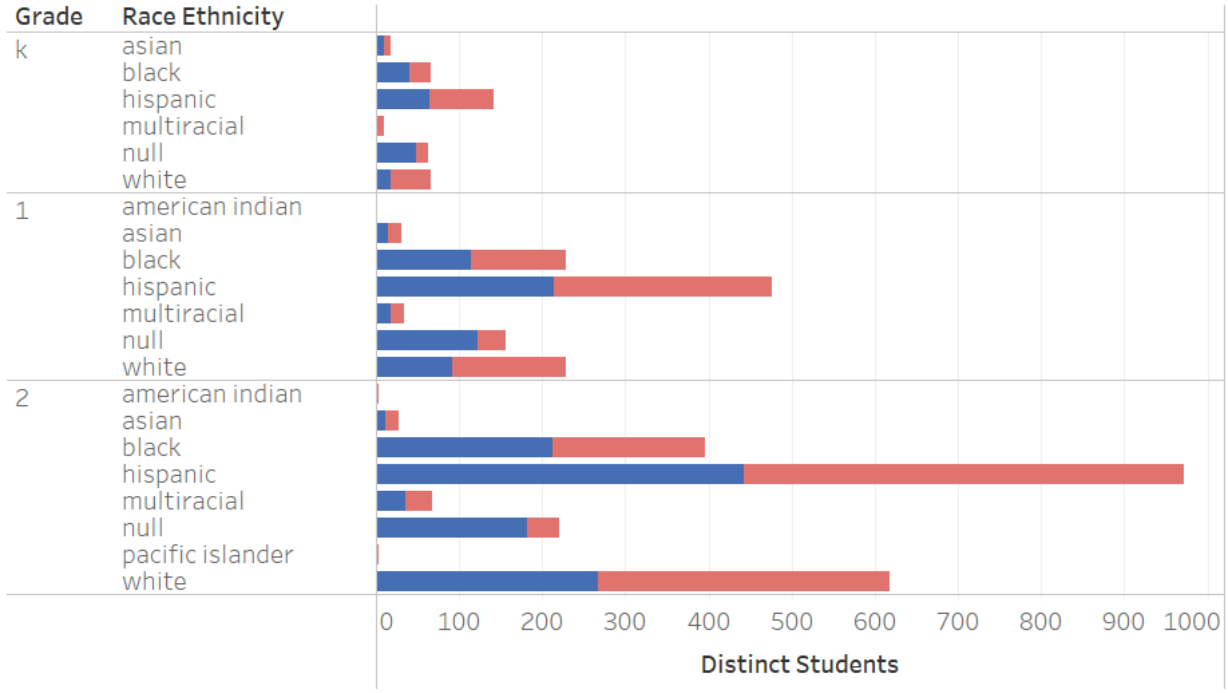
Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades K-2.



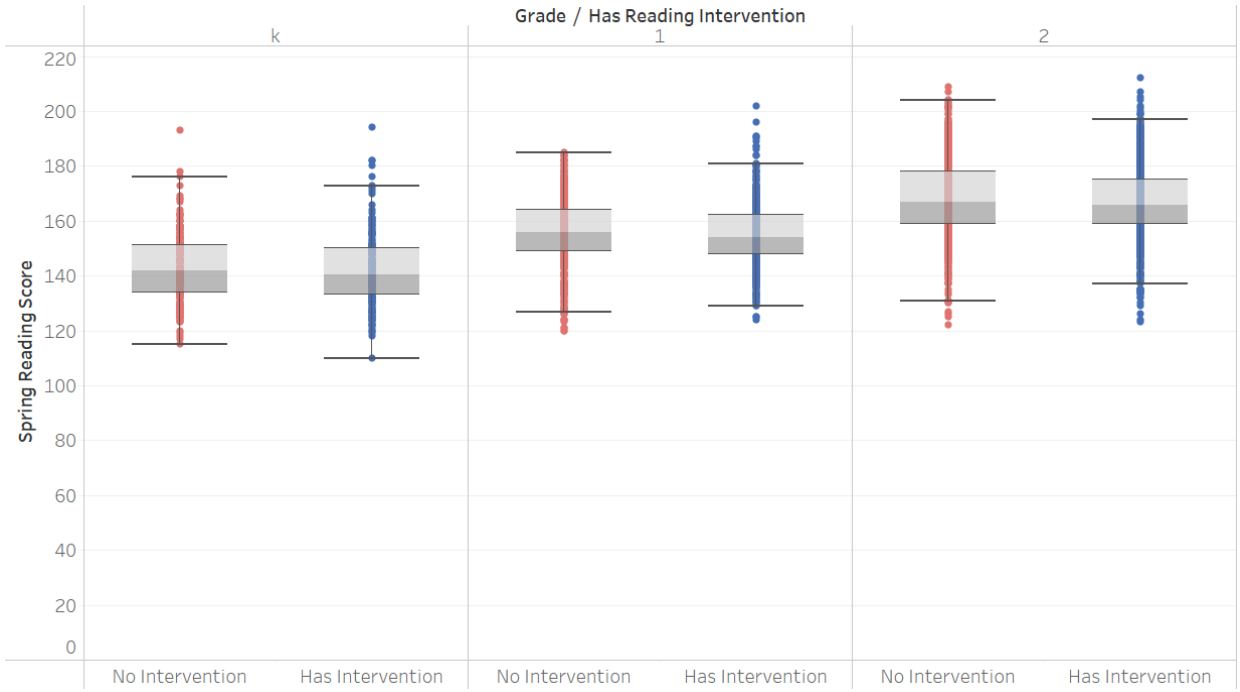
Distribution of all Students in the Matched Reading Grade K-2 Sample by Race and by Grade Level.



Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform by Race in Grades K-2.

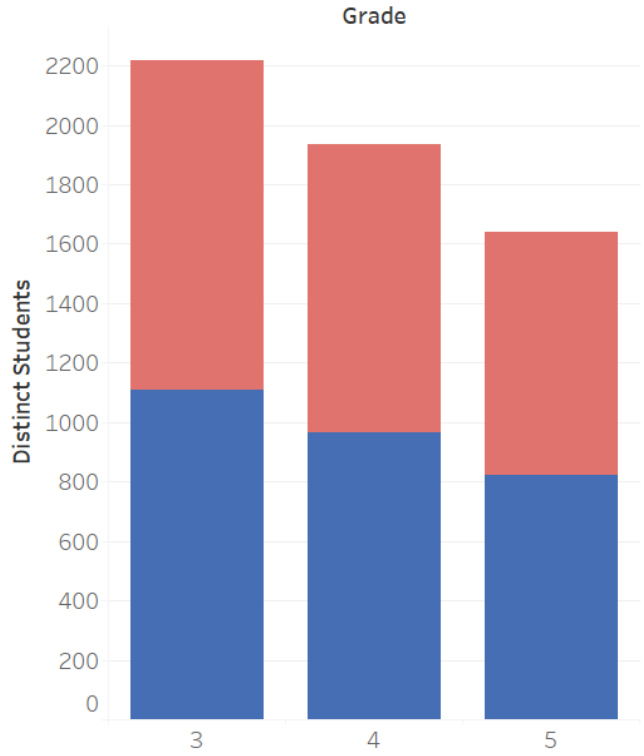


Distribution of Spring Scores for Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades K-2.

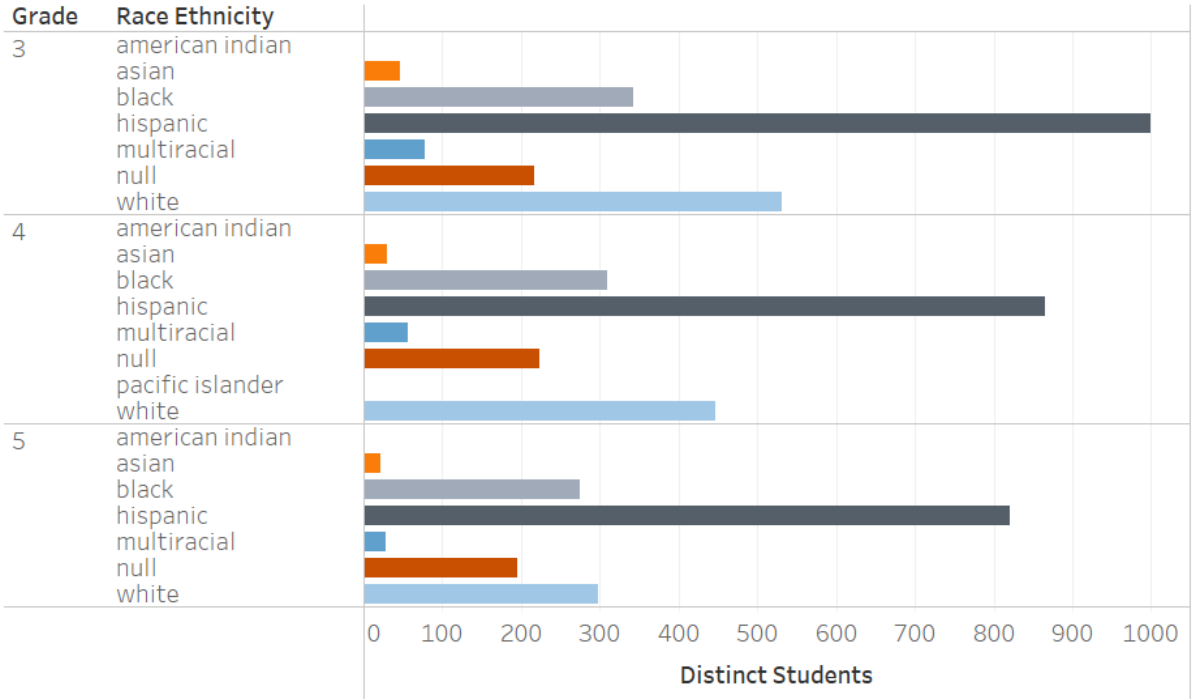


B.2 Reading Matched Sample Visualizations Grades 3-5

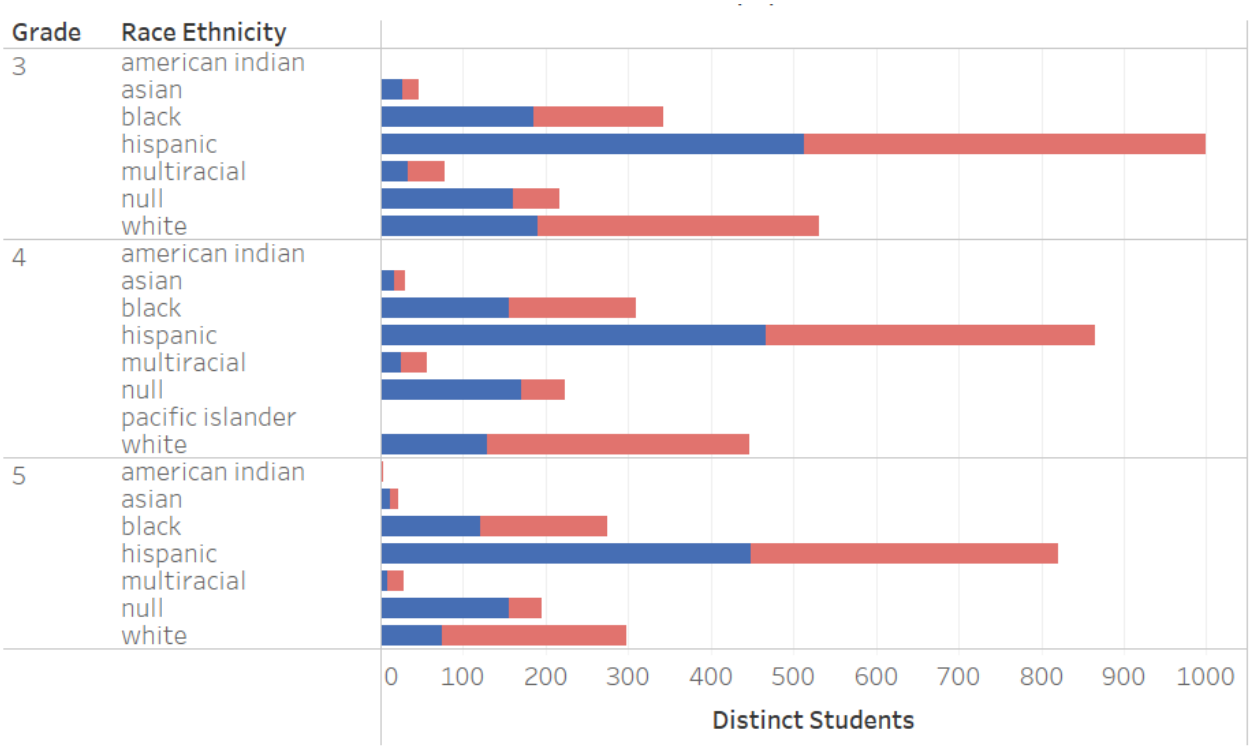
Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades 3-5.



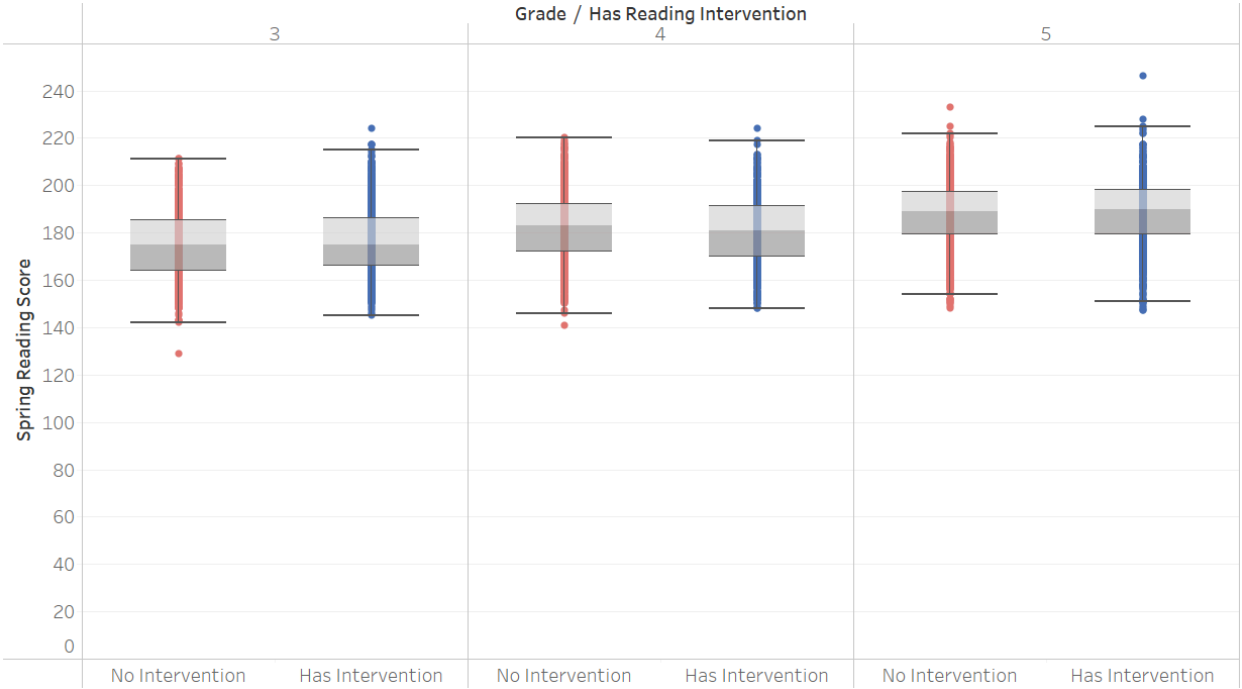
Distribution of all Students in the Matched Reading Grade 3-5 Sample by Race and Grade Level.



Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform by Race in Grades 3-5.

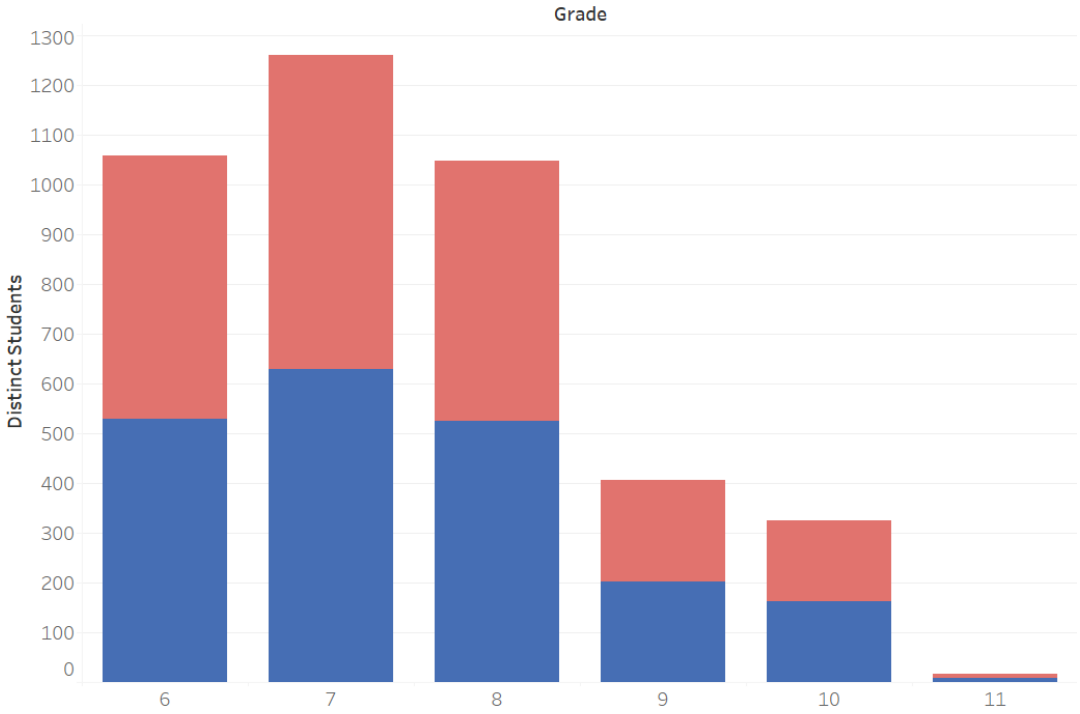


Distribution of Spring Scores for Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades 3-5.

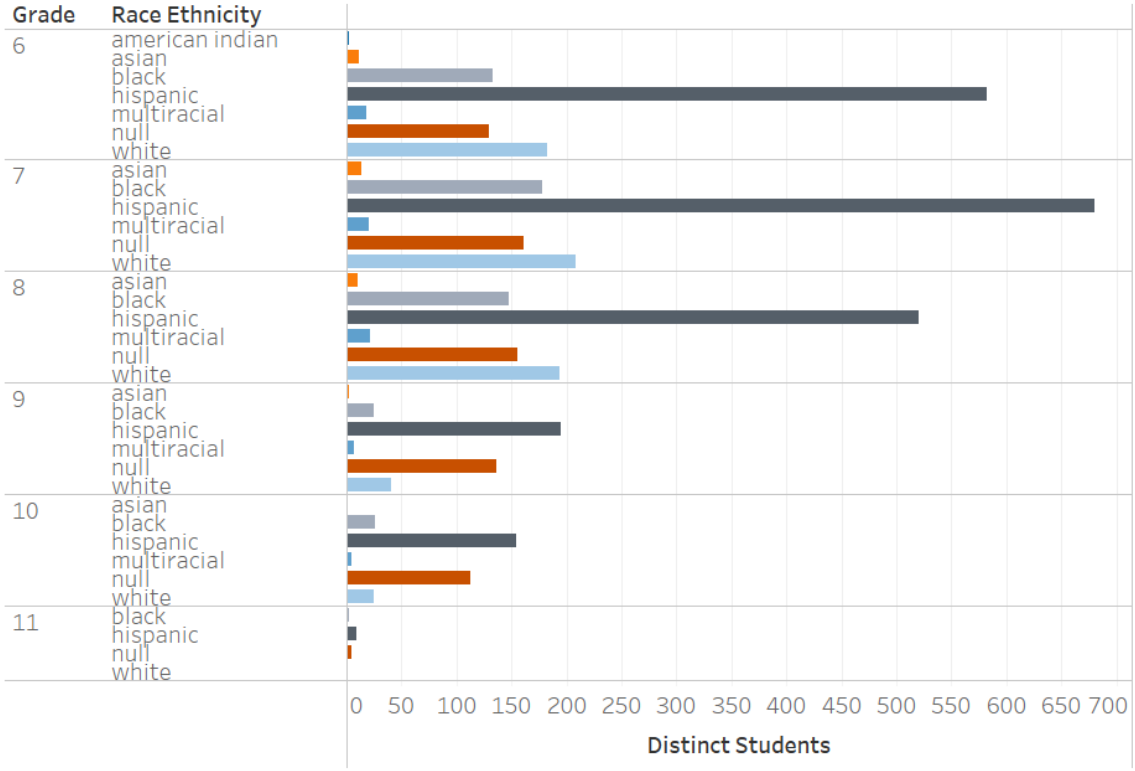


B.3 Reading Matched Sample Visualizations Grades 6-12

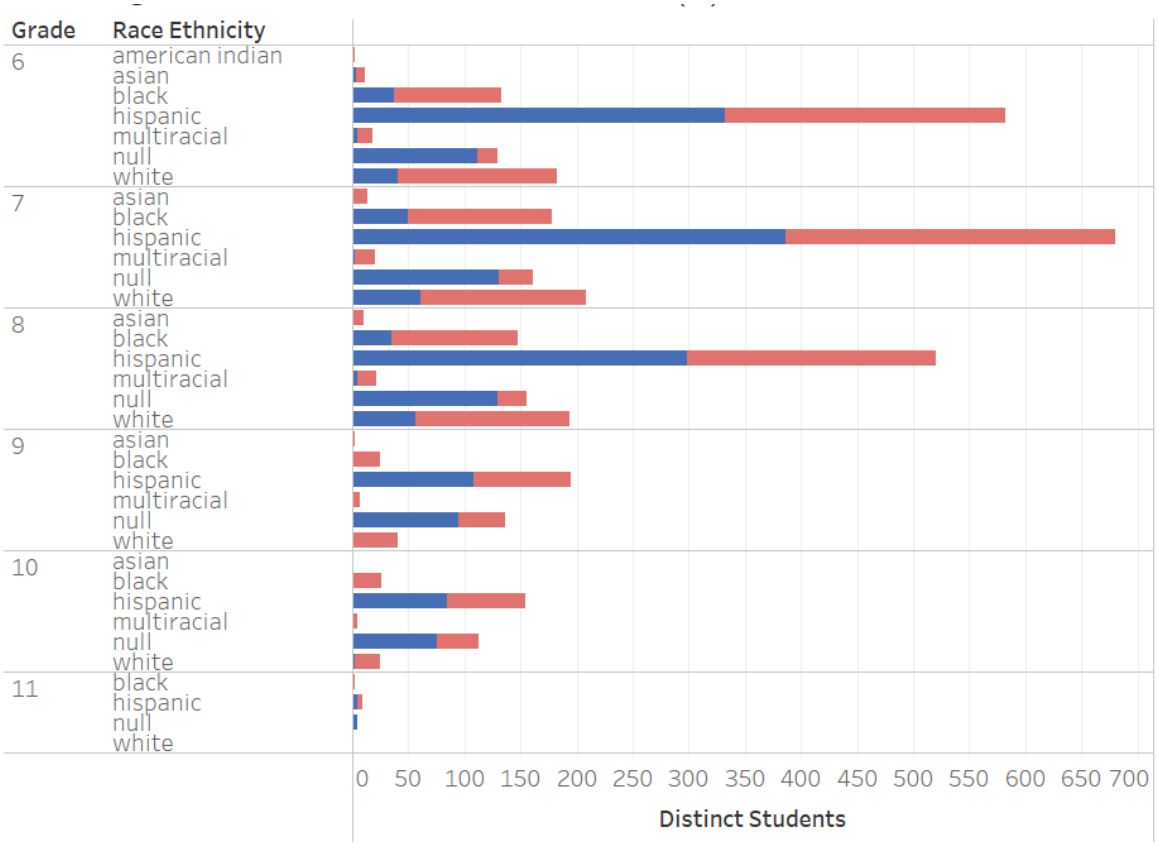
Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades 6-12



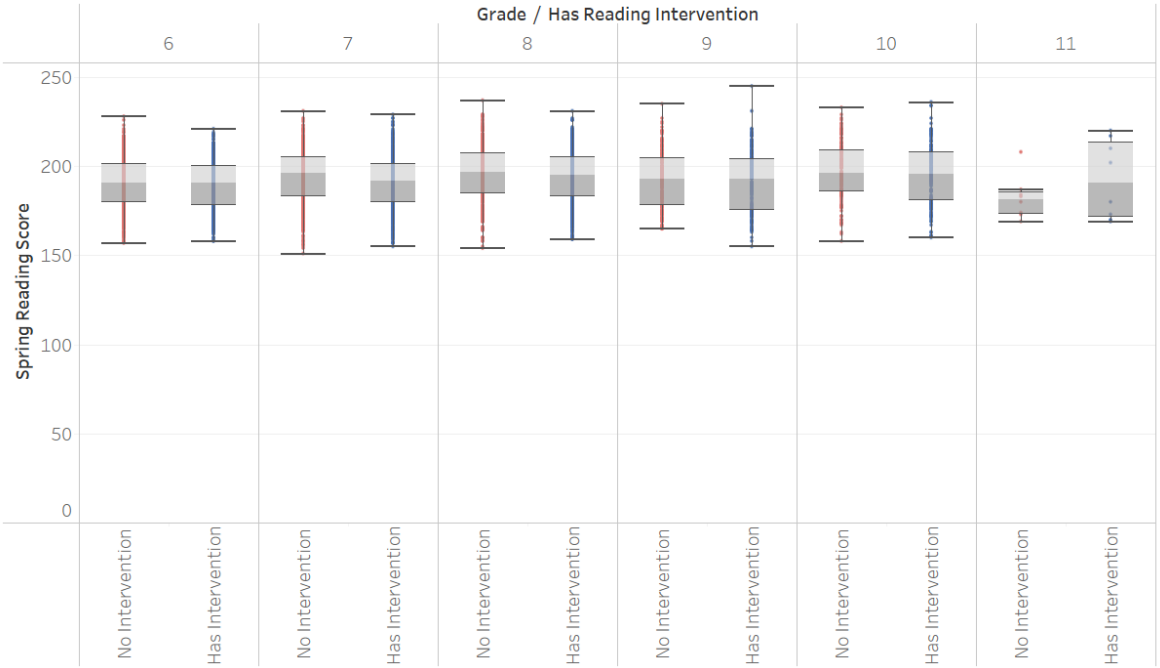
Distribution of all Students in the Matched Reading Grade 6-12 Sample by Race and Grade Level.



Distribution of Students With or Without a Tracked Reading Intervention on the Branching Minds Platform by Race in Grades 6-12



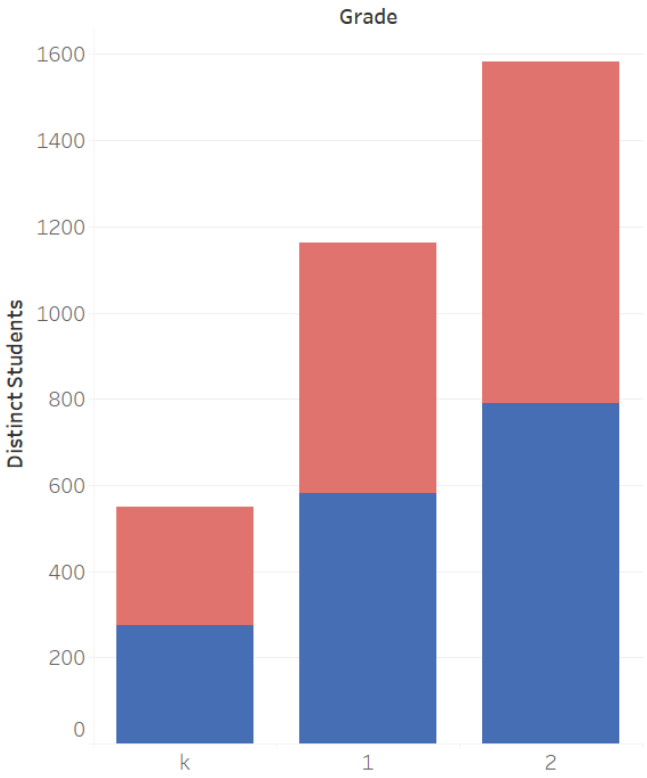
Distribution of Spring Scores for Students With or Without a Tracked Reading Intervention on the Branching Minds Platform in Grades 6-12



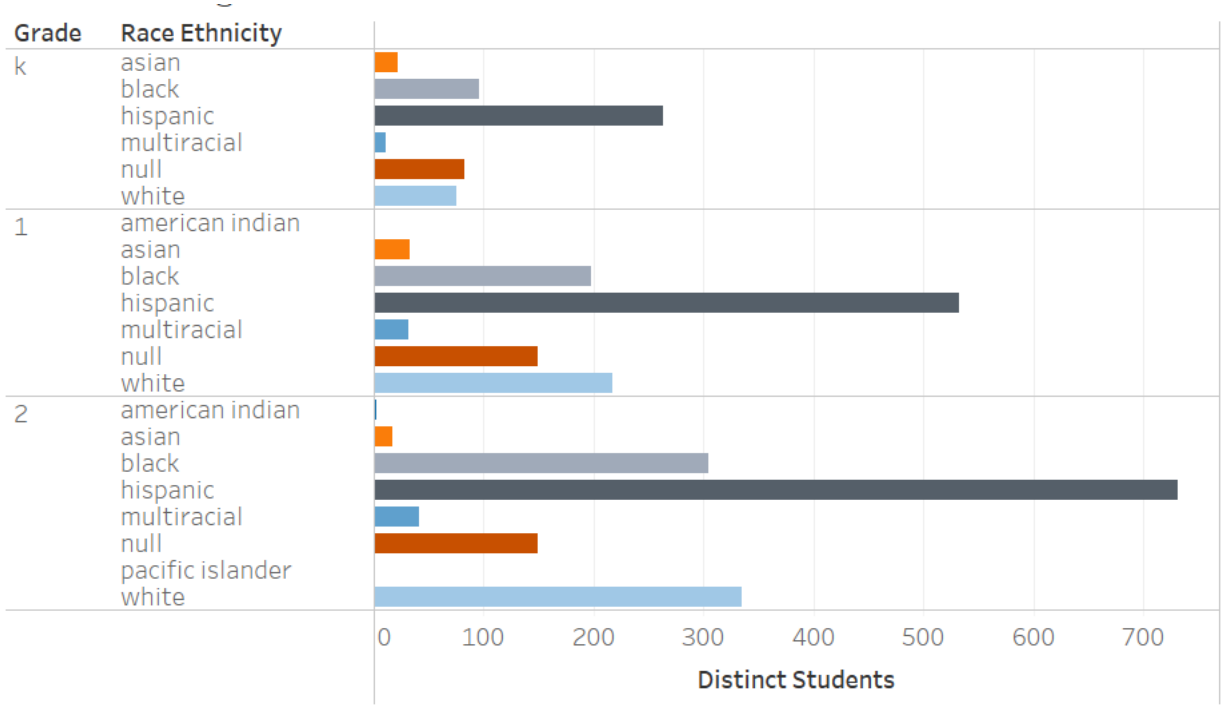
Appendix C - Math: Treatment vs. Comparison Group Descriptive Statistics Results

C.1 Math Matched Sample Visualizations Grades k-2

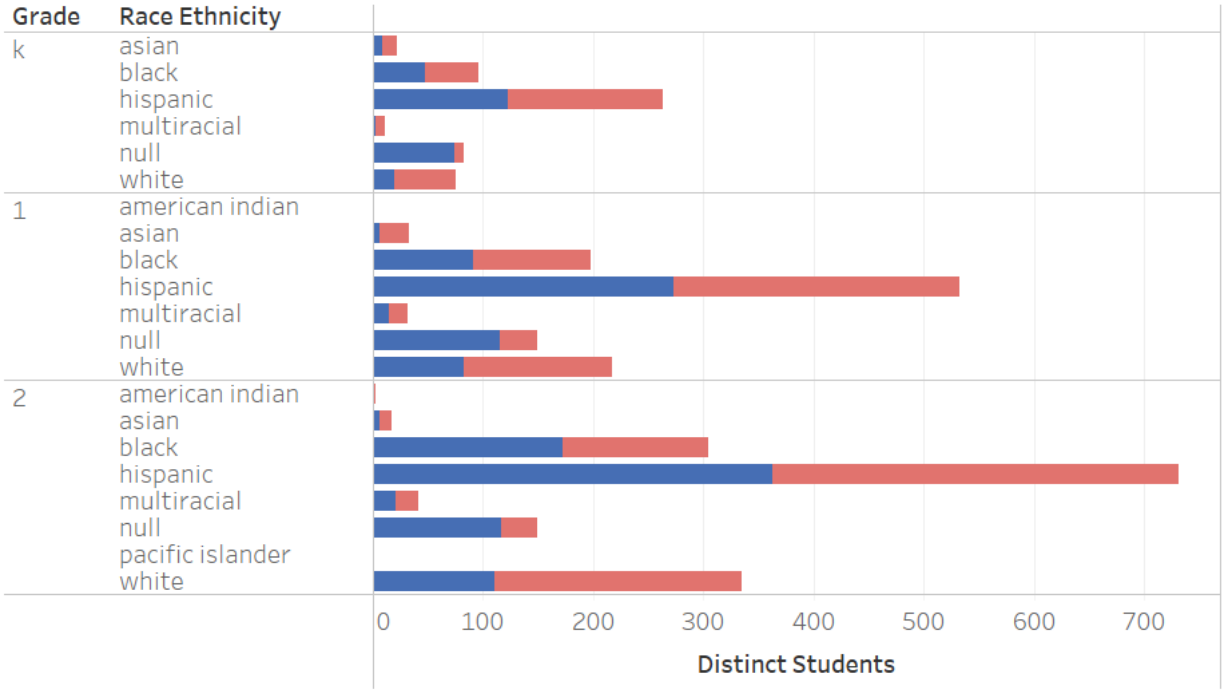
Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform in Grades K-2.



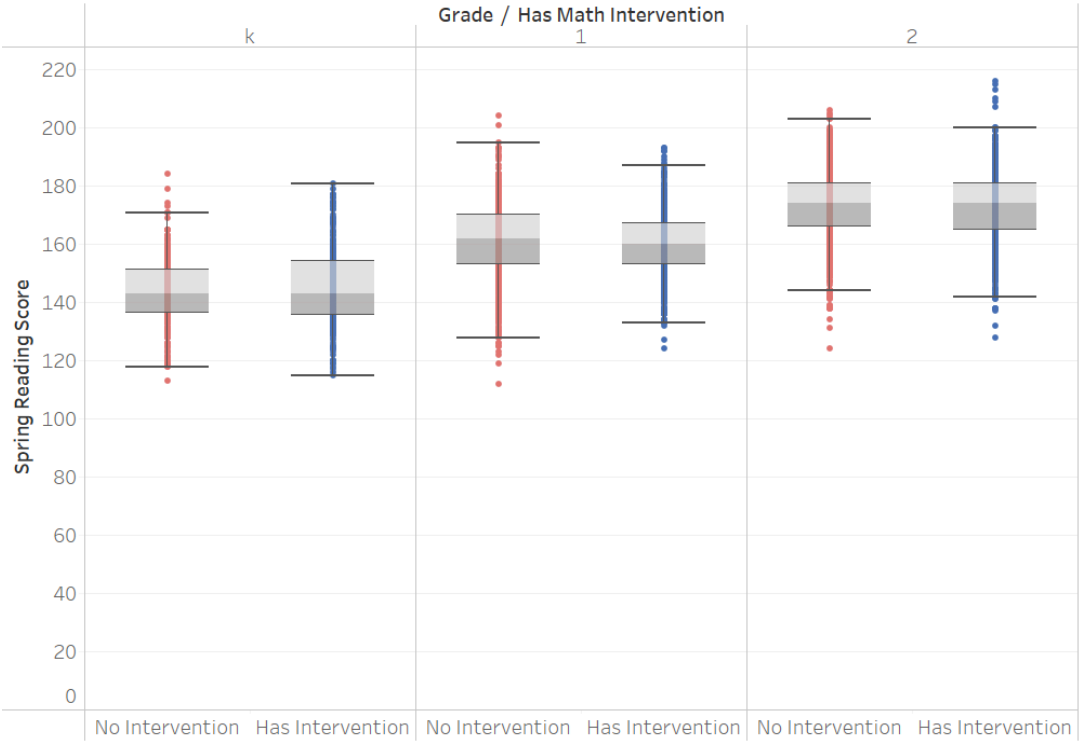
Distribution of all Students in the Matched Math Grade K-2 sample by Race and Grade Level.



Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform by Race in Grades K-2.

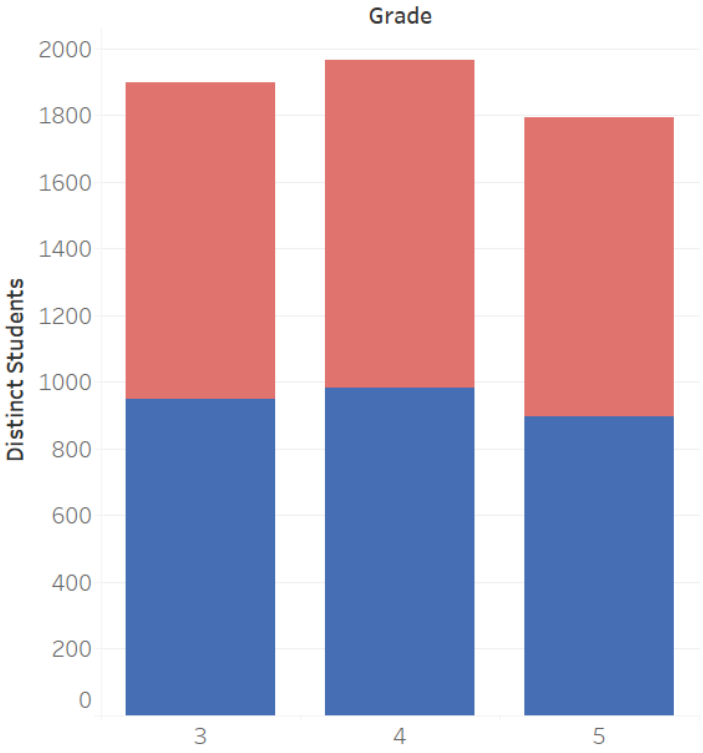


Distribution of Spring Scores for Students With or Without a Tracked Math Intervention on the Branching Minds Platform in Grades K-2.

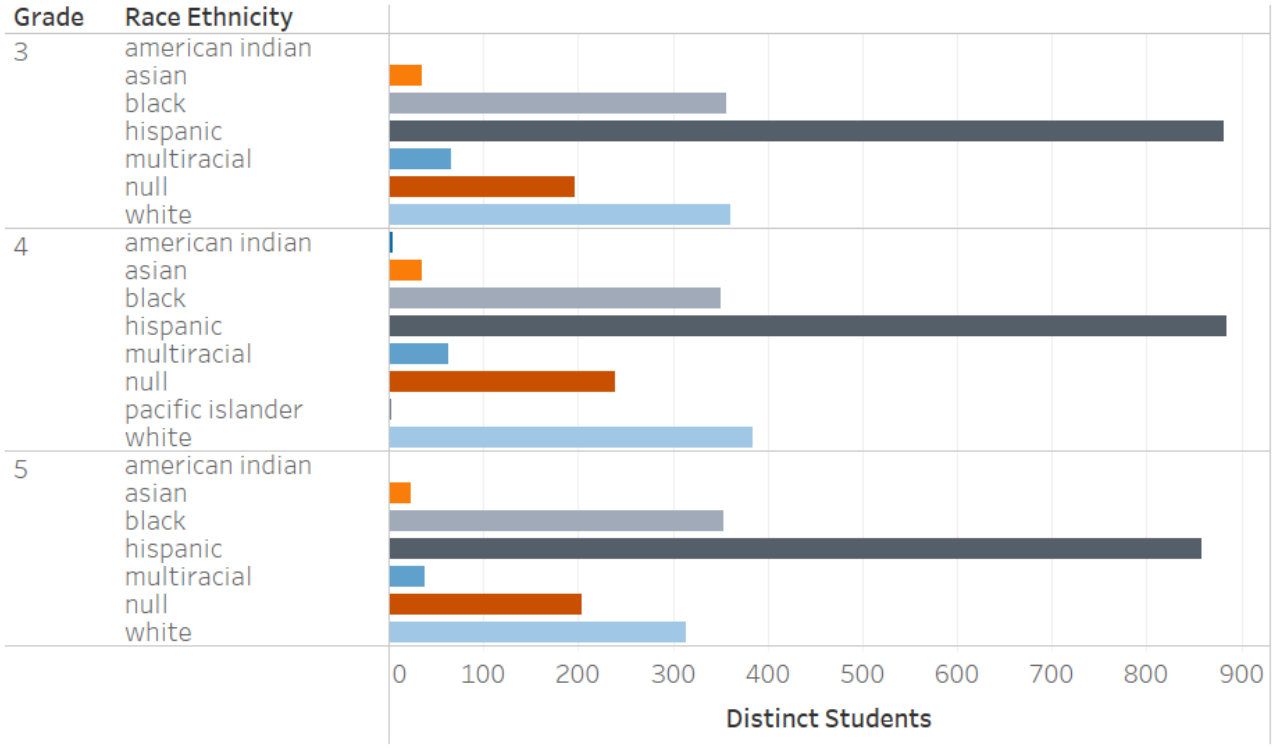


C.2 Math Matched Sample Visualizations Grades 3-5

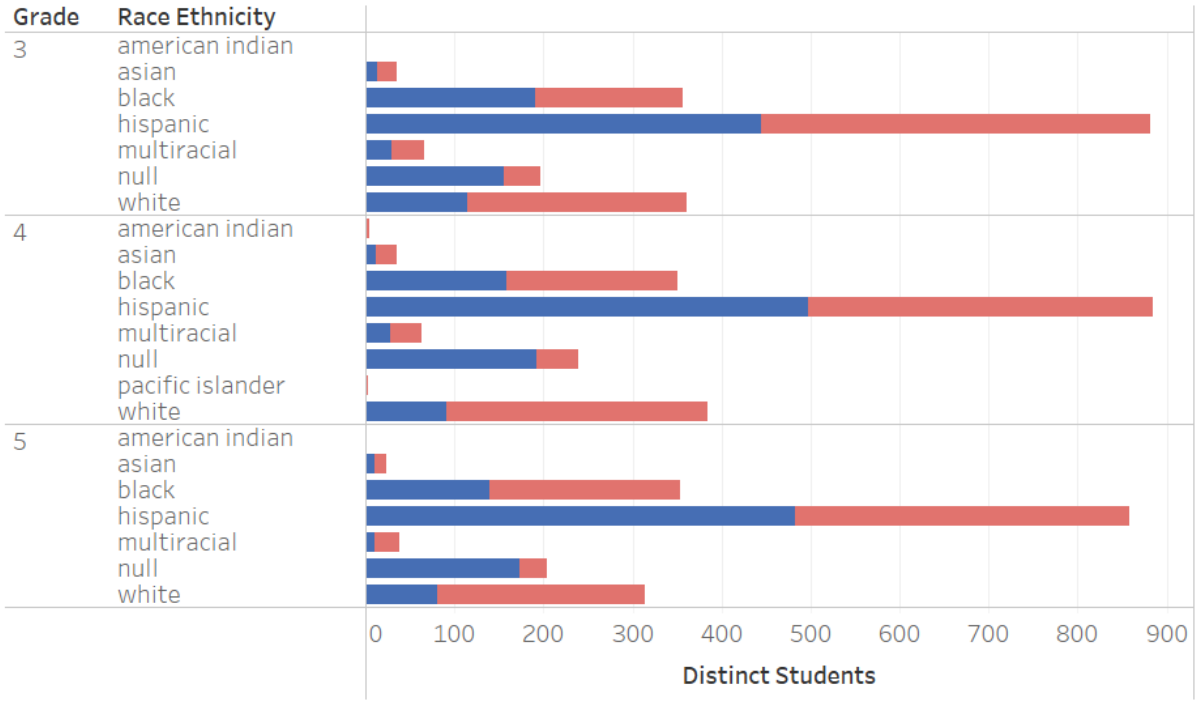
Distribution of Students With or Without a Tracked Math Interventionon the Branching Minds Platform in Grades 3-5.



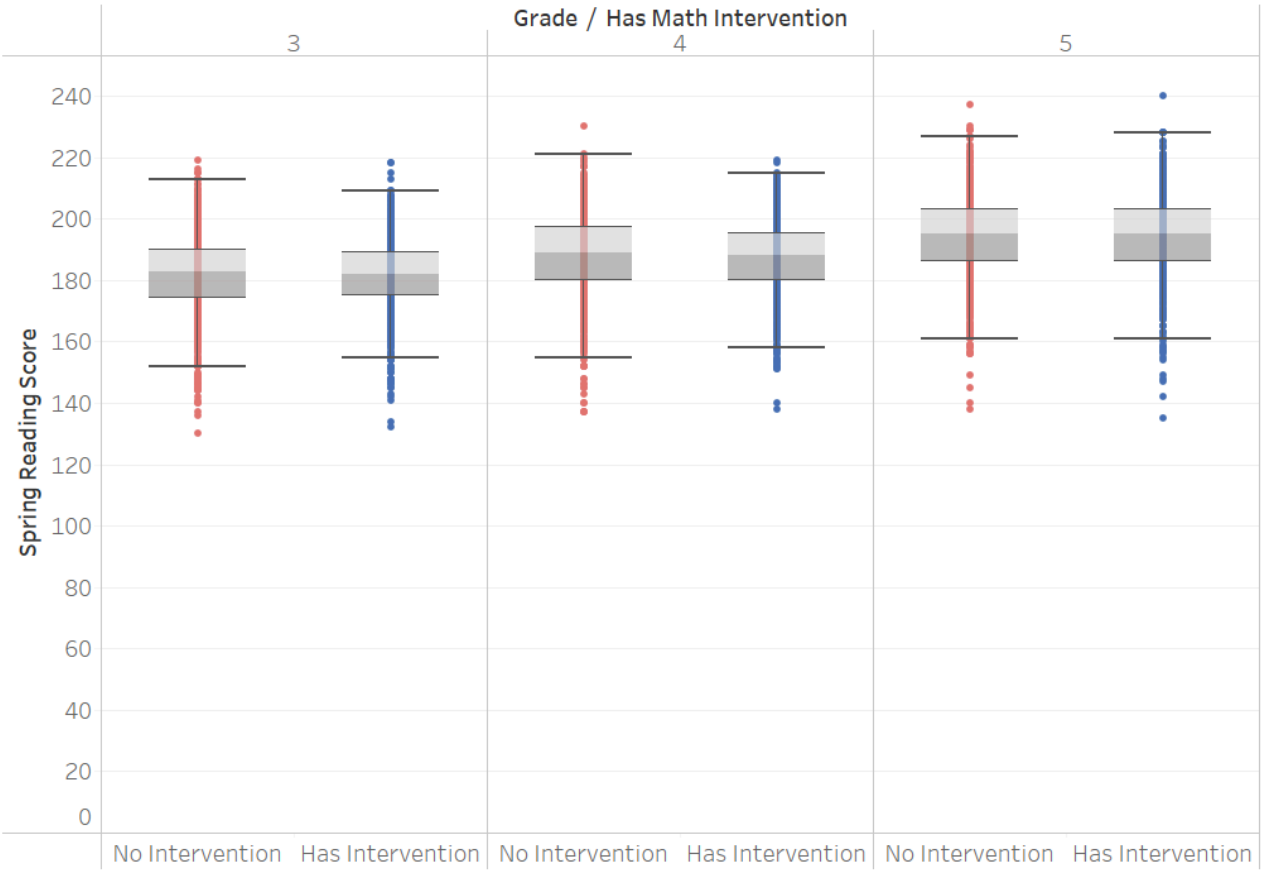
Distribution of all Students in the Matched Math Grade 3-5 Sample by Race and Grade Level.



Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform by Race in Grades 3-5.

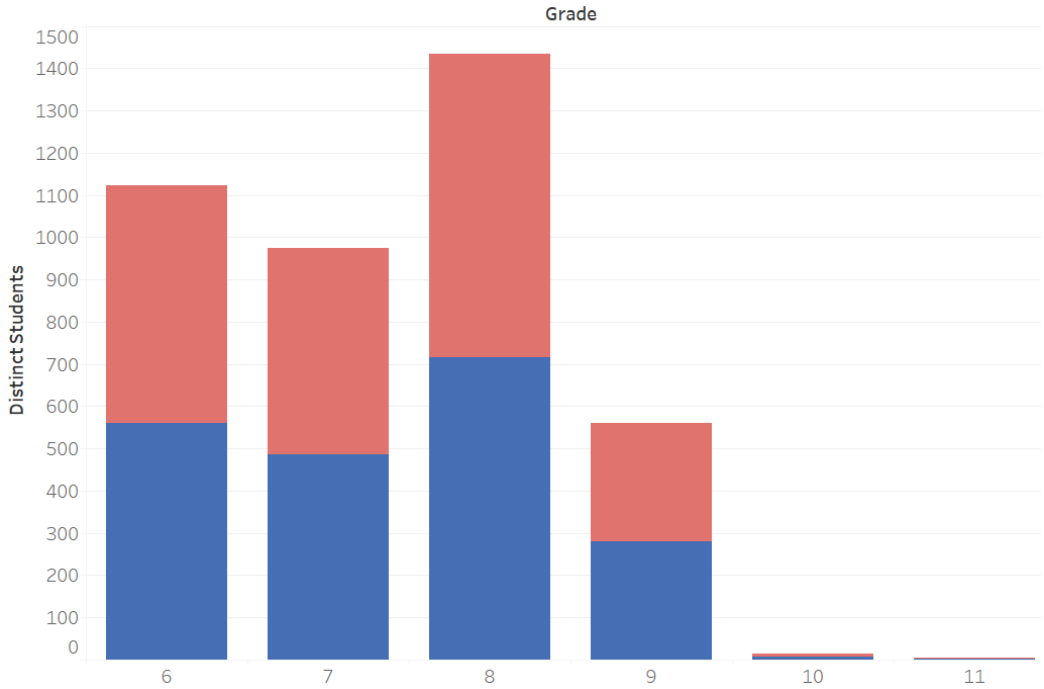


Distribution of Spring Scores for Students With or Without a Tracked Math Intervention on the Branching Minds Platform in Grades 3-5.

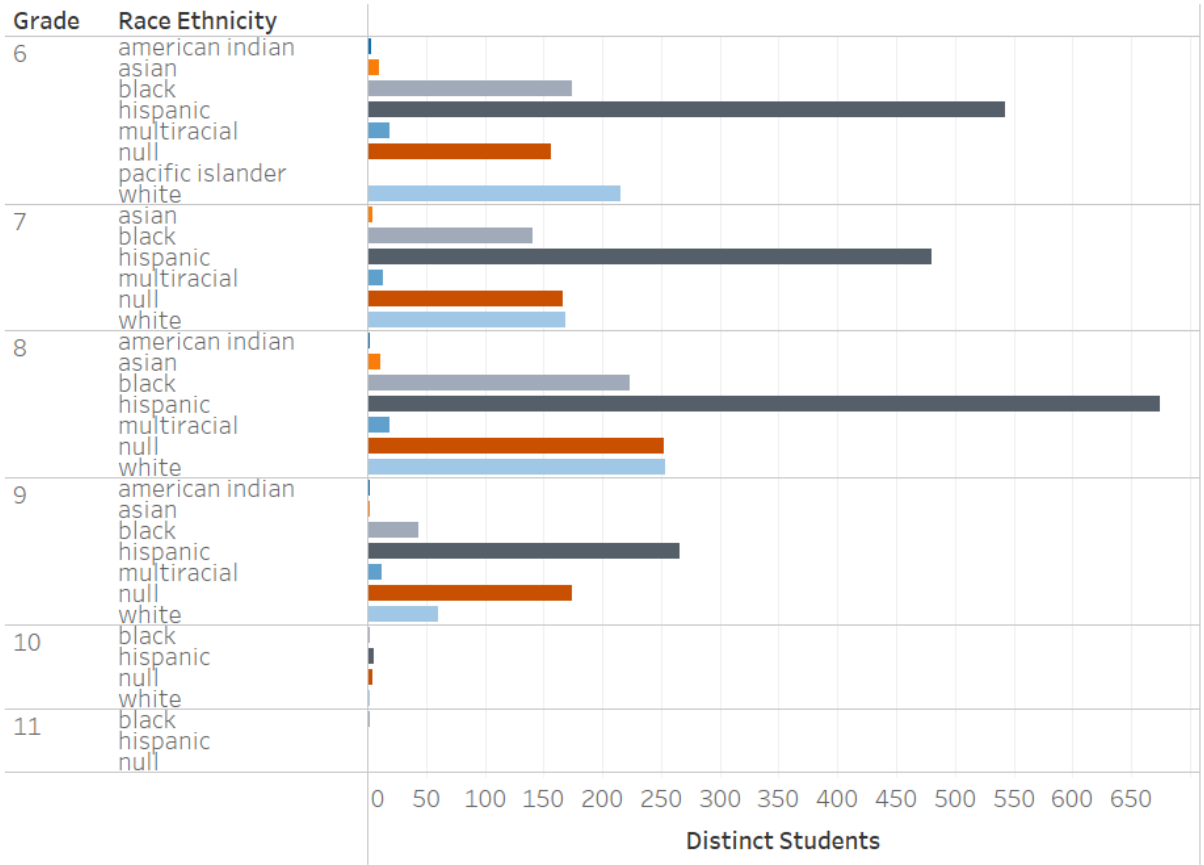


C.3 Math Matched Sample Visualizations Grades 6-12

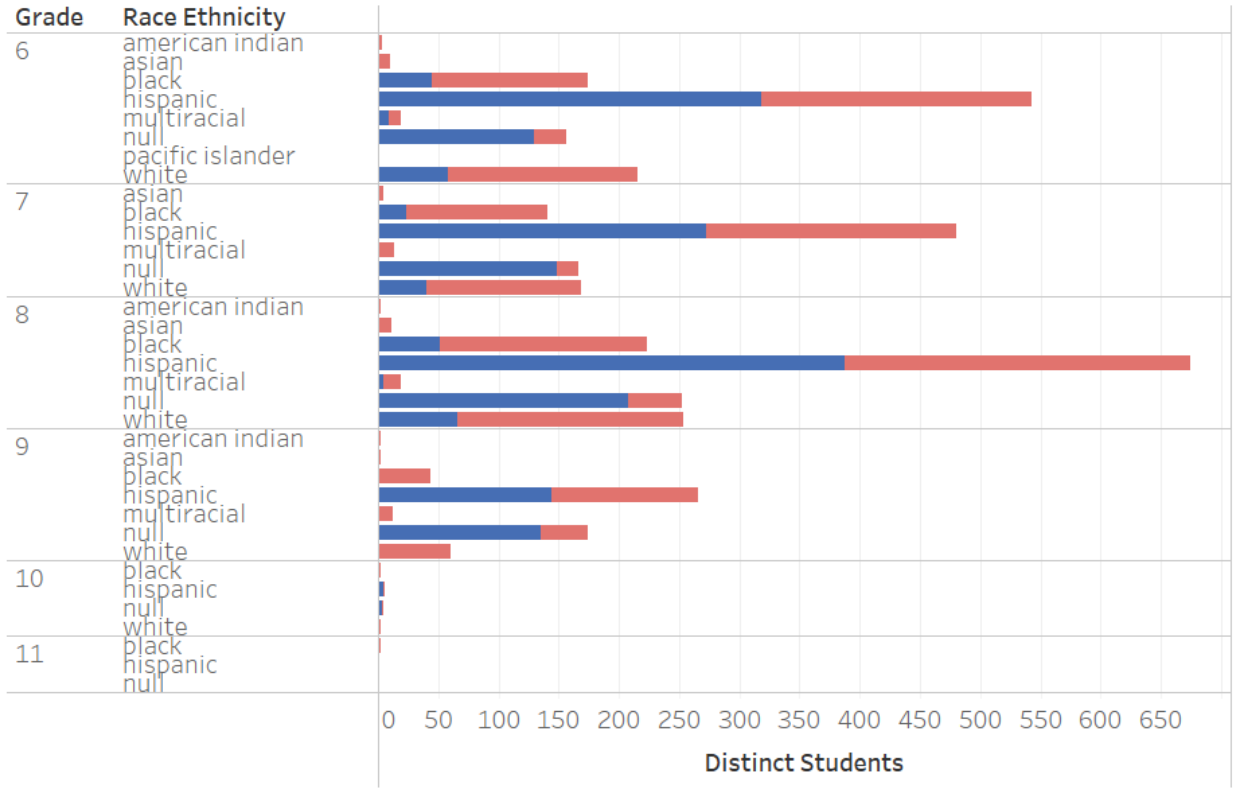
Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform in Grades 6-12



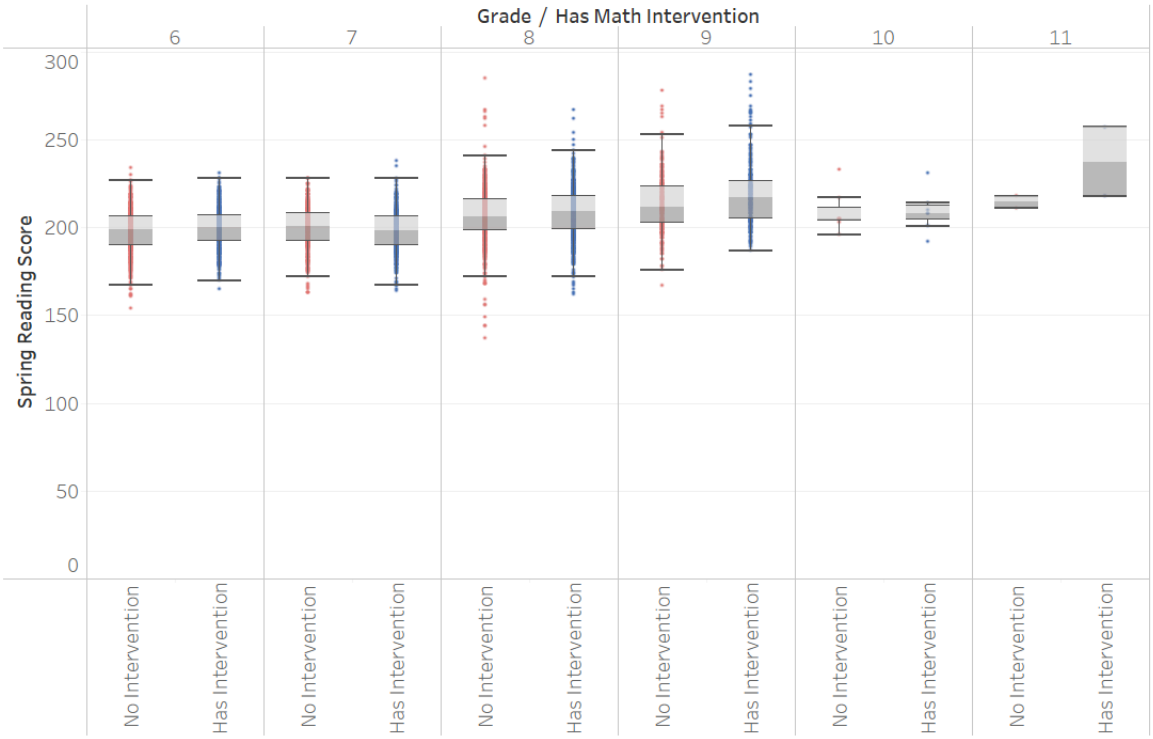
Distribution of all Students in the Matched Math Grade 6-12 Sample by Race and Grade Level.



Distribution of Students With or Without a Tracked Math Intervention on the Branching Minds Platform by Race in Grades 6-12



Distribution Spring Scores for Students With or Without a Tracked Math Intervention on the Branching Minds Platform in Grades 6-12



Appendix D - Reading Outcomes

Appendix D.1 Regression Models Predicting Spring NWEA MAP Growth Reading Assessment Scores for K-2 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
I	0.80 ***	-1.07 **	1.27 **	-1.12 ***		0.43	29517.41
II	0.75 ***	-0.85	1.66 ***	-2.14 ***	n = 42	0.4	29441.08

*** = p < .001, ** = p < .01, * = p < .05, n = 3,824

Appendix D.2 Regression Models Predicting Spring NWEA MAP Growth Reading Assessment Scores for 3-5 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
III	0.90 ***	-0.01	-1.09 ***	-2.09 ***		0.39	44920.49
IV	0.86 ***	1.27 ***	-0.72 **	-2.79 ***	n = 46	0.37	44695.34

*** = p < .001, ** = p < .01, * = p < .05, n = 5,790

Appendix D.3 Regression Models Predicting Spring NWEA MAP Growth Reading Assessment Scores for 6-12 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
V	0.78 ***	-1.88 ***	-0.23	-1.57 ***		0.37	32185.17
VI	0.76 ***	-0.54	0.03	-2.08 ***	n = 39	0.36	32056.67

*** = p < .001, ** = p < .01, * = p < .05, n = 4,112

Appendix E - Math Outcomes

Appendix E.1 Regression Models Predicting Spring NWEA MAP Growth Math Assessment Scores for K-2 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
VII	0.78 ***	-0.39	2.38 ***	-3.26 ***		0.54	25190.26
VIII	0.76 ***	-0.86	2.43 ***	-4.12 ***	n = 43	0.53	25117.56

*** = p < .001, ** = p < .01, * = p < .05, n = 3,294

Appendix E.2 Regression Models Predicting Spring NWEA MAP Growth Math Assessment Scores for 3-5 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
IX	0.88 ***	-0.09	1.75 ***	-1.67 ***		0.51	41733.17
X	0.87 ***	0.97 **	-1.64 ***	-2.66 ***	n = 44	0.49	41552.48

*** = p < .001, ** = p < .01, * = p < .05, n = 5,656

Appendix E.3 Regression Models Predicting Spring NWEA MAP Growth Math Assessment Scores for 6-12 Students

	Predictors					Model Comparison	
Model	Fall Score	Tracked Intervention(s) vs. none	Grade	Mandated learning plan(s) vs. none	Random effects: District ID	R^2	AIC
XI	0.86 ***	0.78 *	1.35 ***	-2.18 ***		0.48	31318.85
XII	0.85 ***	-0.49	1.42 ***	-2.66 ***	n = 40	0.47	31253.52

*** = p < .001, ** = p < .01, * = p < .05, n = 4,108