RIT Score Comparability

Maine Through Year Assessment
and
MAP Growth

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Topics

- Dimensionality: Do the MAP Growth and Through Year Assessments measure similar constructs?
- Comparisons for Spring 2023 "Double-Testers"
  - Consideration that Impacts Comparability: Time Between Assessments
  - Standard Error of Measurement
  - Pearson Correlation Coefficient
  - Score Comparisons Breakdown by Grade Level: Reading and Math
- Trends in Fall-to-Spring RIT Score Growth

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Dimensionality

Do the MAP Growth and Maine Through Year Assessment measure similar constructs?

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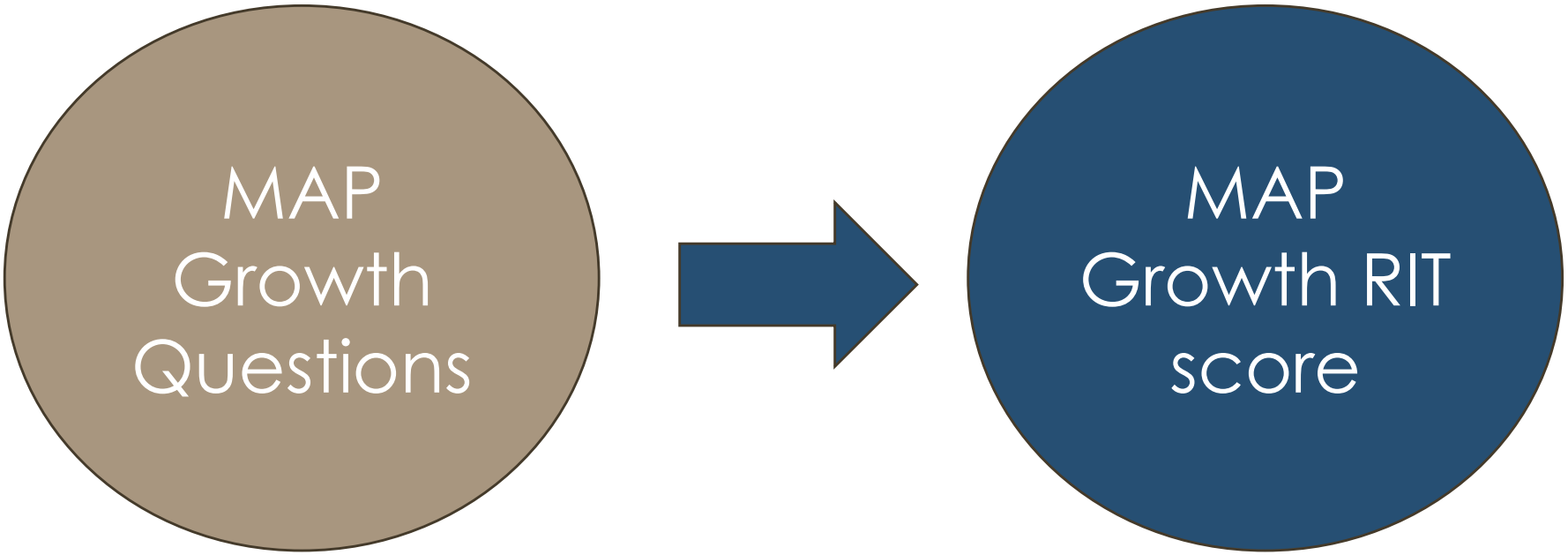
MAP Growth Assessment Construction



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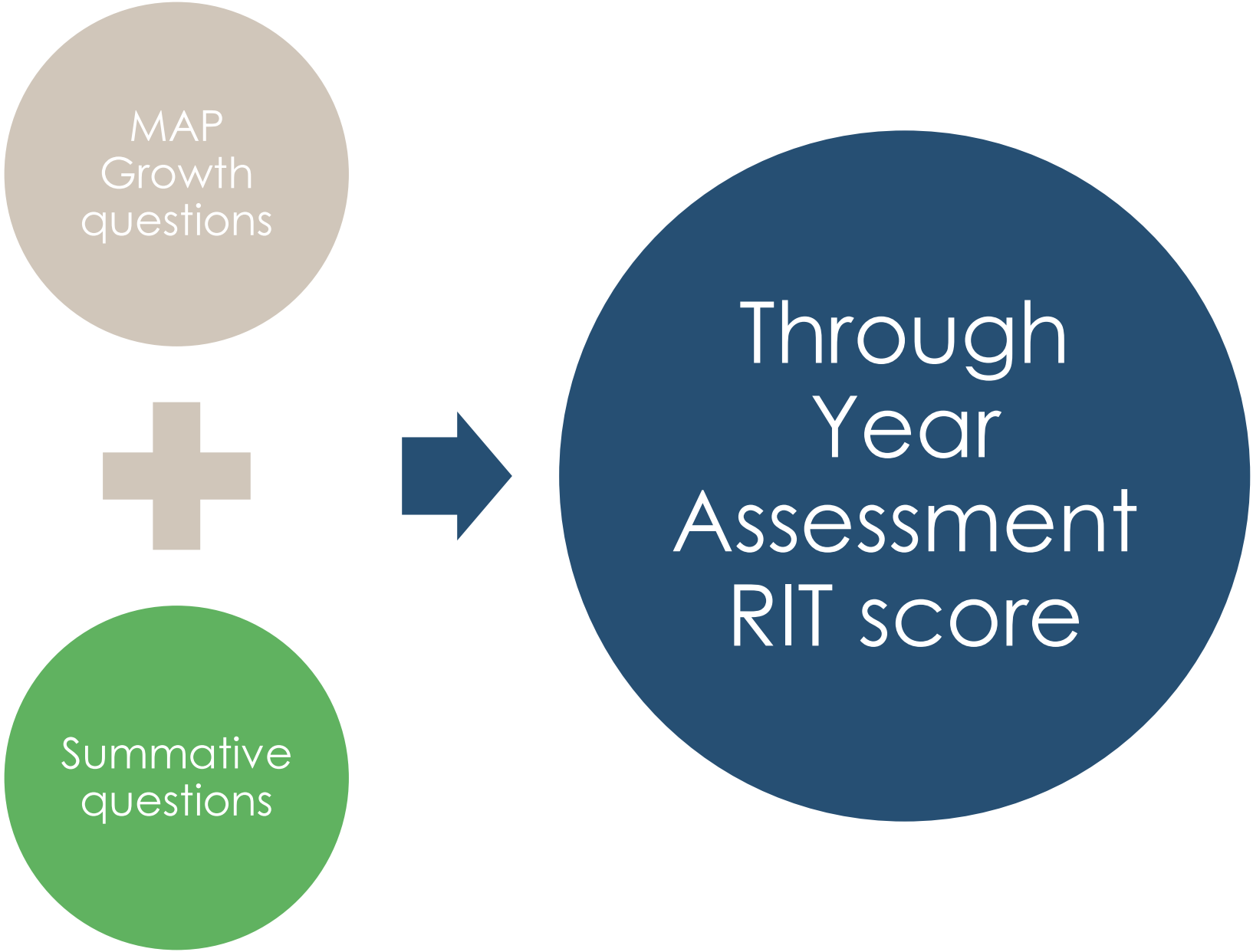
Spring Through Year Assessment Construction



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Key Assumption

Key assumption required to align Maine summative questions to the RIT scale:

Maine summative and MAP Growth items measure very similar constructs.

- Assessment items are the questions students answer.

- The construct is the knowledge, skill, or ability the assessment is intended to measure.
- Broad examples of constructs are math achievement and reading ability.

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Dimensionality

Dimensions are the characteristics that are assessed or influence the results of the assessment.

Examples:

- Math achievement
- Type of test
- Reading ability

Multidimensionality: Occurs when multiple underlying dimensions influence scores

Unidimensionality: Occurs when a single underlying dimension influences scores

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A math assessment should measure math achievement and nothing but math achievement.

Unidimensionality

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DETECT

Are the data unidimensional enough that Maine summative items can be aligned to the RIT scale?

DETECT = Dimensionality Evaluation to Enumerate Contributing Traits

- Non-parametric test
  - No assumptions are made about the frequency distribution of the data being assessed (e.g., normal distribution or "bell curve")
  - Flexible test that can be applied to different types of data
- Estimates the number of dimensions and, if multiple dimensions are present, identifies which dimension is predominantly measured

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DETECT Values for Math and Reading Tests

Grade	Math	Reading
3	-0.29	-0.54
4	0.19	-0.24
5	-0.21	-0.22
6	0.11	-0.63
7	-0.15	-0.47
8	-0.64	-0.24
High School	-0.41	-1.07

< 0.2 Essential unidimensionality
0.2-0.4 Weak multidimensionality
0.4-1 Moderate multidimensionality
> 1 Strong multidimensionailty

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Comparisons for "Double-Testers"

Students Who Were Administered Both the MAP Growth and Through Year Assessments

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Consideration that Impacts Comparability

Time Between Assessments

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Data Set: Spring 2023

- 9,784 MAP Growth assessments in Reading
  - Average of 1,398 assessments per grade level
- 10,221 MAP Growth assessments in Math
  - Average of 1,460 assessments per grade level

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Time Between Tests: Reading

Grade Level	Median Number of Days Between Tests
3	-3
4	-3
5	-7
6	-5
7	-7
8	-8
High School	-8

Positive values:
Maine Through Year Assessment **after** MAP Growth

Negative values:
Maine Through Year Assessment **before** MAP Growth

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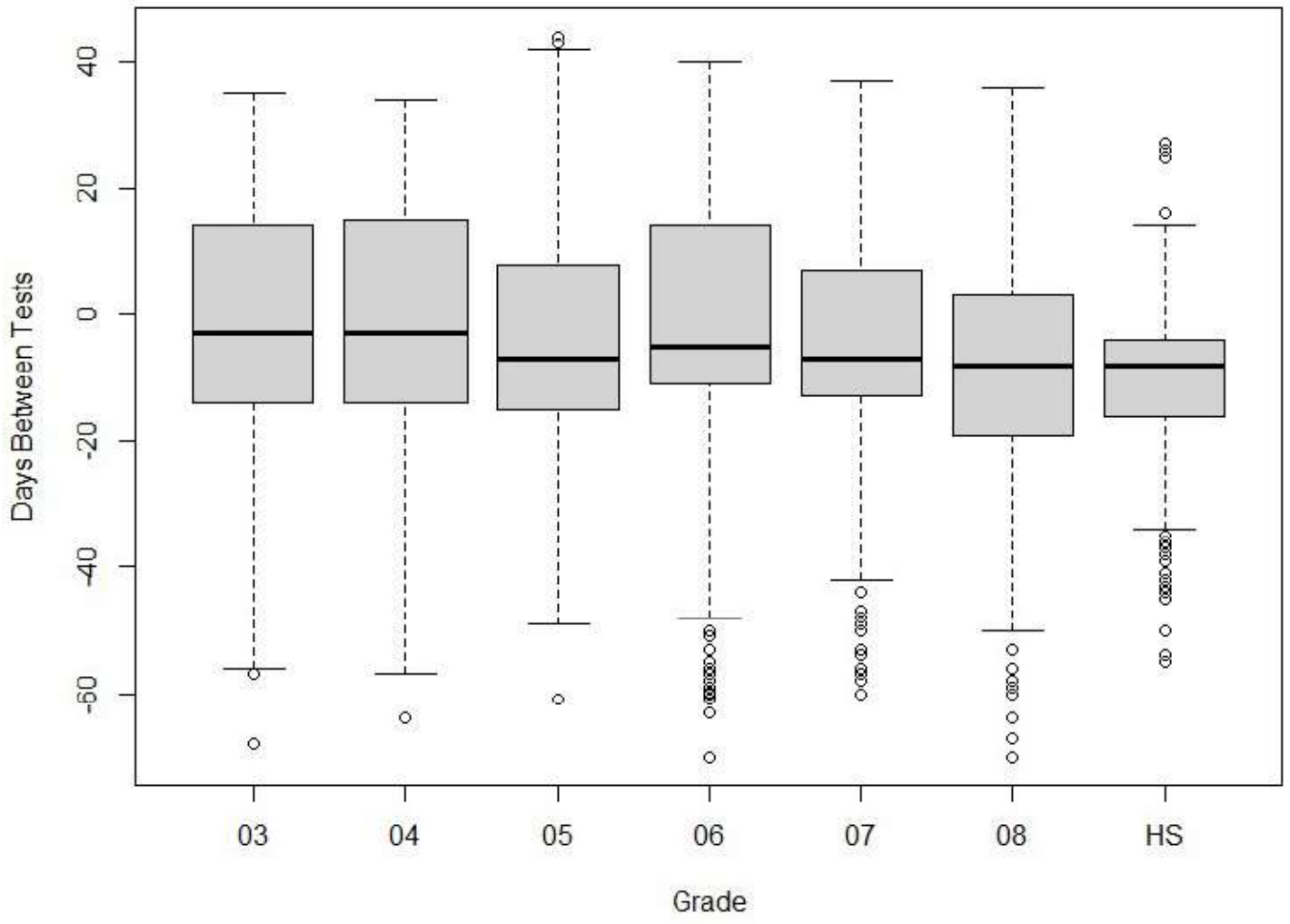
Time Between Tests: Reading



Dotted lines:
Range from the minimum to maximum number of days between tests

Example: Grade 4 is approximately -60 to +35 days

Dark, horizontal line:
Median number of days between tests for each grade level

Shaded region: The range of days between testing for the middle 50% of students

Empty circles:
Outliers, or extreme values

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Time Between Tests: Math

Grade Level	Median Number of Days Between Tests
3	5
4	4
5	-6
6	1
7	-8
8	-12
High School	-10

Positive values:
Maine Through Year Assessment **after** MAP Growth

Negative values:
Maine Through Year Assessment **before** MAP Growth

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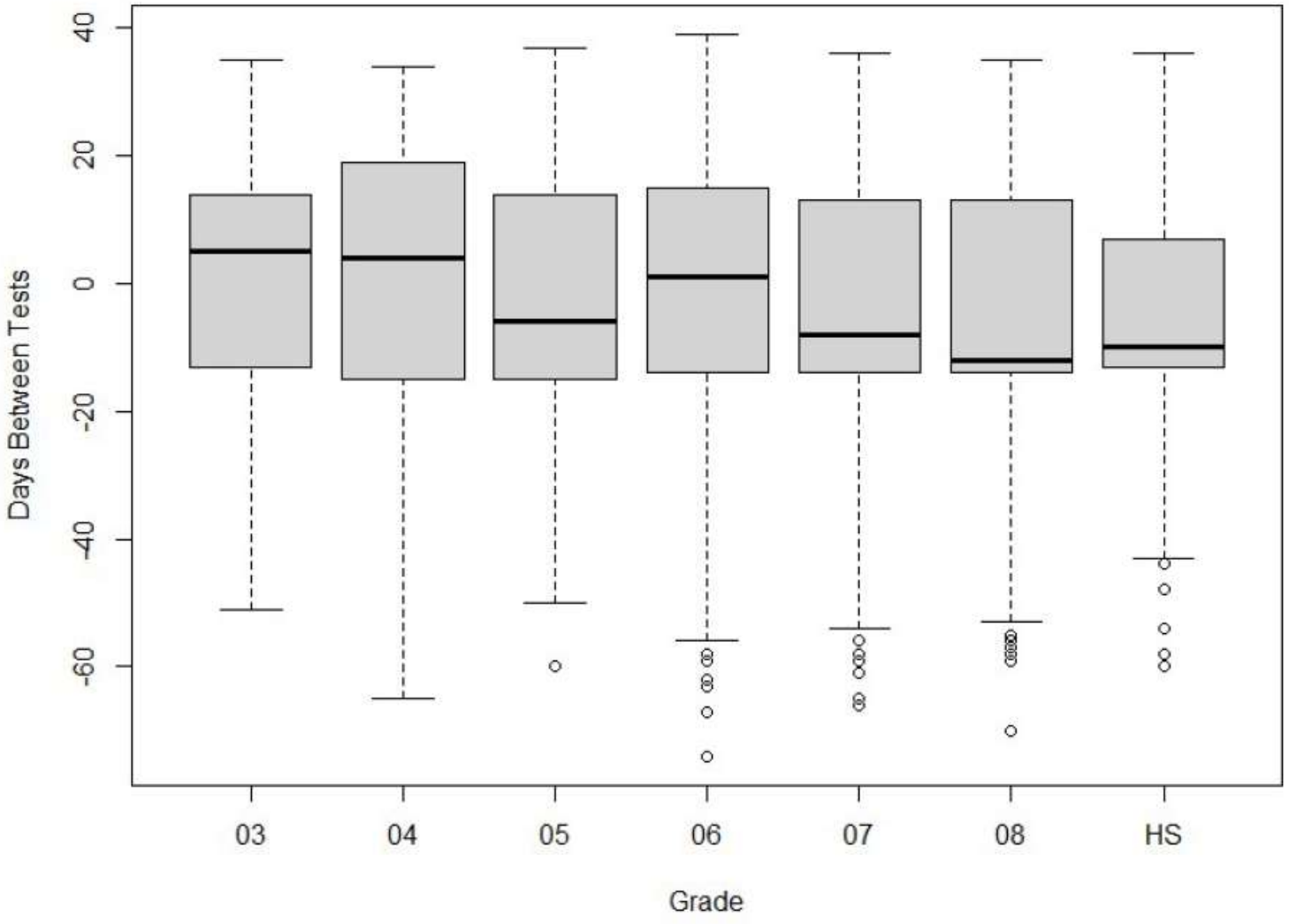
Time Between Tests: Math



Dotted lines: Range from the minimum to maximum number of days between tests

Example: Grade 4 is approximately -70 to +35 days

Dark, horizontal line: Median number of days between tests for each grade level

Shaded region: The range of days between testing for the middle 50% of students

Empty circles: Outliers, or extreme values

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Time Between Tests

- The amount of time that elapsed for some students between tests was larger than a month.
  - Opportunity to learn new content
- Different testing conditions (e.g., time) could impact student results.

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Standard Error of Measurement

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Standard Error of Measurement (SEM)

- All achievement test scores are **estimates** of a student's trait, in particular a latent trait that cannot be seen, for example "math knowledge" or "reading ability."
- Because the trait cannot be seen, test developers **make inferences** based on the student's answers to a range of questions that have been anchored to the trait.
- **The standard error of measurement (SEM) indicates a score's precision.**
- Multiple factors can impact the student's score, or estimated ability:
  - Careless errors by the student
  - Lucky guesses by the student
  - Distractions in the testing environment
  - Idiosyncrasies in the assessment content
- Example: When calculating SEM, one aspect NWEA considers is, *Was the student's answering pattern predictable or erratic?*

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RIT Score Standard Error of Measurement

The student's score of 203 is an estimate.

The SEM of +/- 3 RIT points, indicates that the student's true score would *likely* fall between 200-206 RIT points.

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Looking a Little More Closely

The student's score of 203 is an estimate.

The SEM of +/- 3 RIT points, indicates that the student's true score would ***likely*** fall between 200-206 RIT points.

Confidence Intervals

- 200-206 is the range within which there is a 68% chance that a student's true score lies, with 203 representing the most likely estimate of this student's score.
- Expanding the range around the estimated score increases the confidence interval.
- For example, ± 2 SEM, or approximately ± 6 RIT, corresponds to a 95% confidence interval. There is a 95% chance that a student's true score lies within 197-209 RIT points.

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Typical SEM for MAP Growth ranges from **2.8 to 3.5 RIT score points**.

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Pearson Correlation Coefficient

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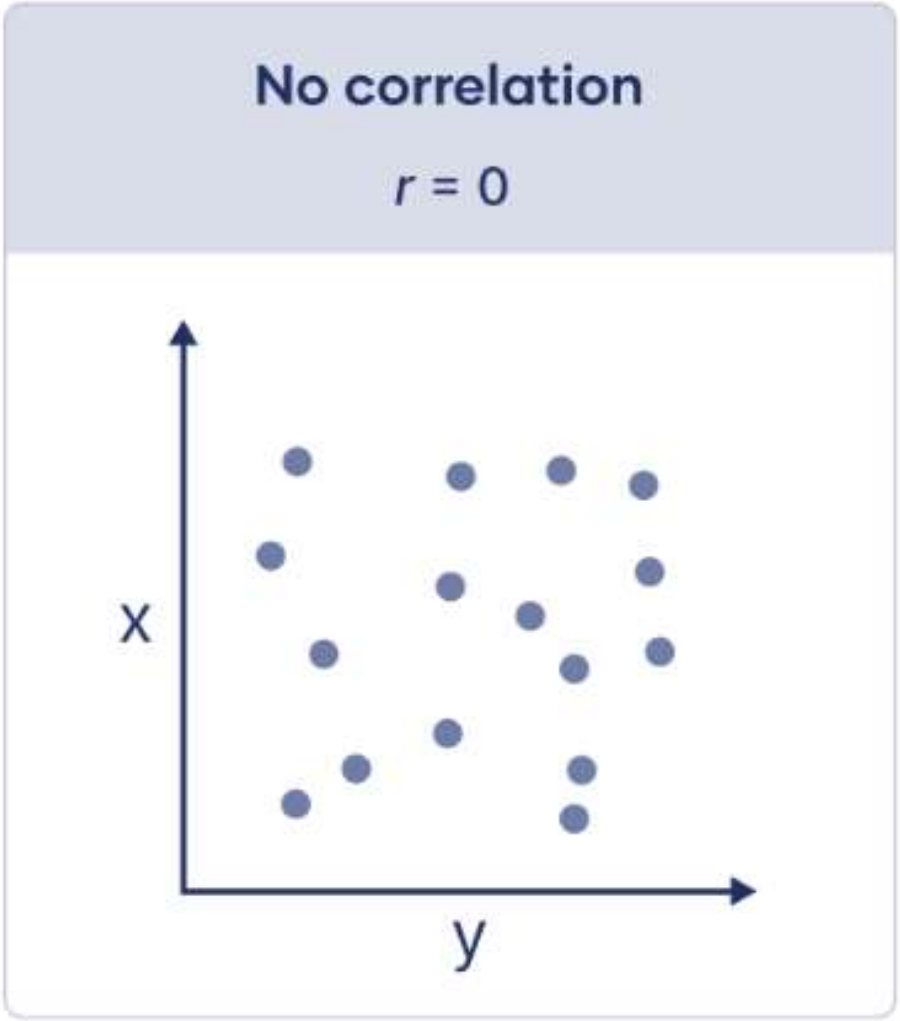
Pearson correlation coefficient (r)



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Turney, S. (2023, June 22). *Pearson Correlation Coefficient (r) | Guide & Examples.* Scribbr. Retrieved September 8, 2023, from https://www.scribbr.com/statistics/pearson-correlation-coefficient/

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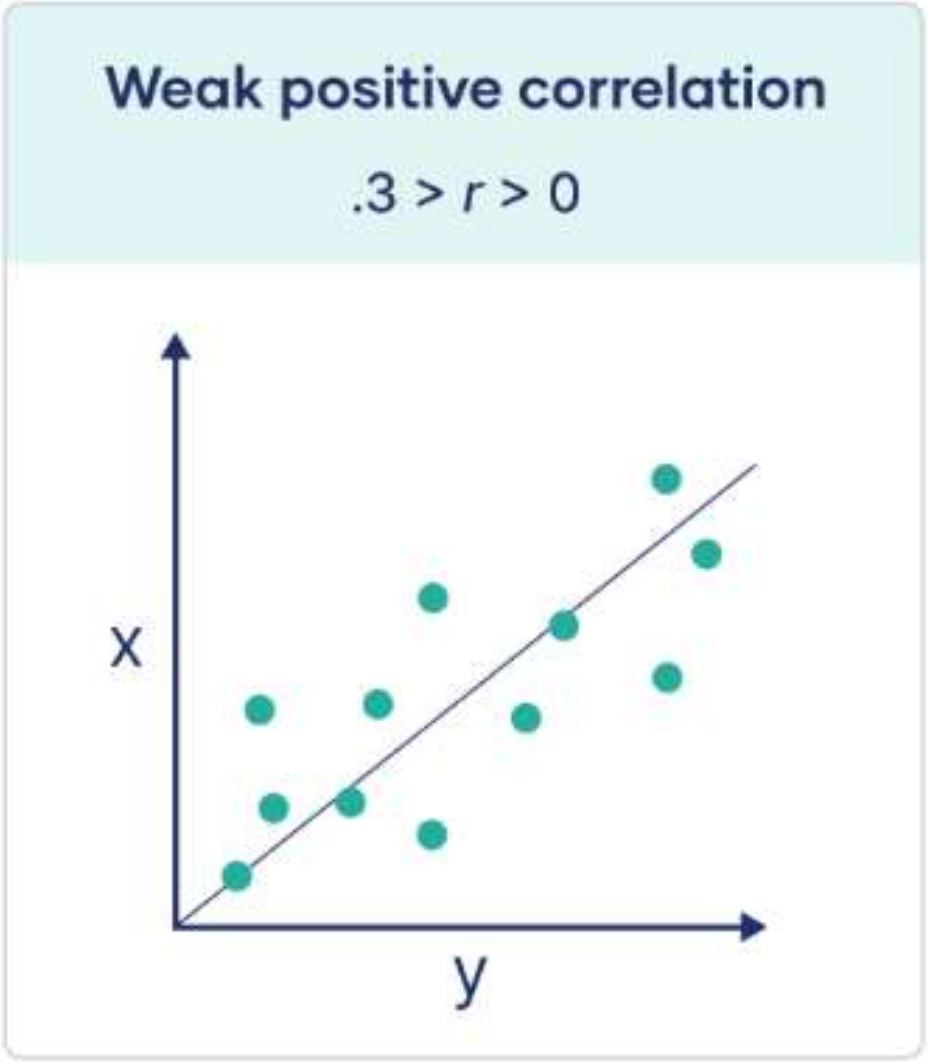

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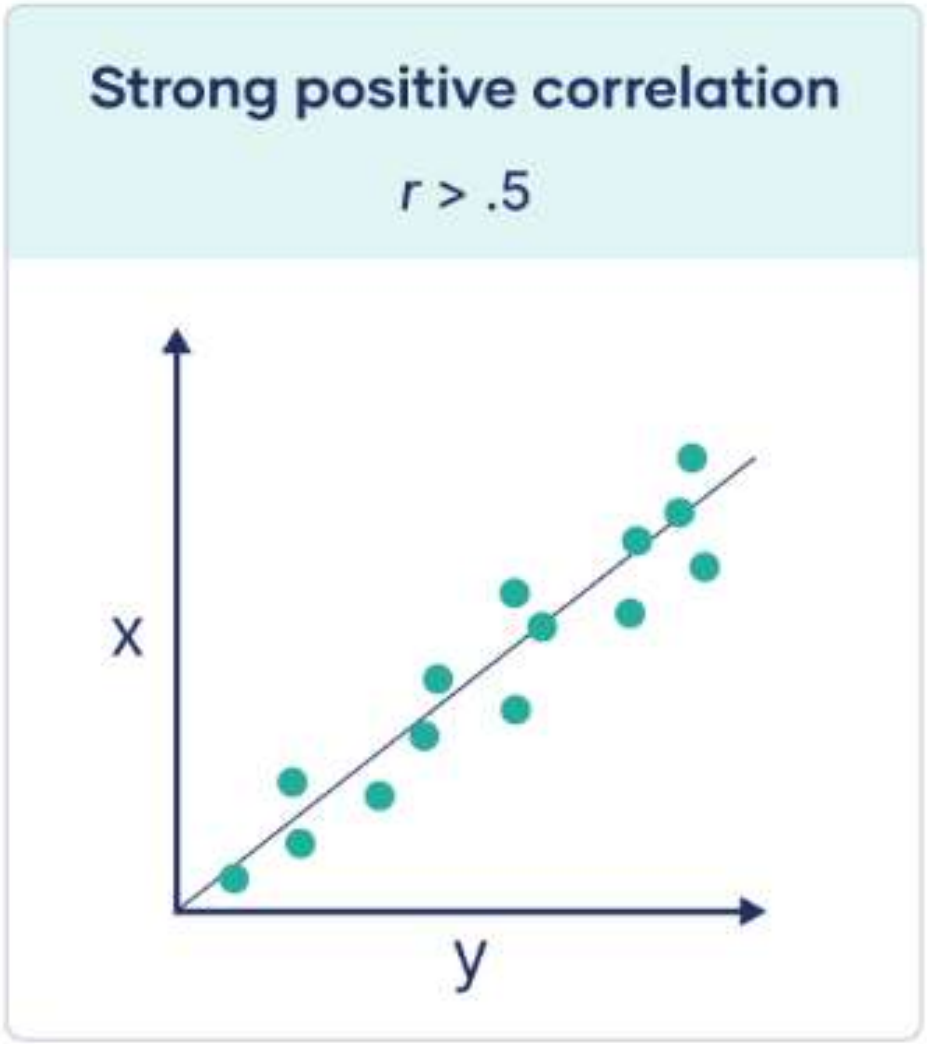

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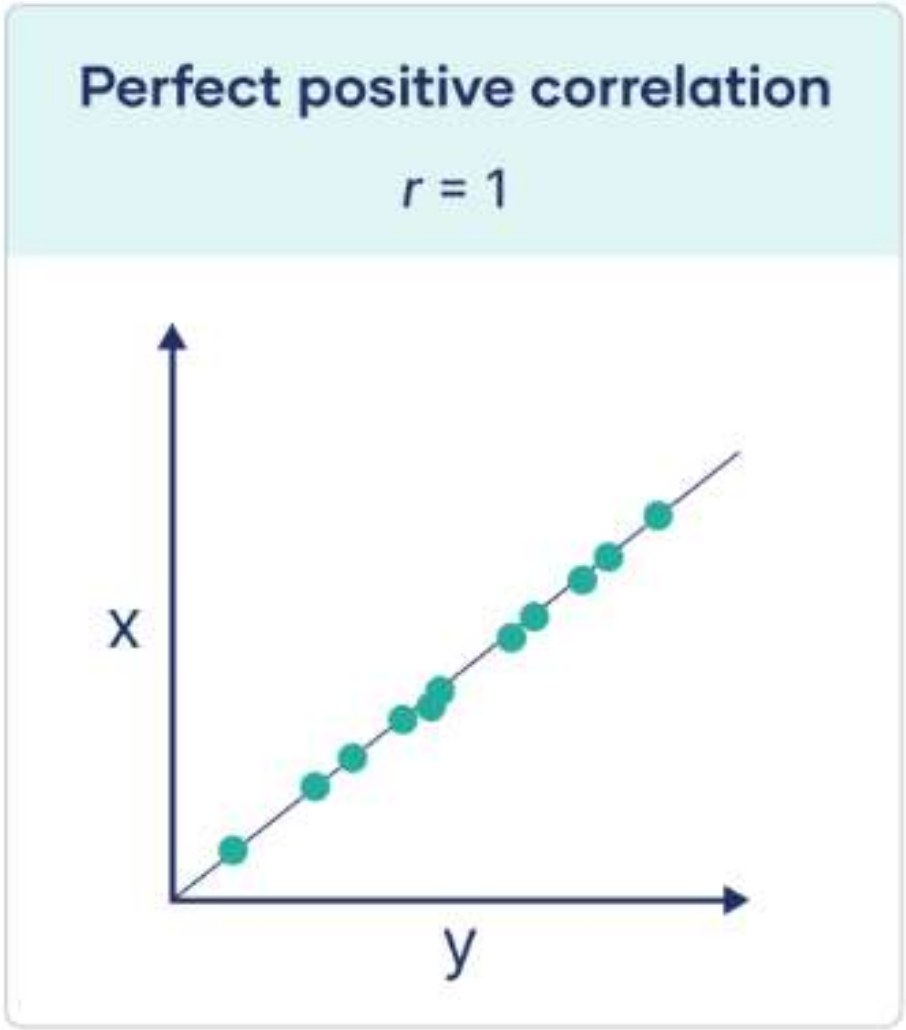

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Score Comparisons

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What are the characteristics of the "double-testers"?

Math Demographics

				Percent of Grade						
Group	Grade	N	Male	Female	AI/AN	Asian	Black	Hispanic	NH/PI	White	Multiple
Double	3	1,172	53	47	4	0	3	5	0	85	4
Testers	4	1,090	53	47	3	0	1	6	0	87	3
	5	1,273	51	49	3	0	1	5	0	89	2
	6	1,421	52	48	2	1	1	4	0	90	2
	7	1,535	53	47	3	0	1	3	0	89	3
	8	1,284	52	48	3	0	1	4	0	90	2
Single	3	8,275	53	47	3	1	1	5	0	86	4
Testers	4	8,381	52	48	3	1	2	5	0	86	4
	5	8,024	52	48	3	1	1	5	0	86	4
	6	8,137	52	48	3	1	2	5	0	86	4
	7	8,251	51	49	3	1	2	5	0	86	3
	8	8,844	51	49	3	1	2	5	0	86	3

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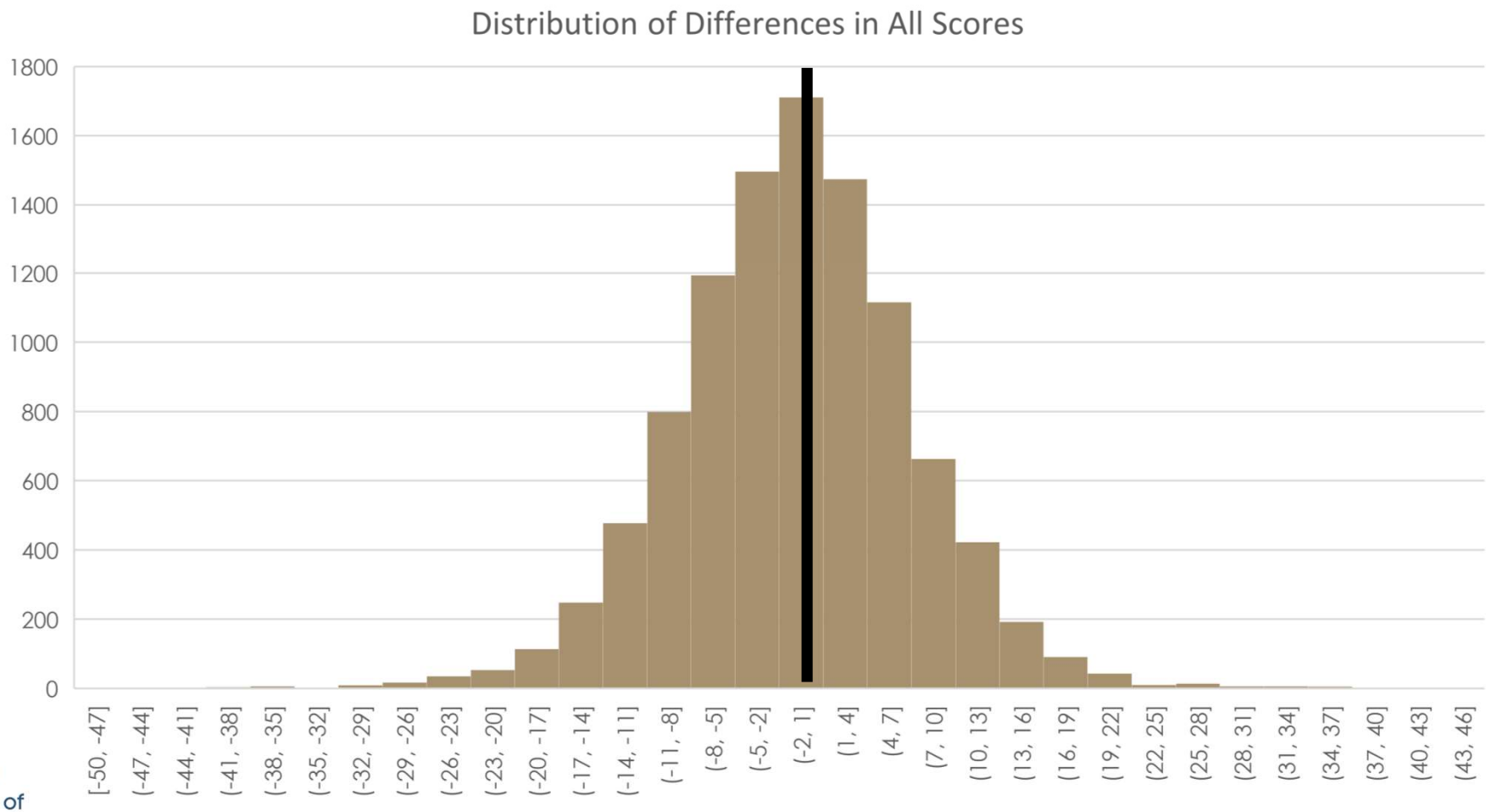
Difference Between Scores

Expectation is that the mean difference in assessment scores for each grade & content area is **less than the typical standard error of measurement for MAP Growth: 2.8-3.5 RIT points**.



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Mean of the Difference Between Scores

READING

Grade	# Students	Ave RIT Diff (MTYA-MAP)
G3	1538	0.07
G4	1454	-1.15
G5	1528	-1.07
G6	1487	-1.37
G7	1509	-1.82
G8	1469	-1.11
HS	799	-5.94
G3-8	**8985**	**-1.07**
ALL	**9784**	**-1.47**

MATH

Grade	# Students	Ave RIT Diff (MTYA-MAP)
G3	1544	1.60
G4	1441	0.07
G5	1653	-0.10
G6	1557	-1.03
G7	1762	-1.63
G8	1446	-0.37
HS	818	-2.45
ALL	**10221**	**-0.45**

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Score Comparisons: Reading

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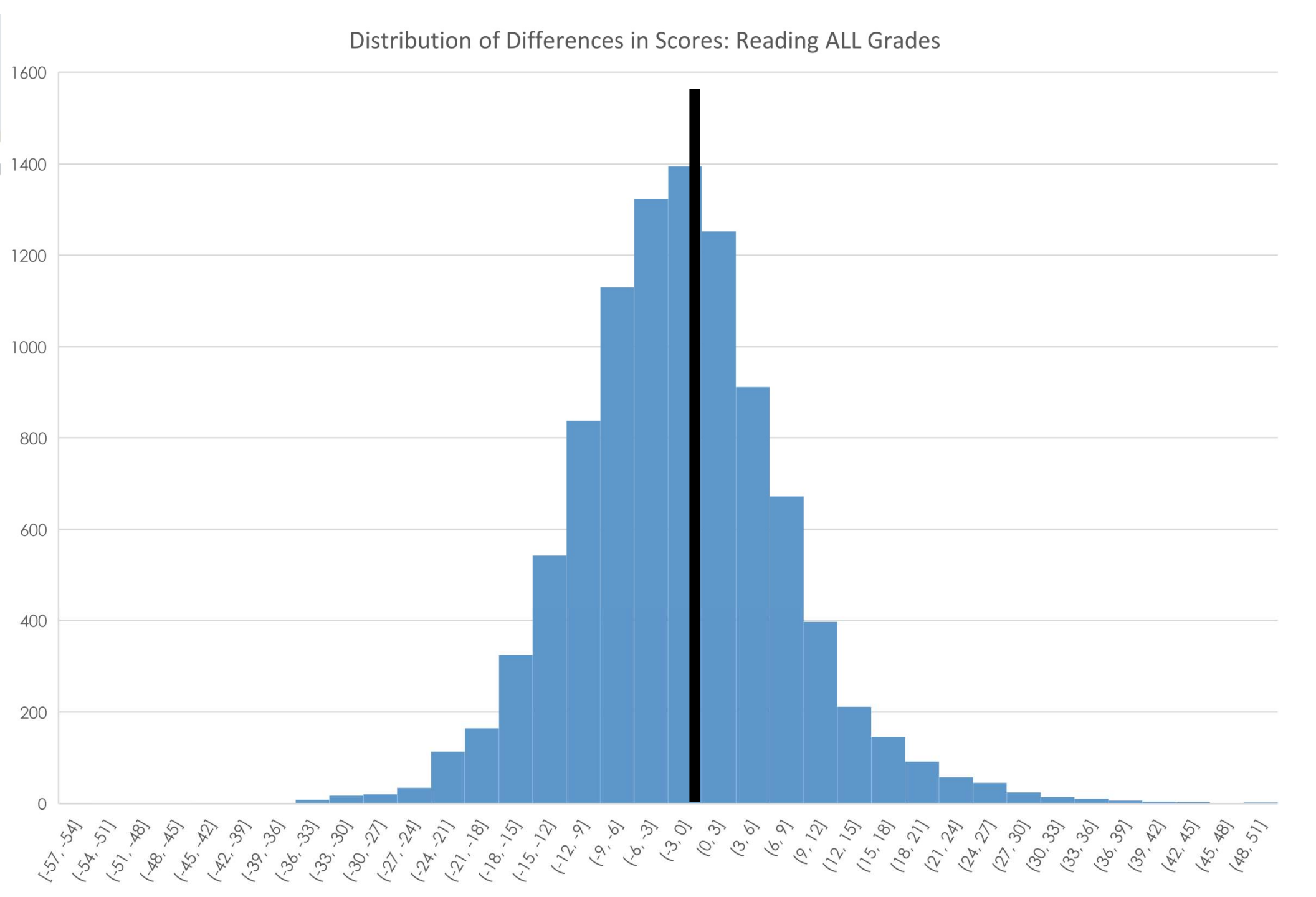

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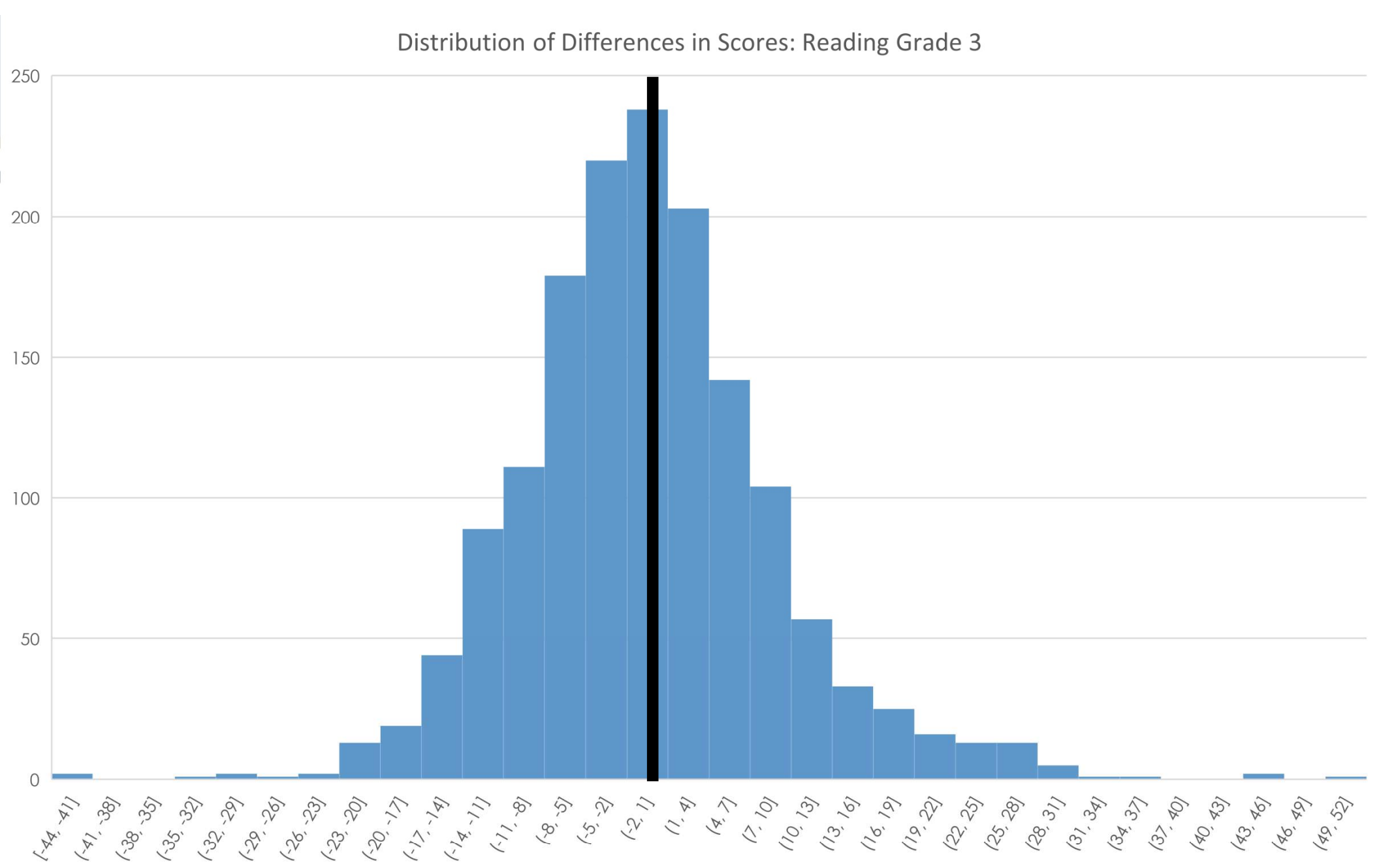
Mean Difference (MTYA - MAP) = -1.47



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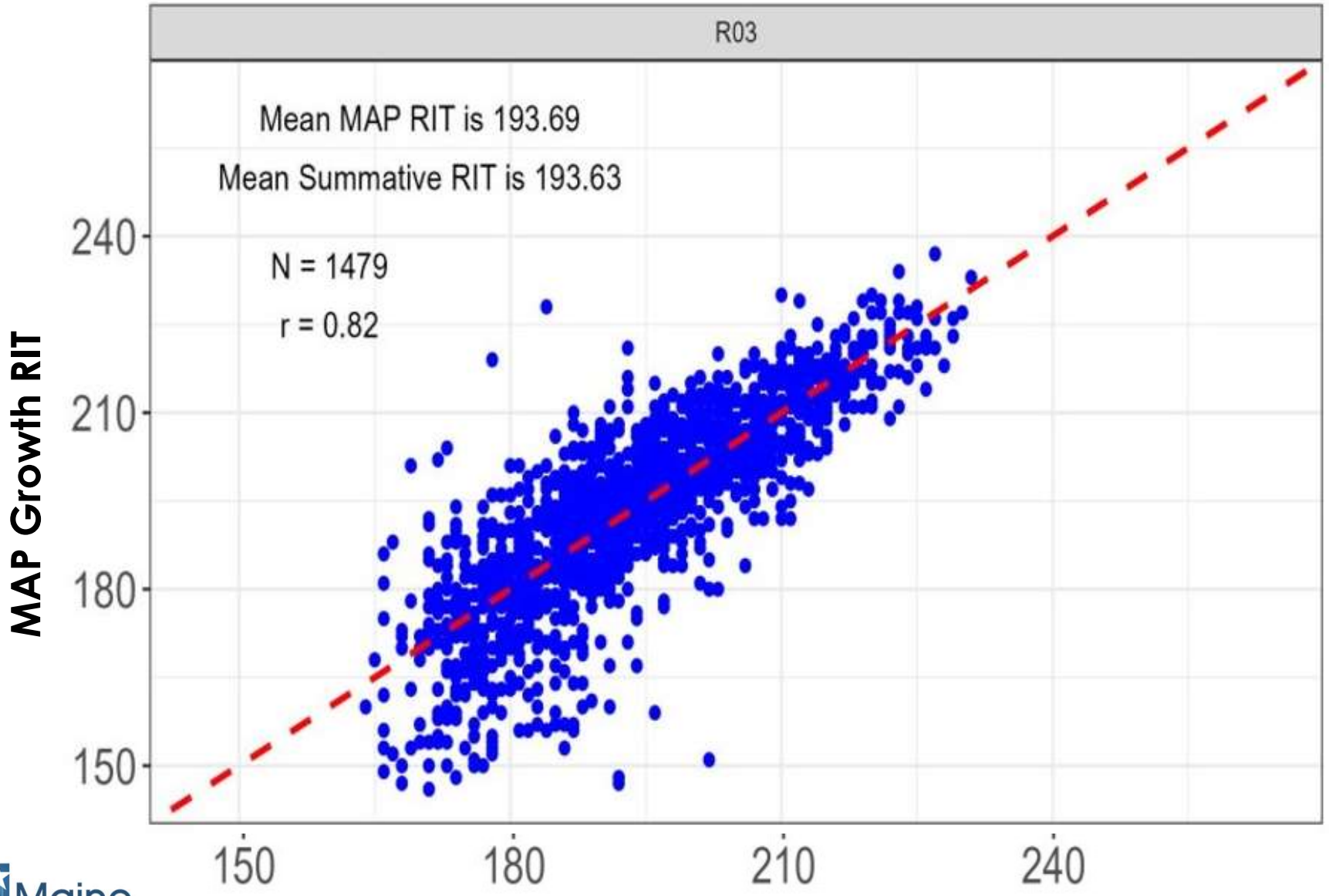
Mean Difference (MTYA - MAP) = +0.07

Reading RIT Score Comparison: Grade 3



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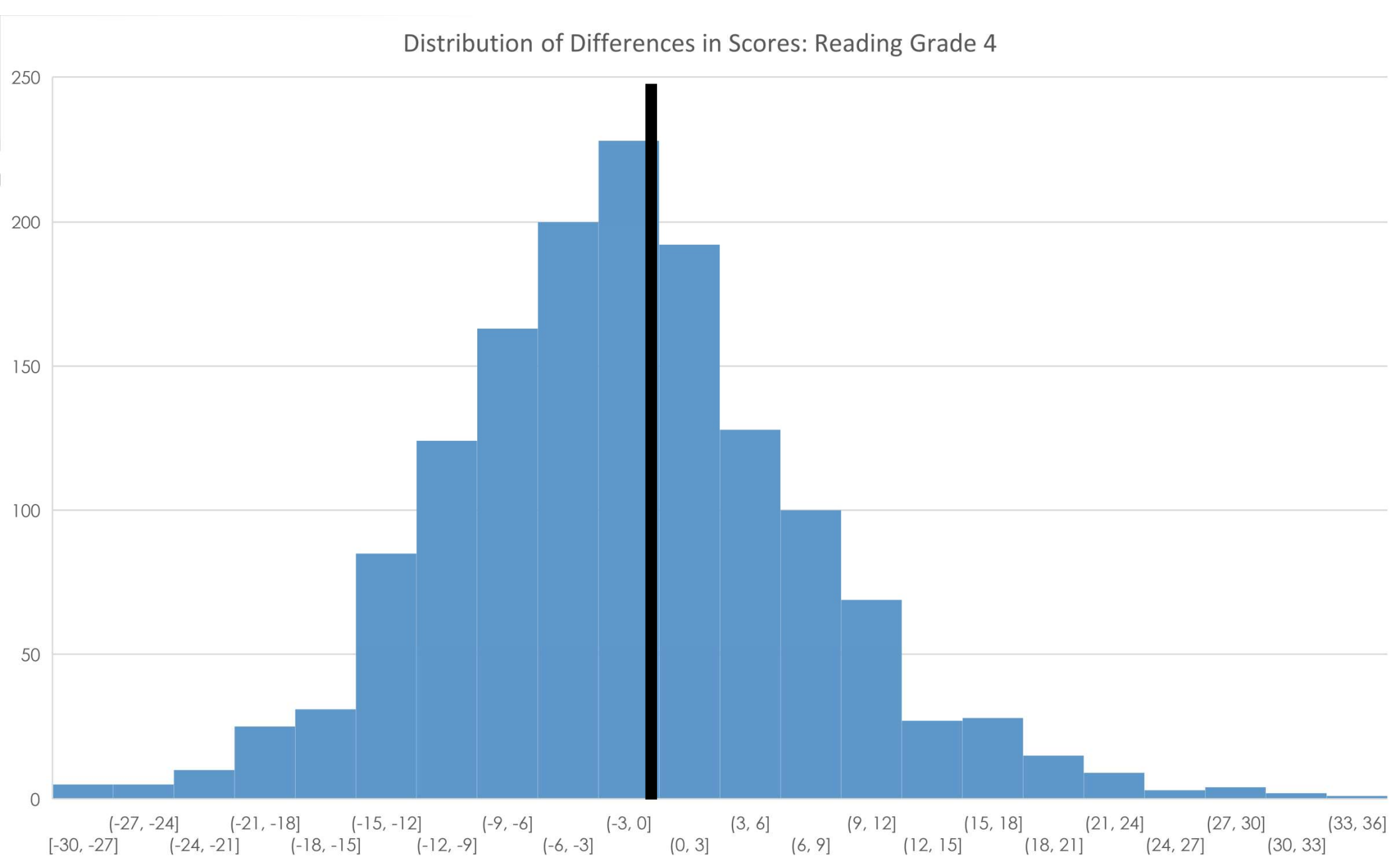

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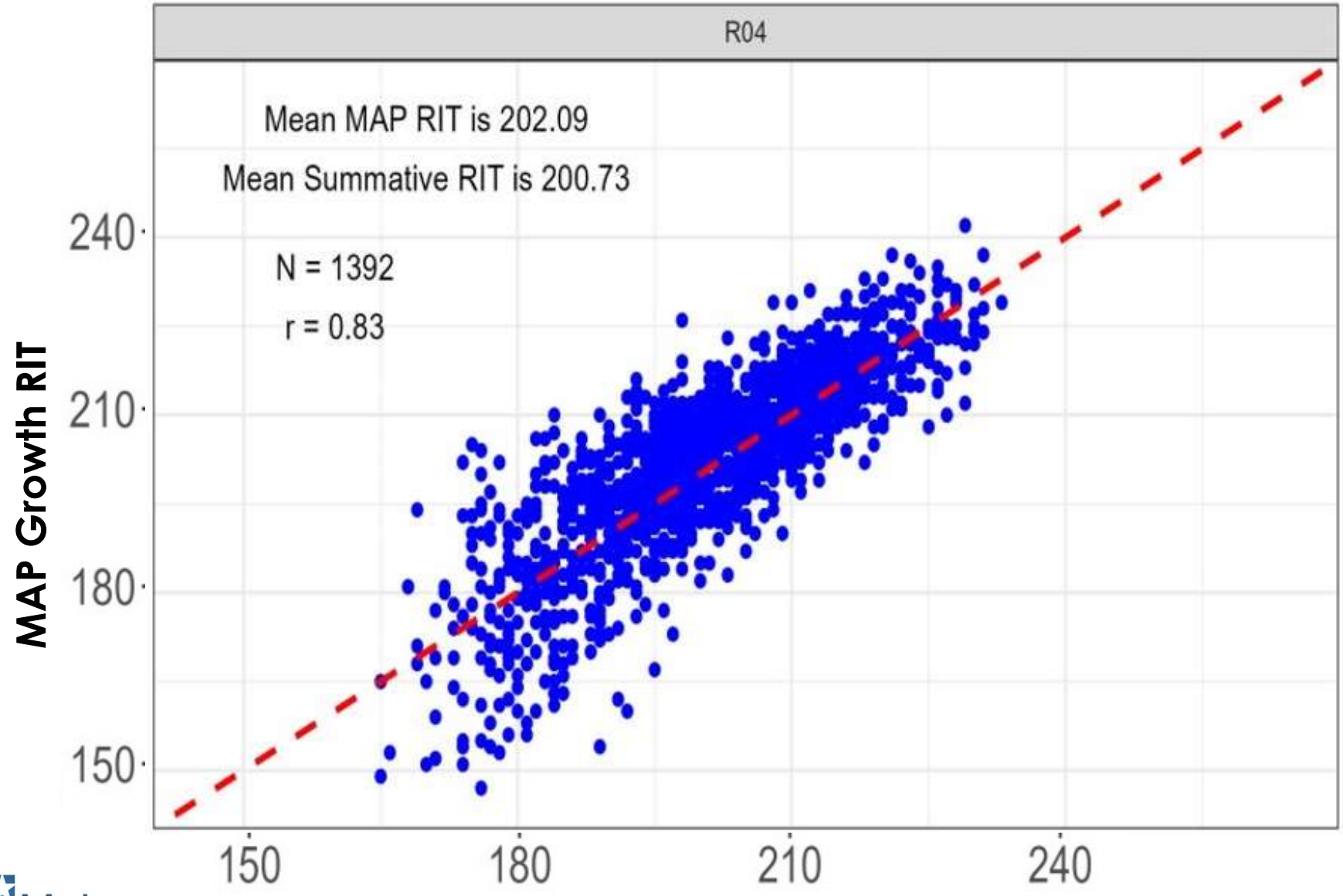
Mean Difference (MTYA - MAP) = -1.15

Reading RIT Score Comparison: Grade 4



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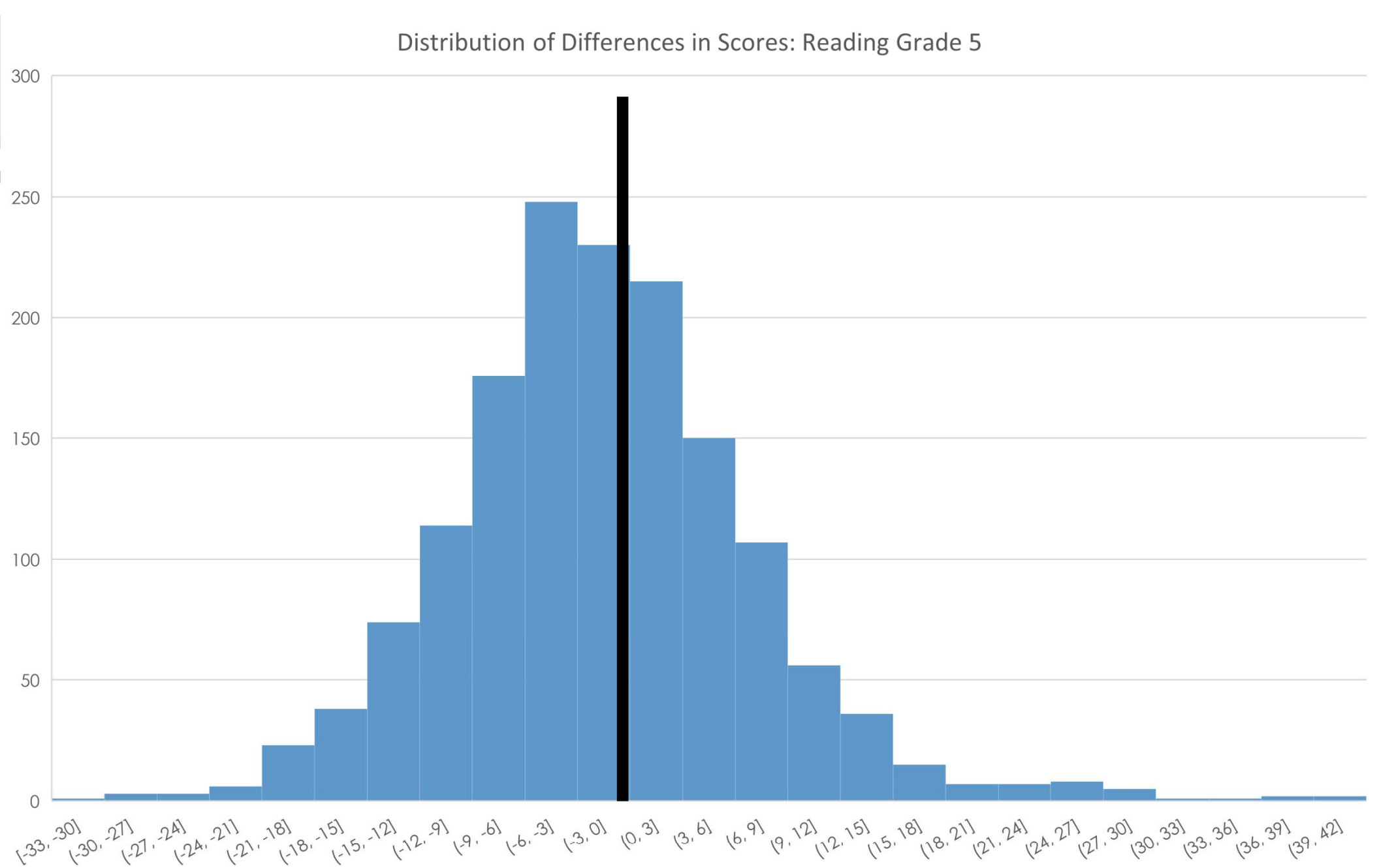

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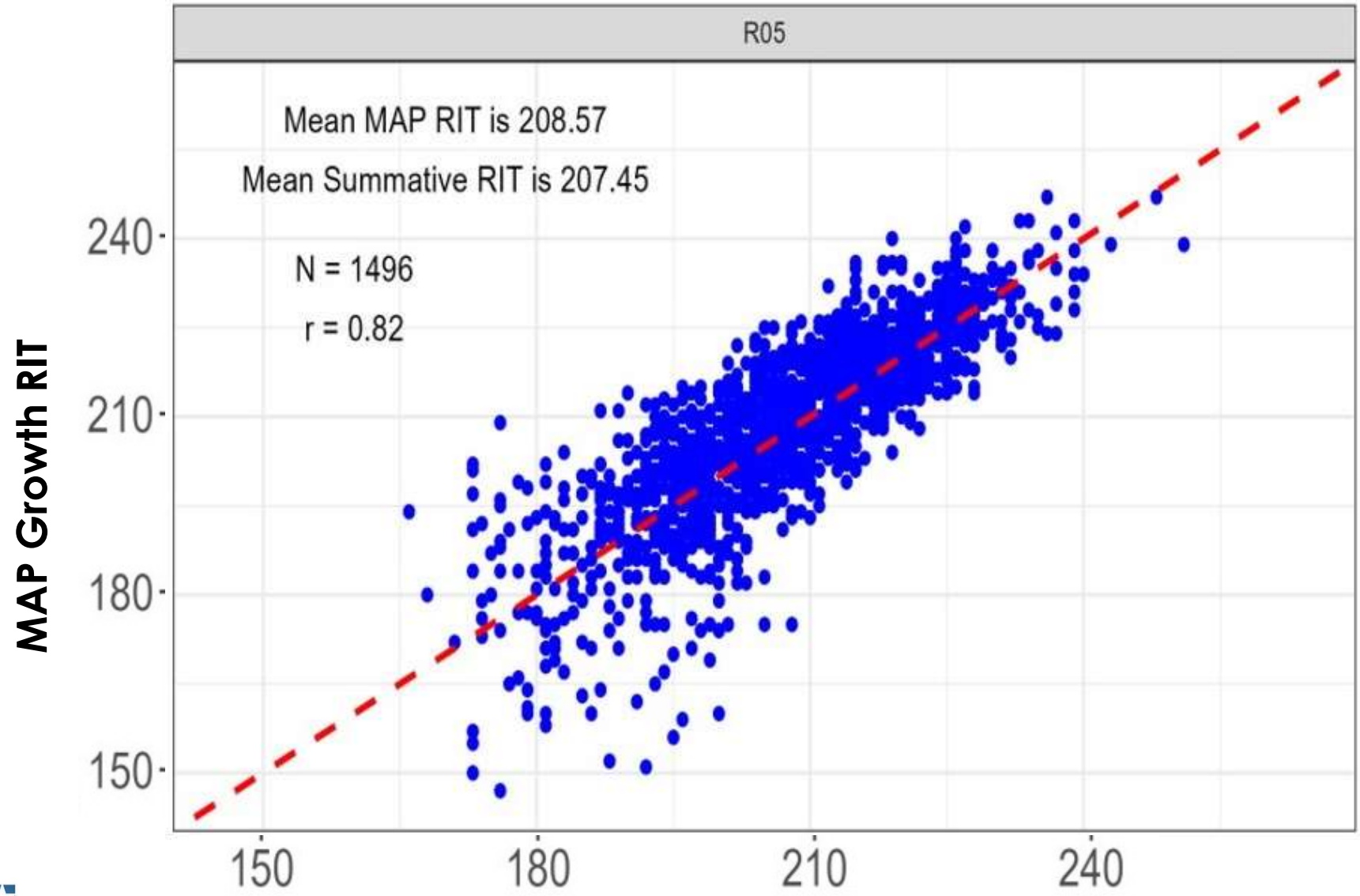
Mean Difference (MTYA - MAP) = -1.07

Reading RIT Score Comparison: Grade 5



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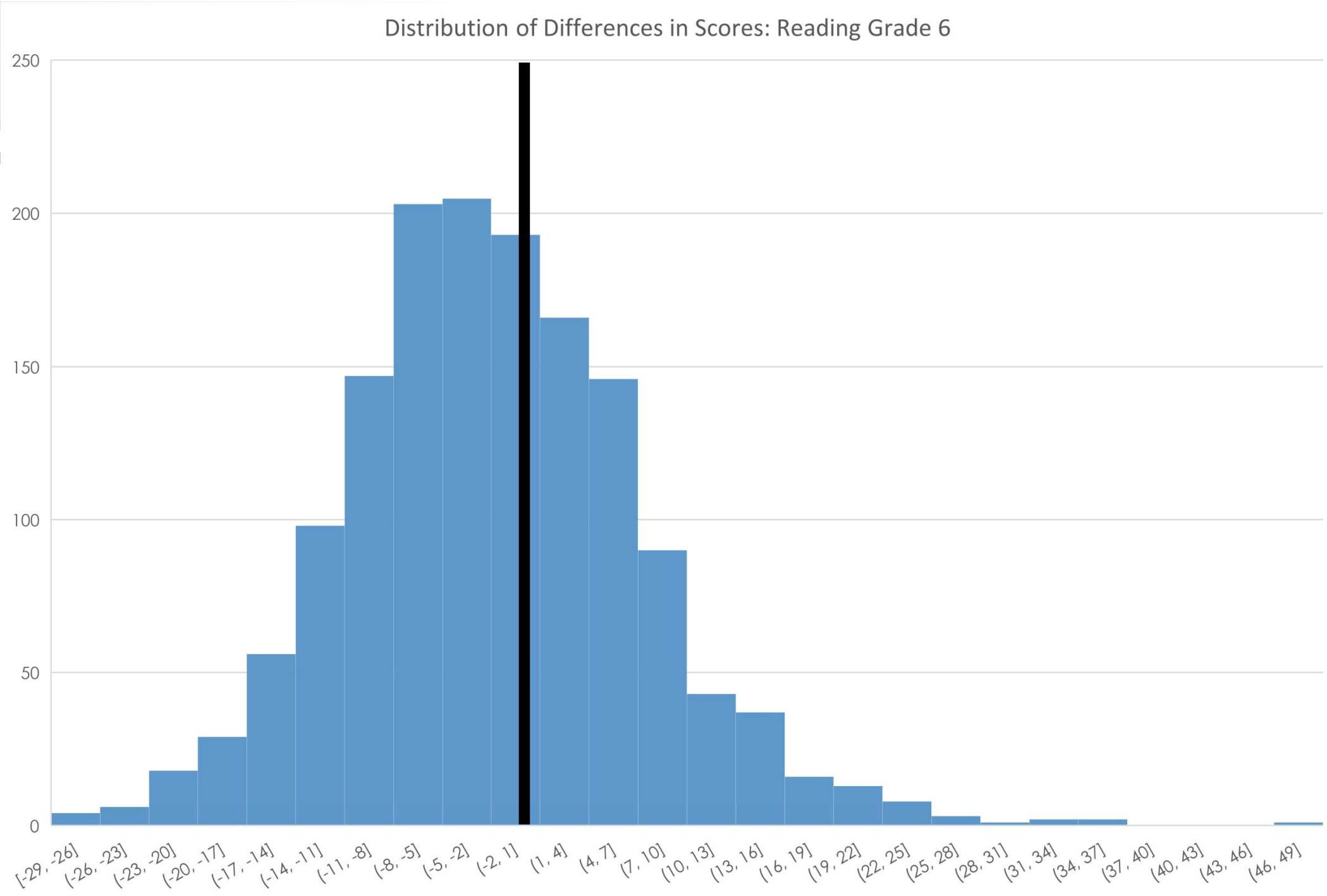

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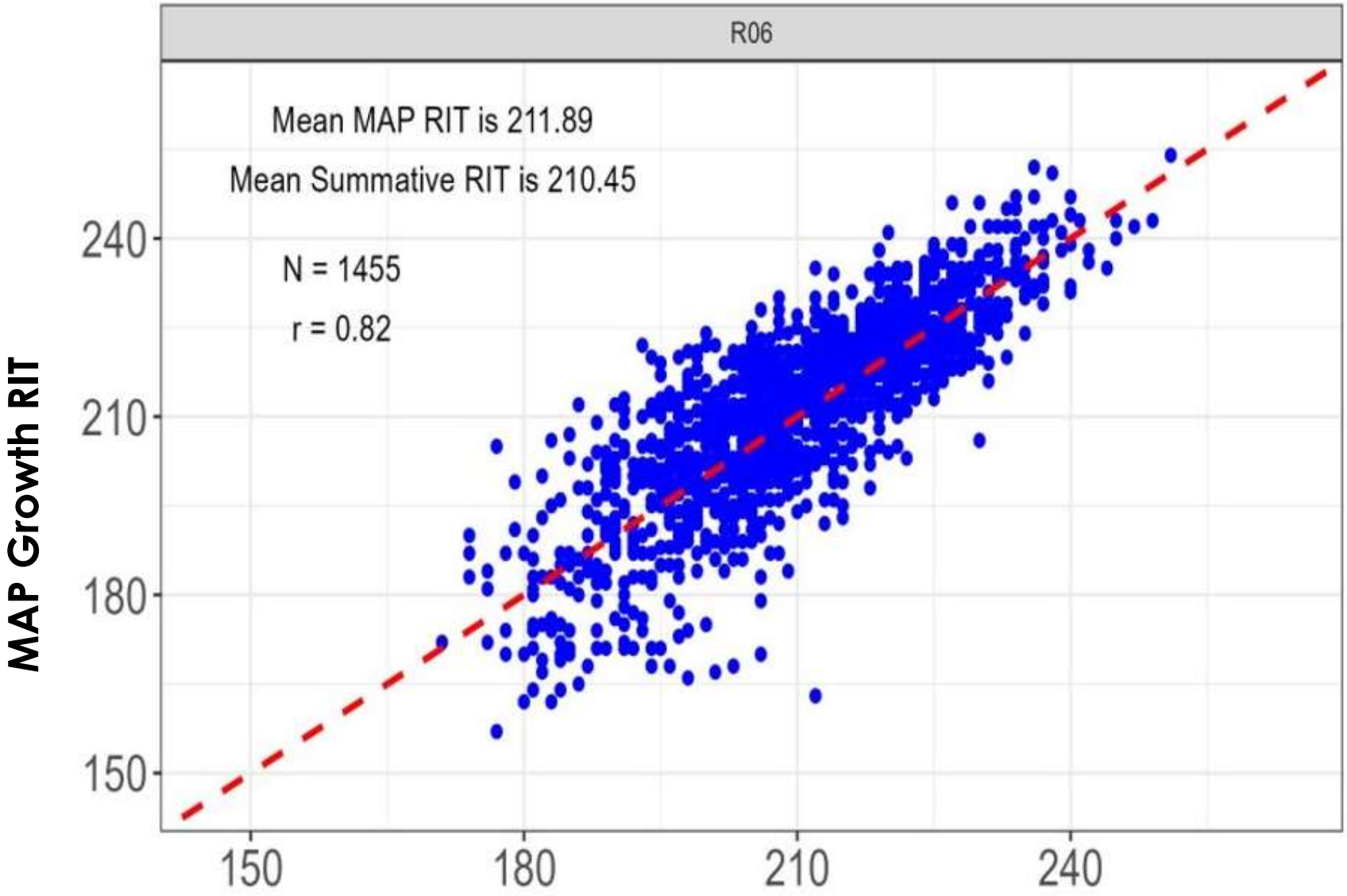
Mean Difference (MTYA - MAP) = -1.37

Reading RIT Score Comparison: Grade 6



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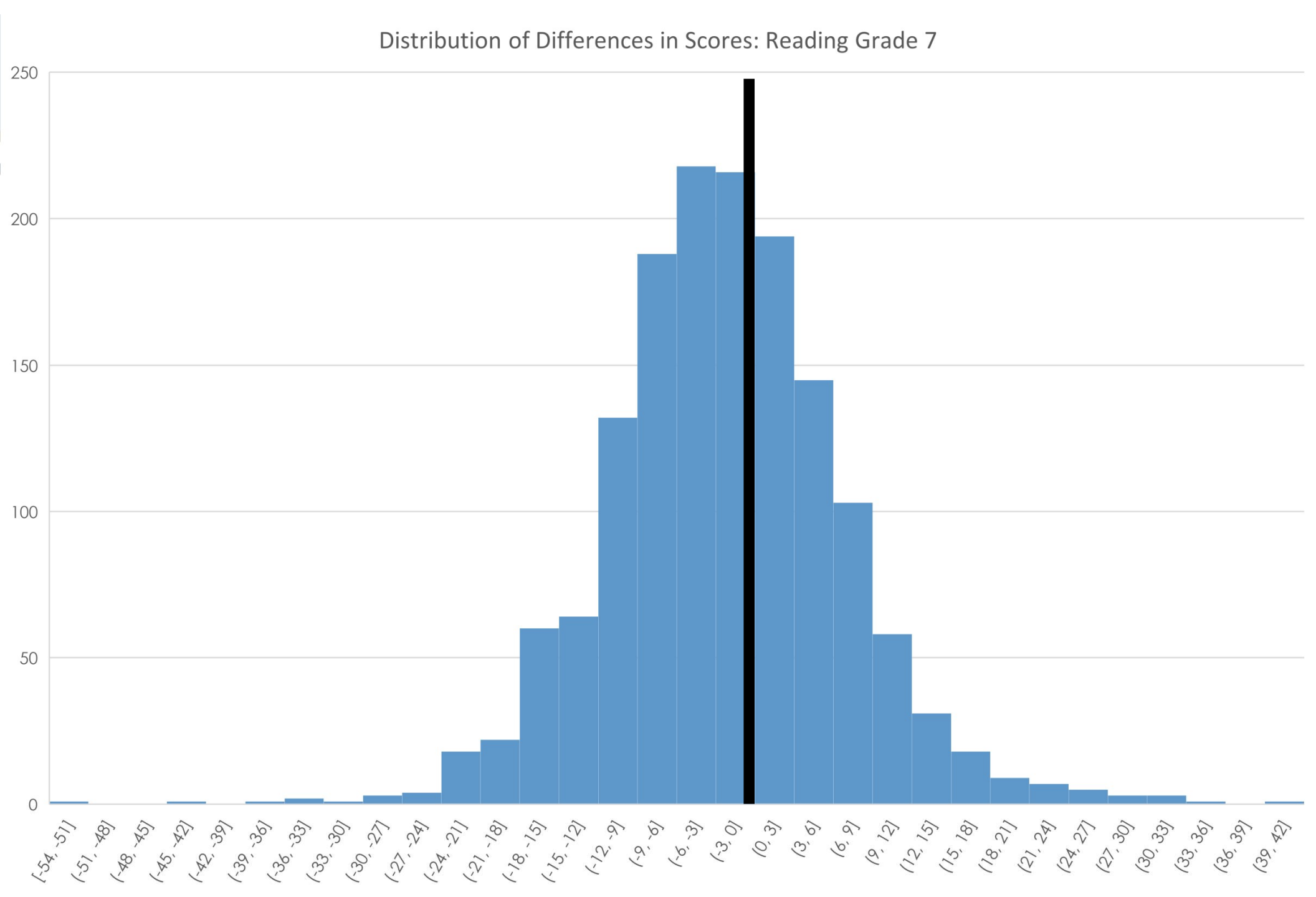

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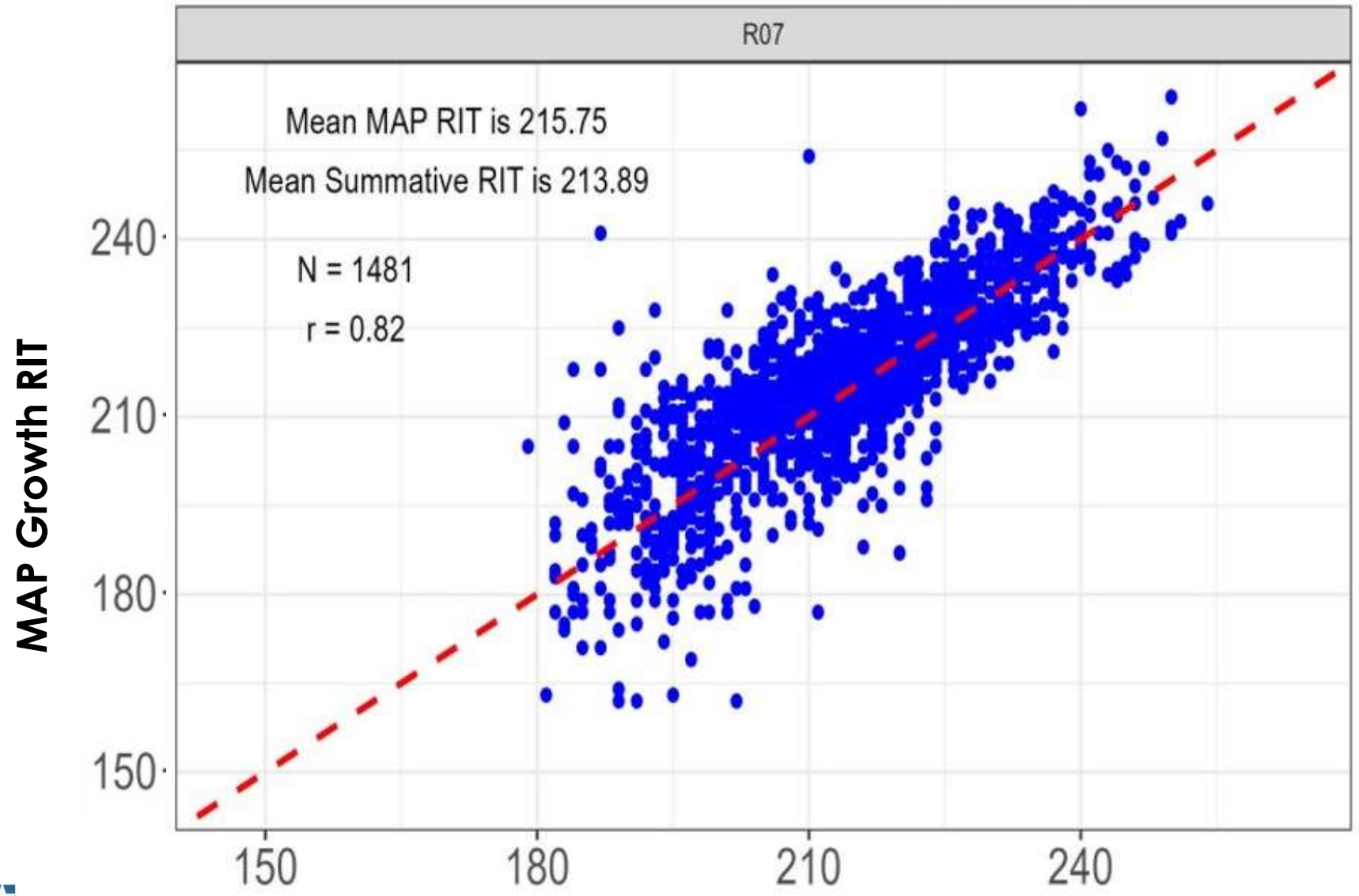
Mean Difference (MTYA - MAP) = -1.82

Reading RIT Score Comparison: Grade 7



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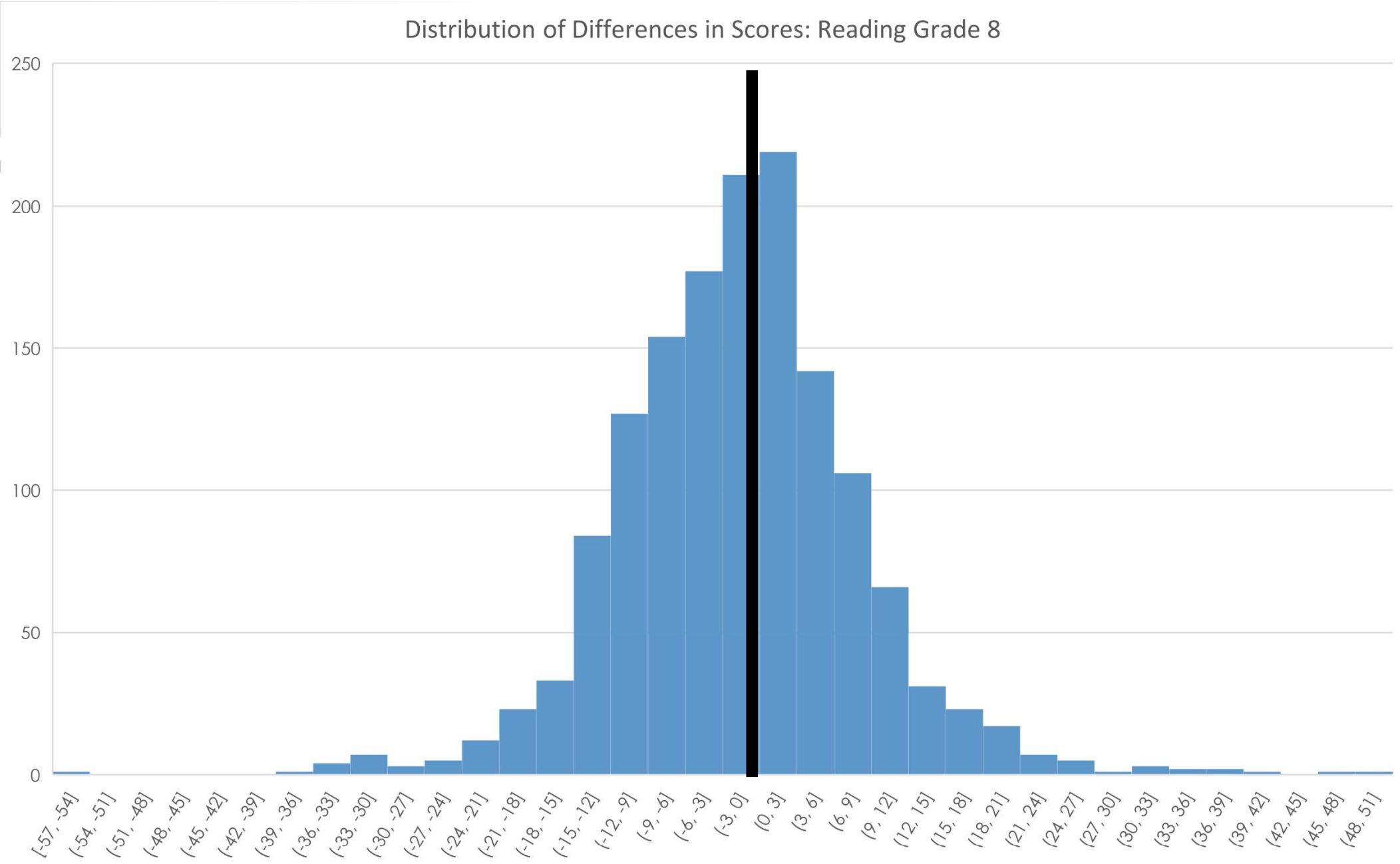

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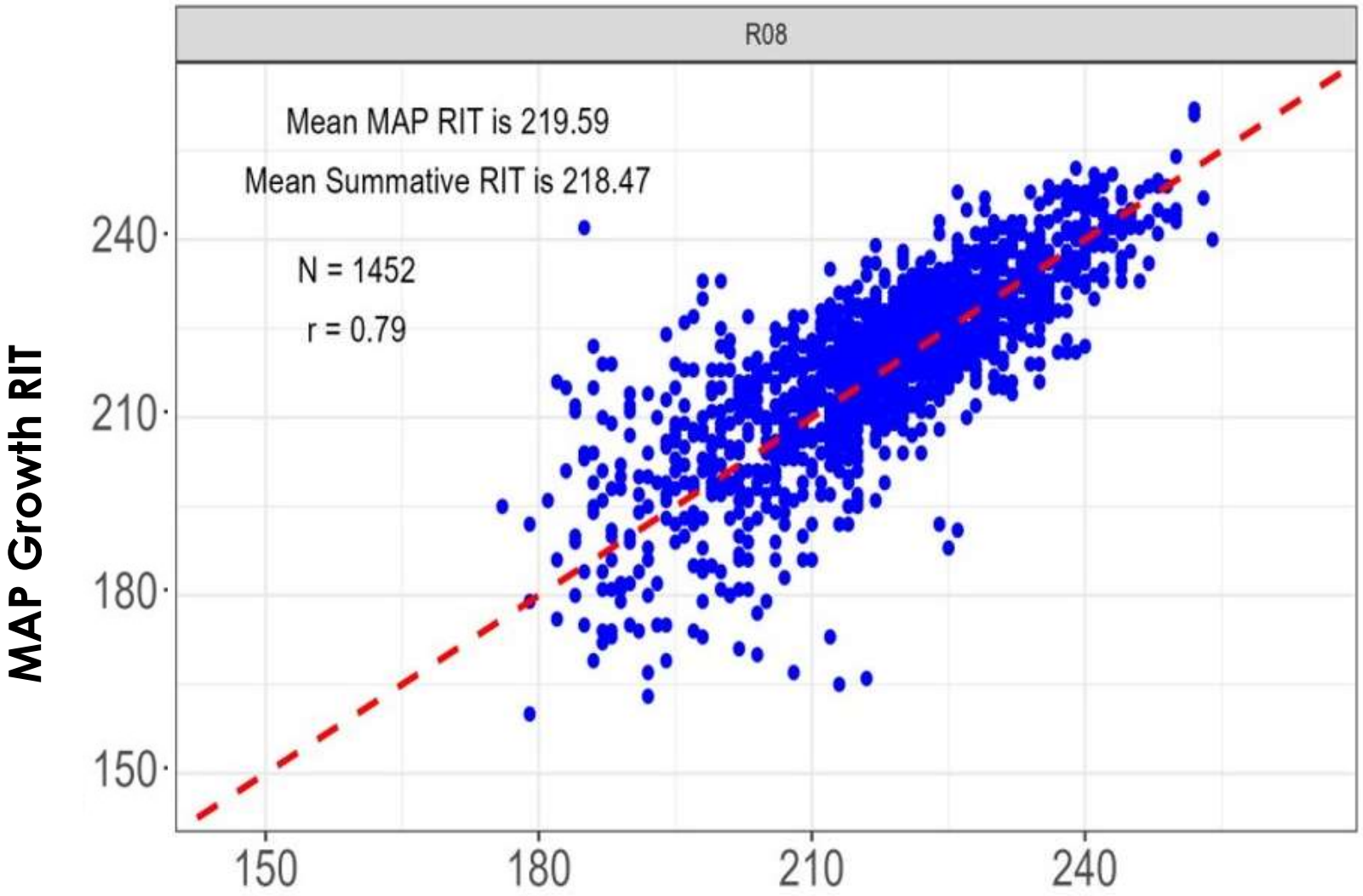
Mean Difference (MTYA - MAP) = -1.11

Reading RIT Score Comparison: Grade 8



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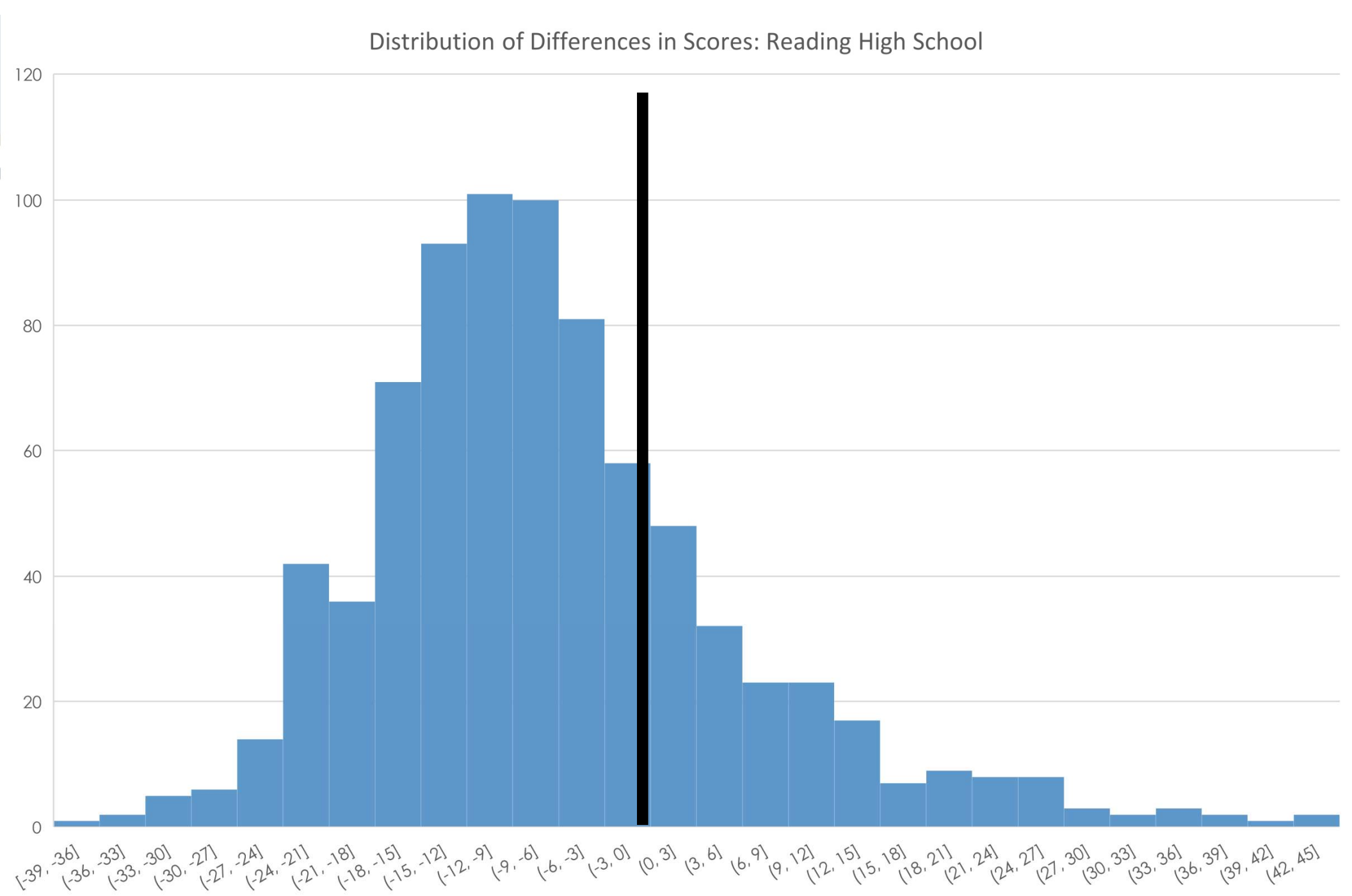

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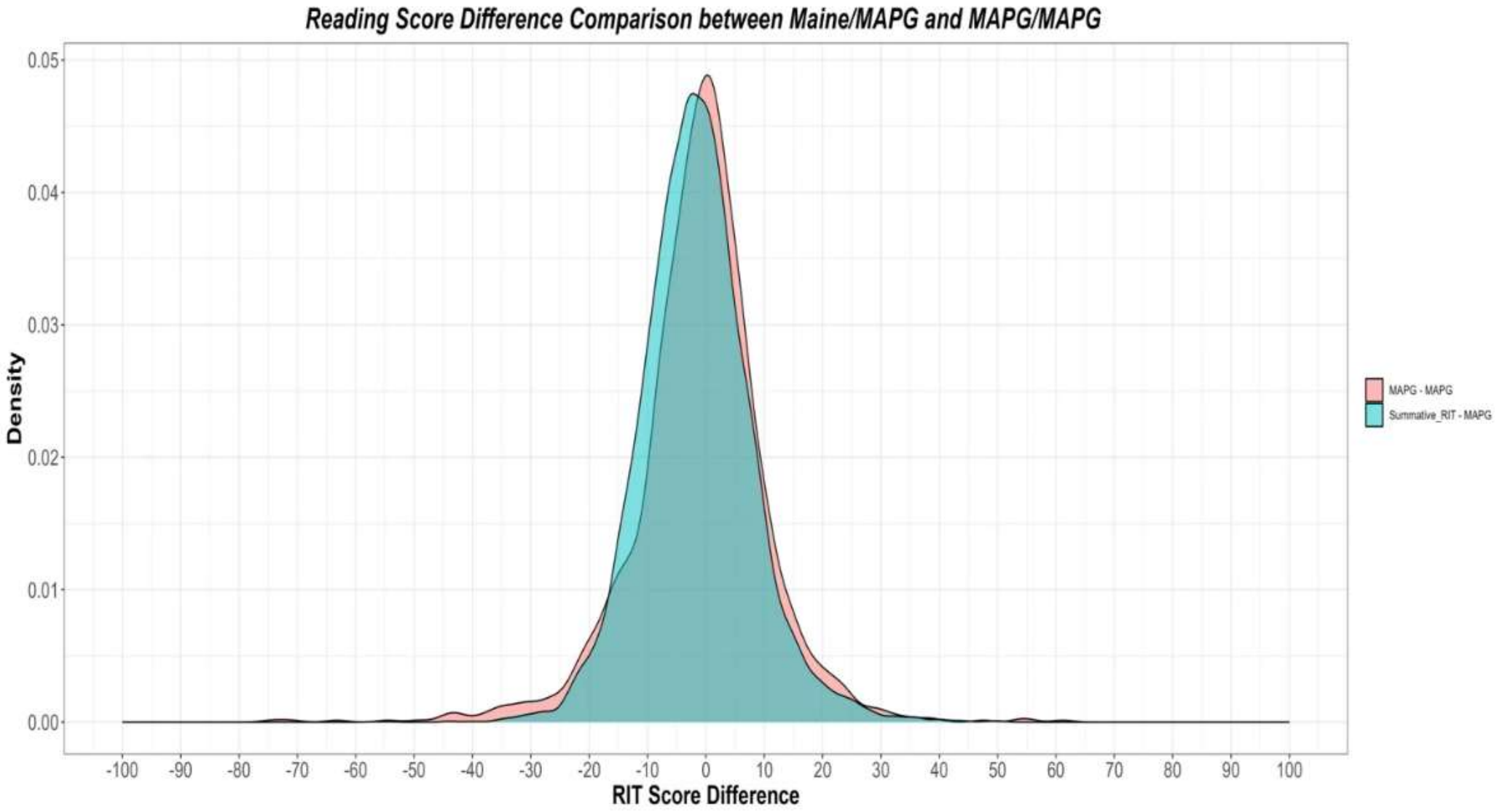
Mean Difference (MTYA - MAP) = -5.94

RIT Score Difference Comparison



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What are the next steps to improve comparability for Reading RIT?

- All Grades
  - Addition of stand-alone items that are not linked to a lengthy reading passage
  - All items in NWEA's through-year, summative item bank are linked to reading passages
  - Will need to pull standalone items from the MAP Growth item bank for the diagnostic portion of the assessment

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What are the next steps to improve comparability for Reading RIT?

- High School
  - Operational field test
    - NWEA's other through-year assessment state partners do not use NWEA for their high school assessments.
    - All summative questions were new and never previously administered to students.
    - Given the timeline for submission of evidence to US DOE for peer review, a true field test was not possible.
  - Maine DOE is requesting that NWEA re-examine the RIT score alignment of the high school reading summative questions.
    - Discrepancy between students' performance according to RIT and Maine-specific scaled scores
    - Results from the summative portion of the assessment indicate that, on average, students in high school performed equally well in Reading as students in other grades.

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Score Comparisons: Mathematics

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Mean Difference in Scores

MATH

Grade	# Students	Ave RIT Diff (MTYA-MAP)
G3	1544	1.60
G4	1441	0.07
G5	1653	-0.10
G6	1557	-1.03
G7	1762	-1.63
G8	1446	-0.37
HS	818	-2.45
ALL	**10221**	**-0.45**

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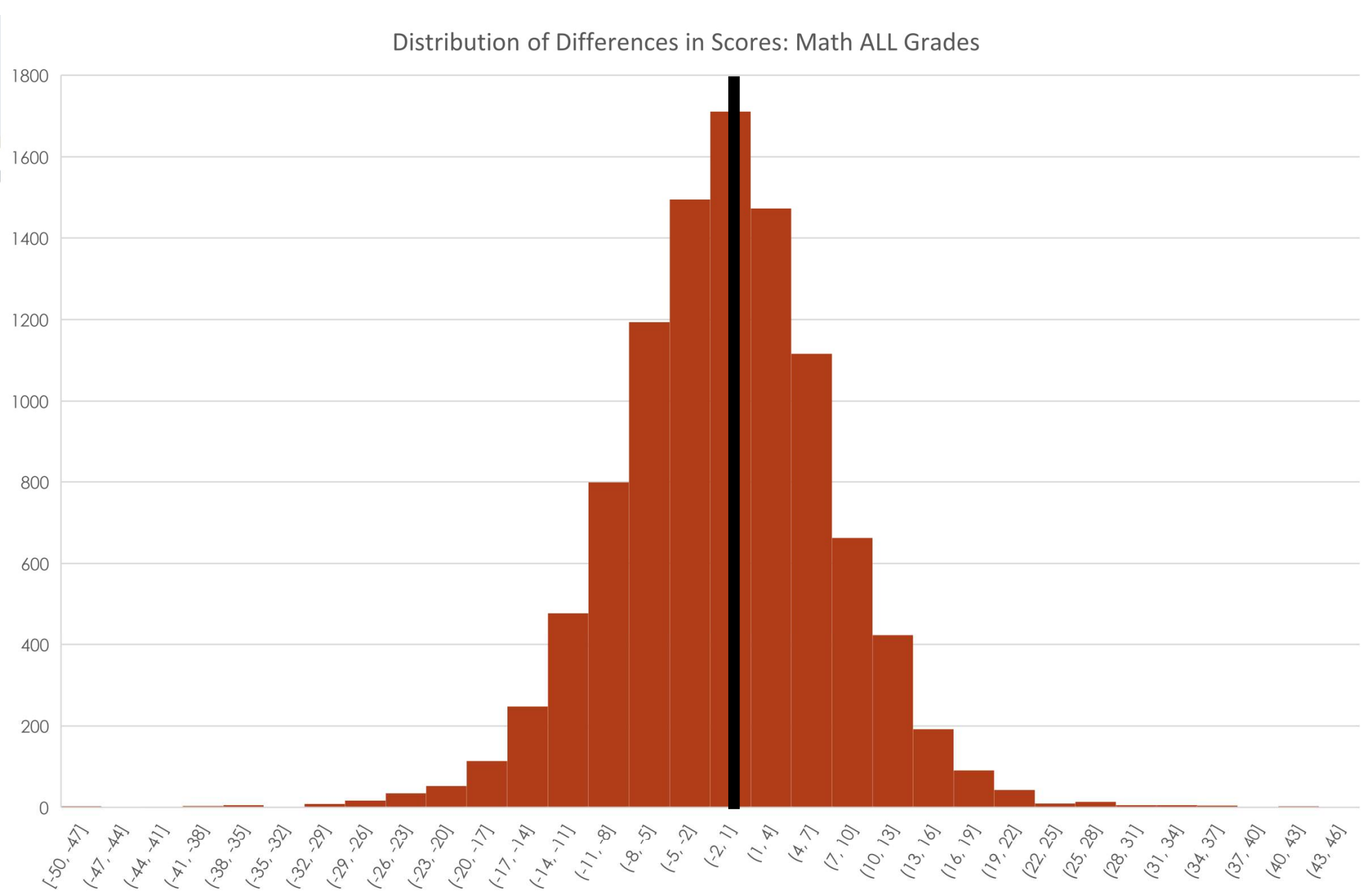

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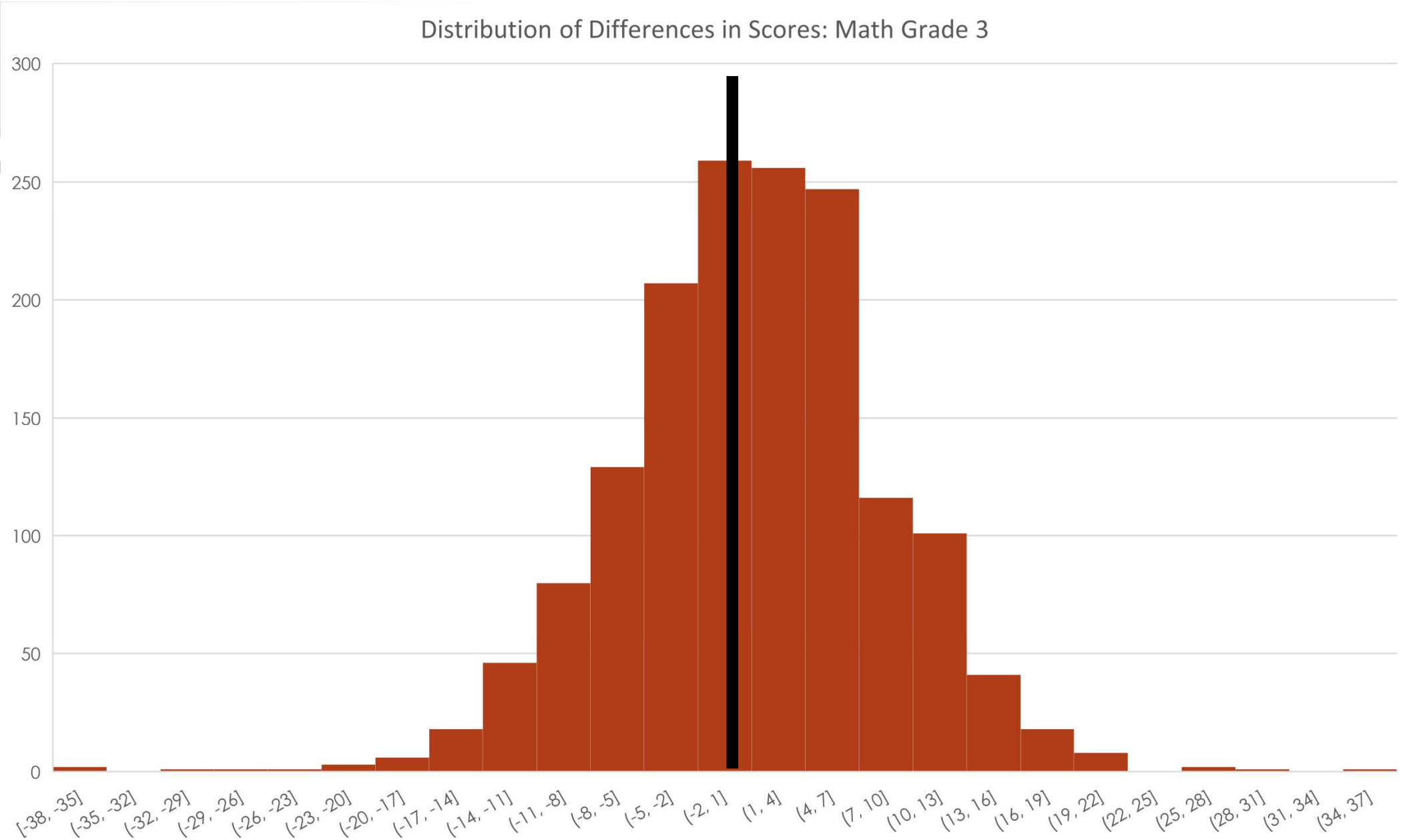
Mean Difference (MTYA - MAP) = -0.45



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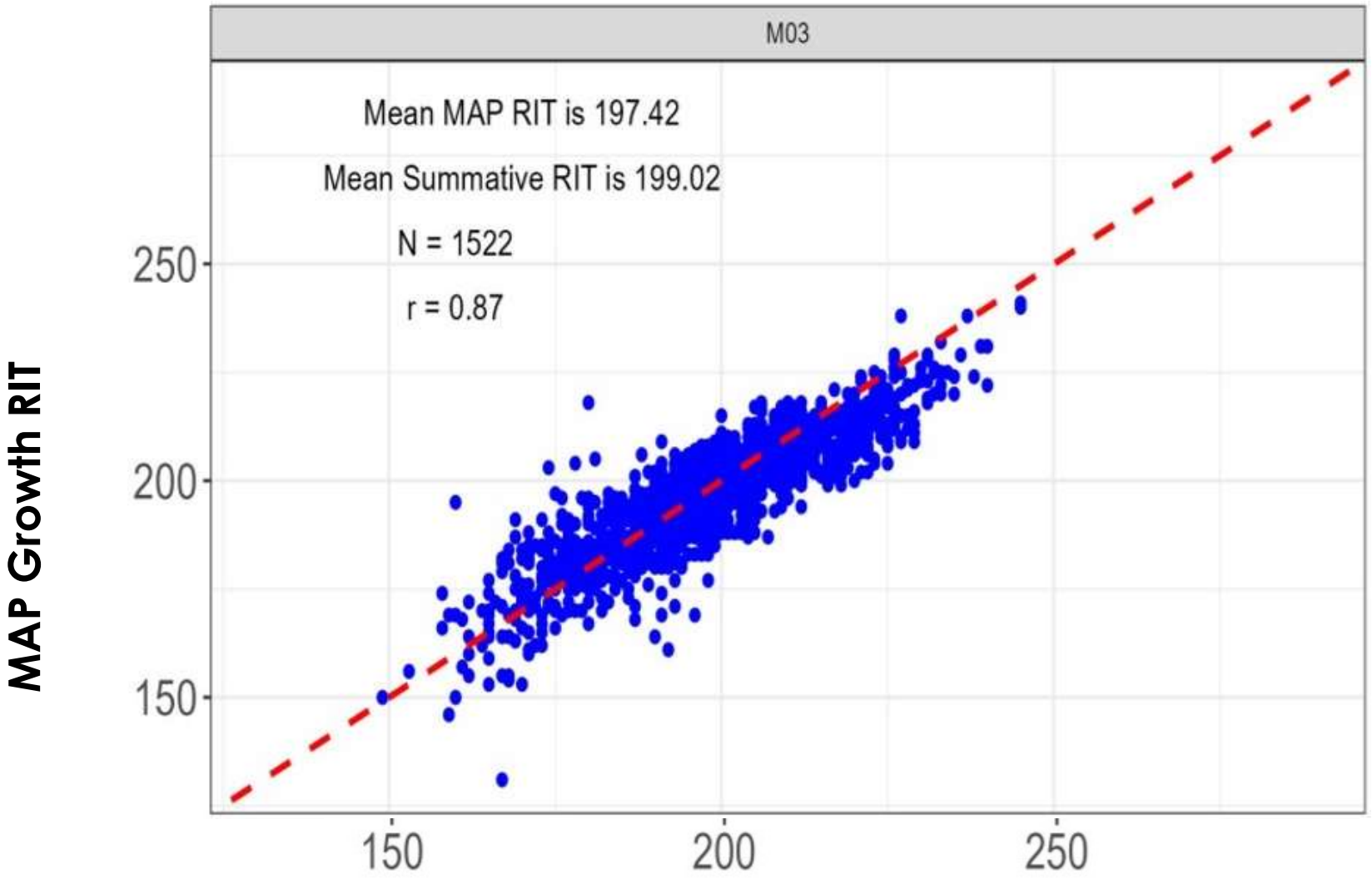
Mean Difference (MTYA - MAP) = +1.60

Math RIT Score Comparison: Grade 3



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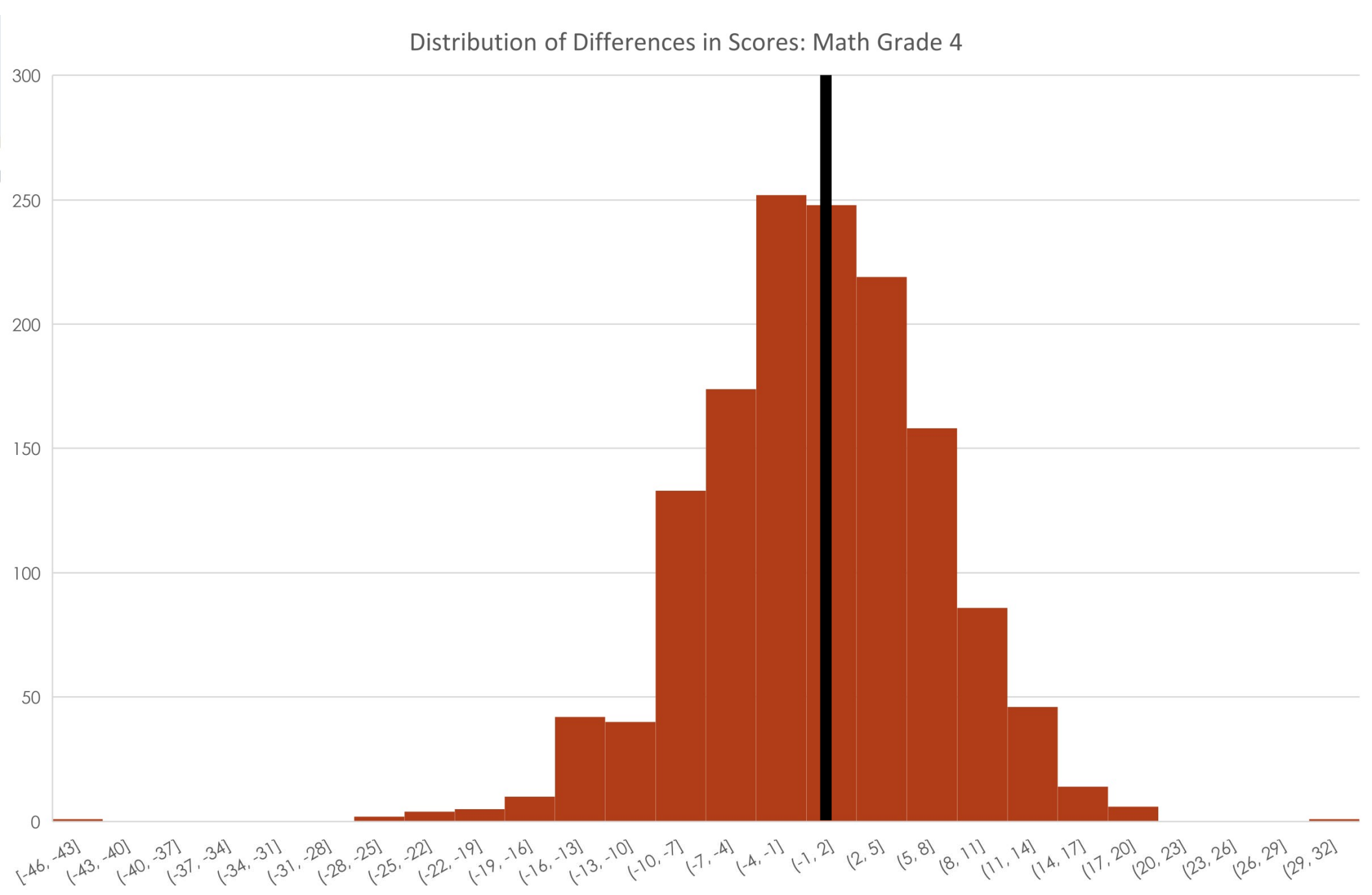

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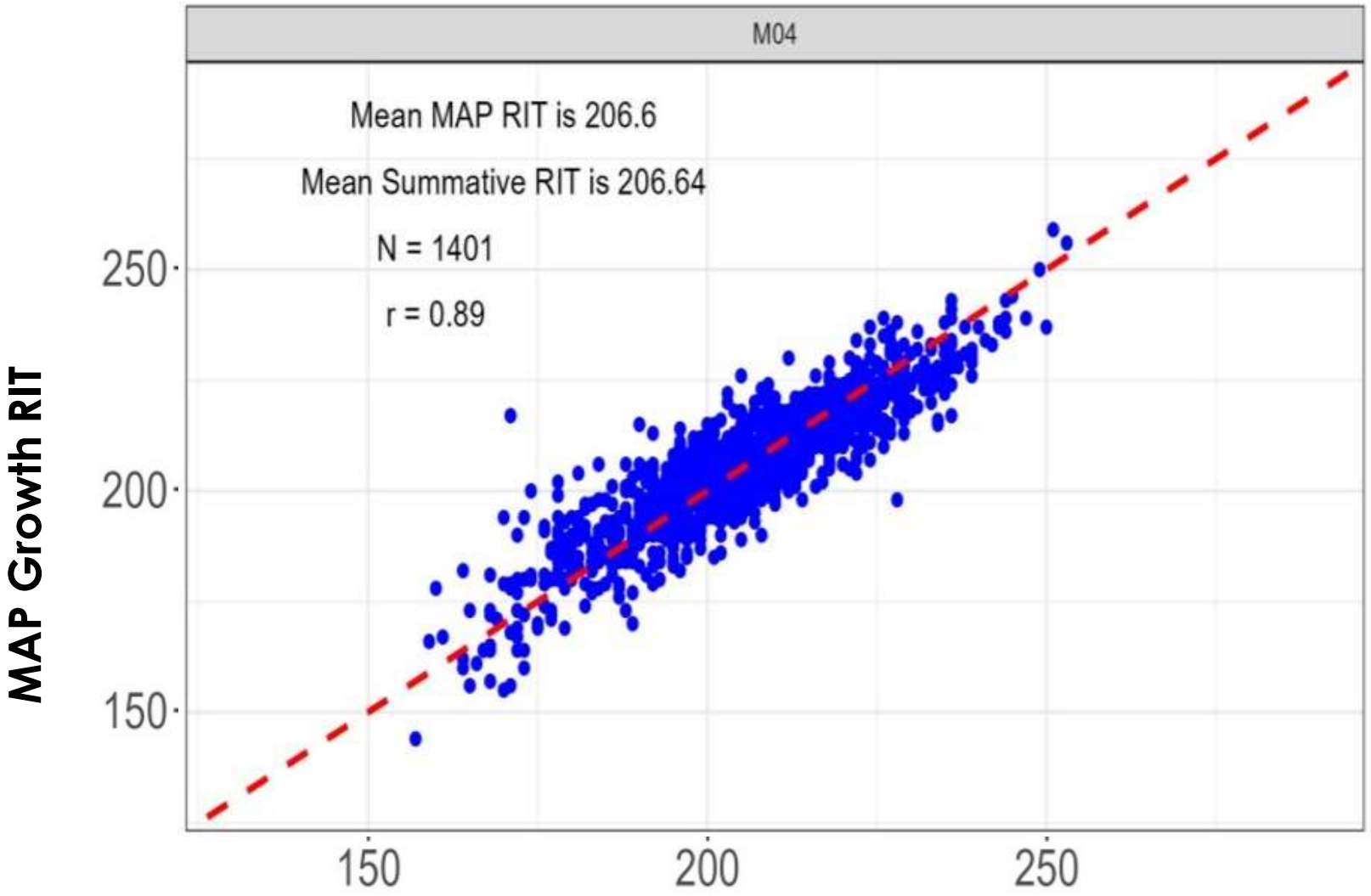
Mean Difference (MTYA - MAP) = +0.07

Math RIT Score Comparison: Grade 4



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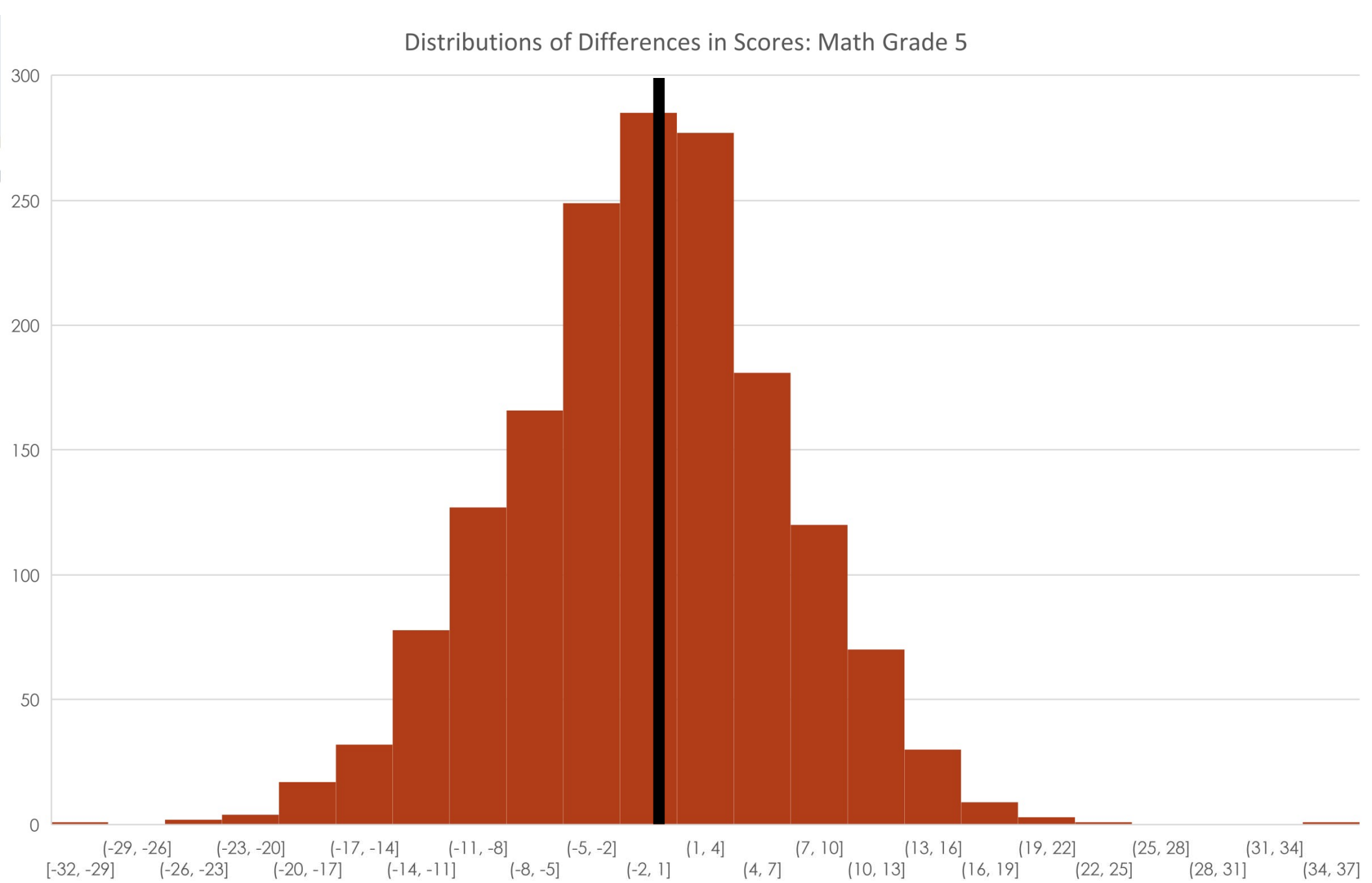

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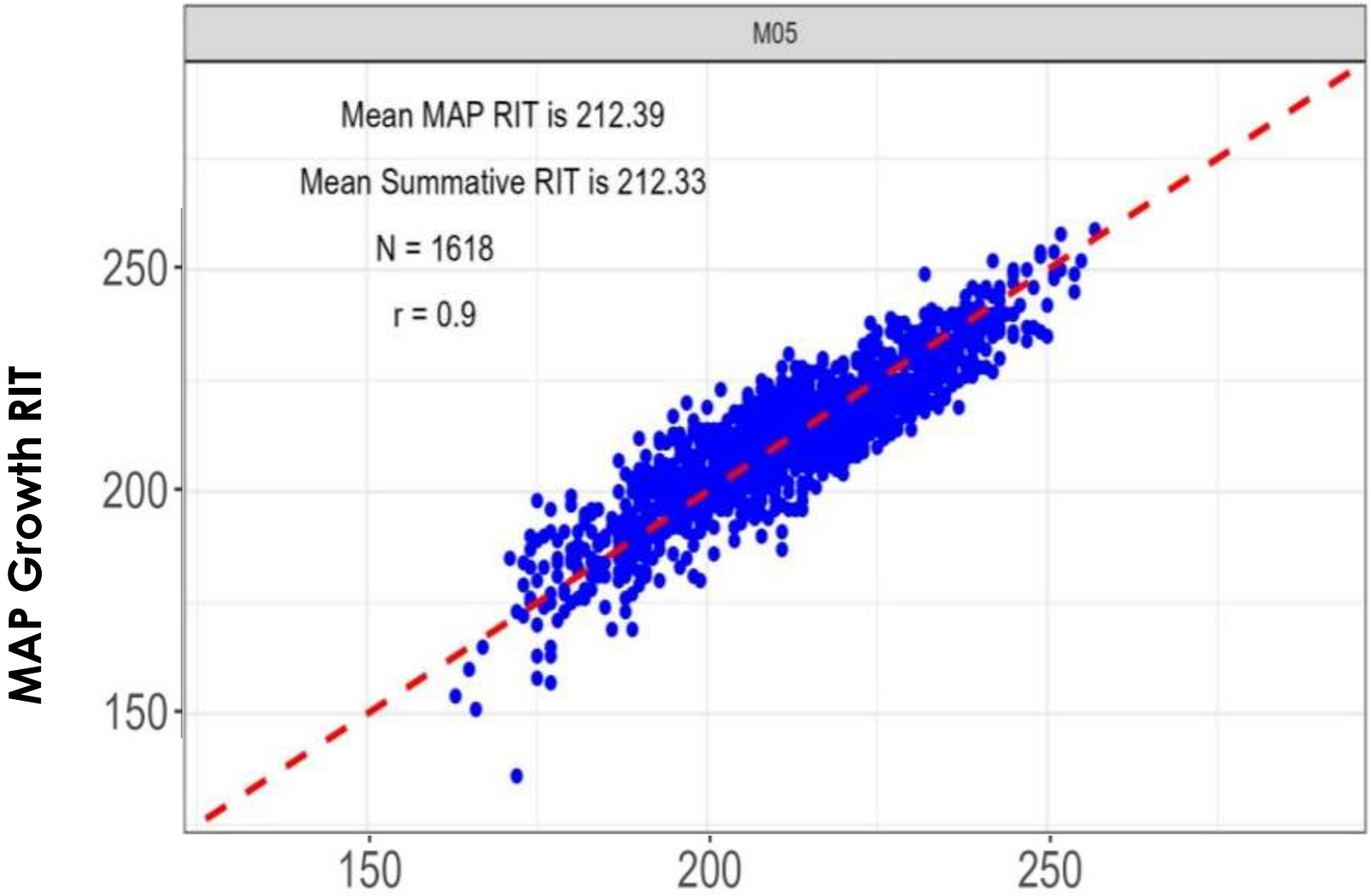
Mean Difference (MTYA - MAP) = -0.10

Math RIT Score Comparison: Grade 5



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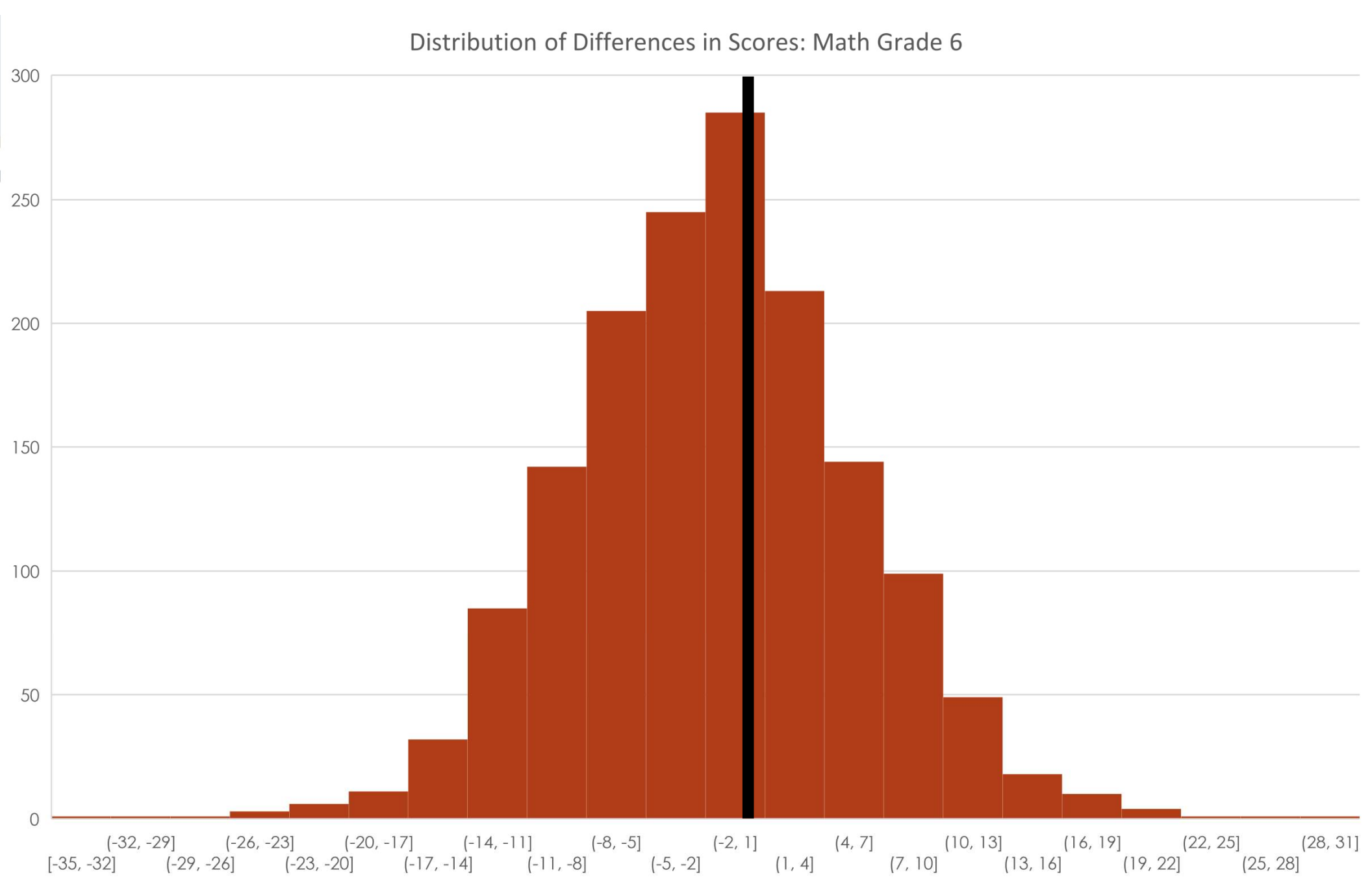

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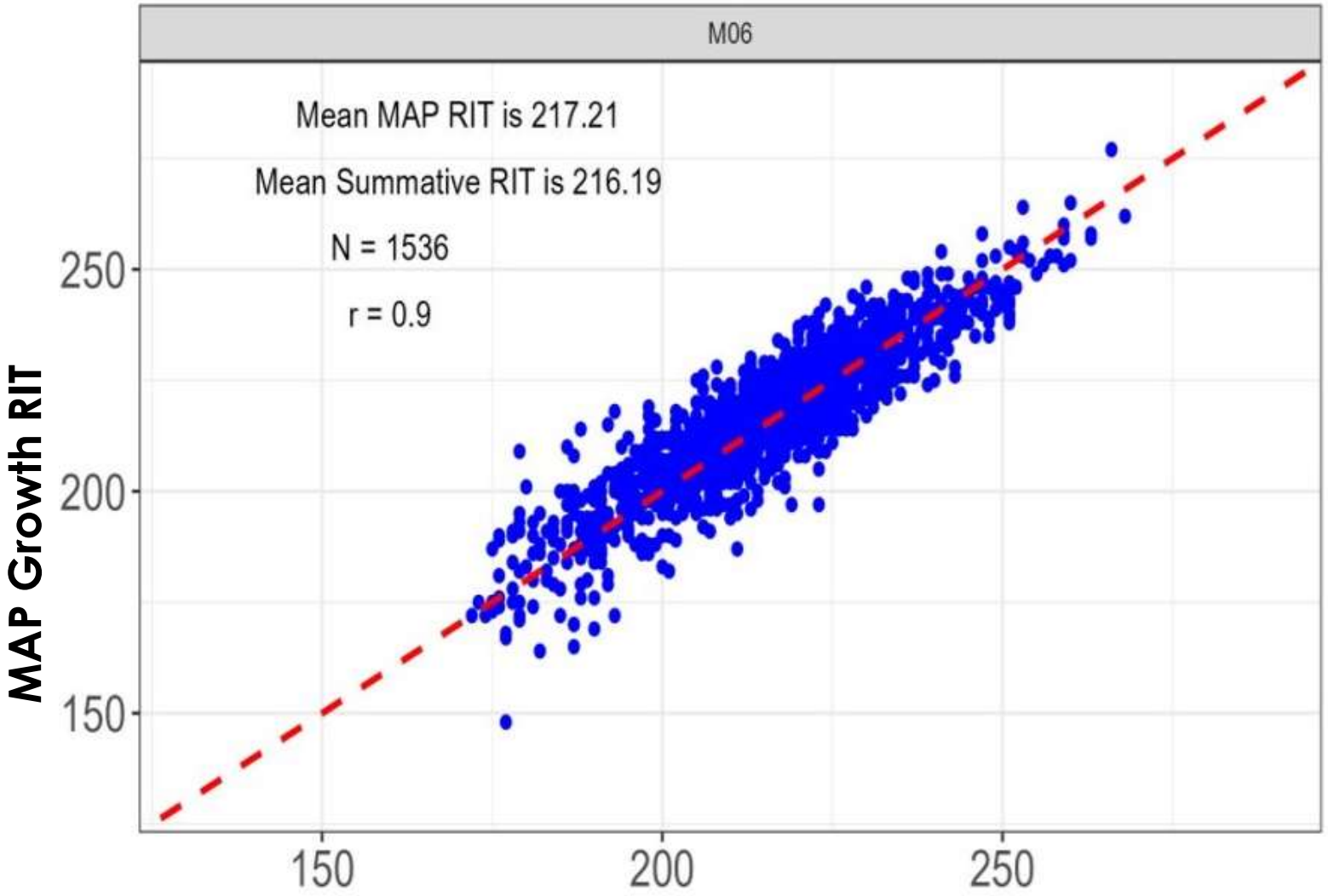
Mean Difference (MTYA - MAP) = -1.03

Math RIT Score Comparison: Grade 6



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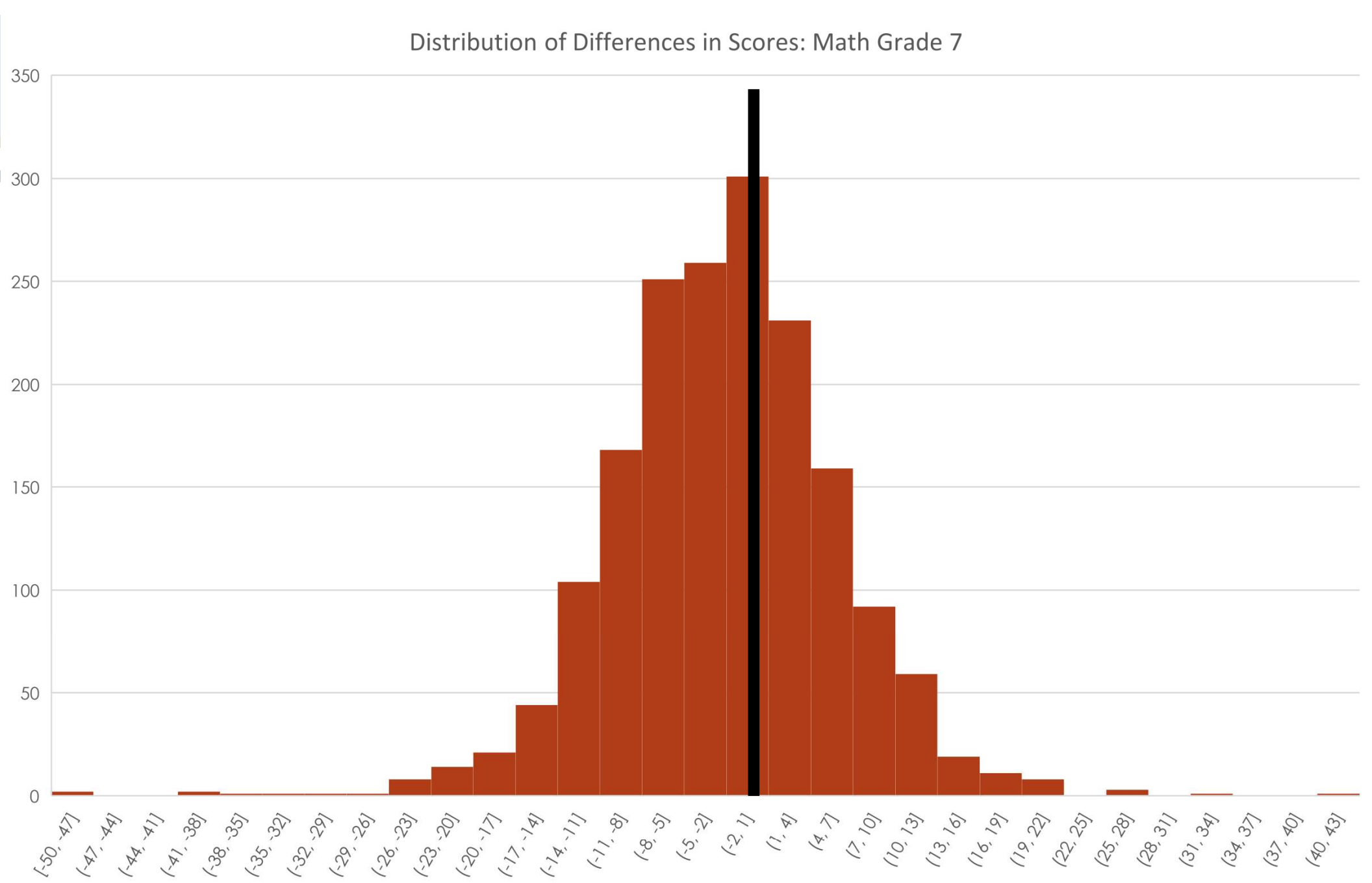

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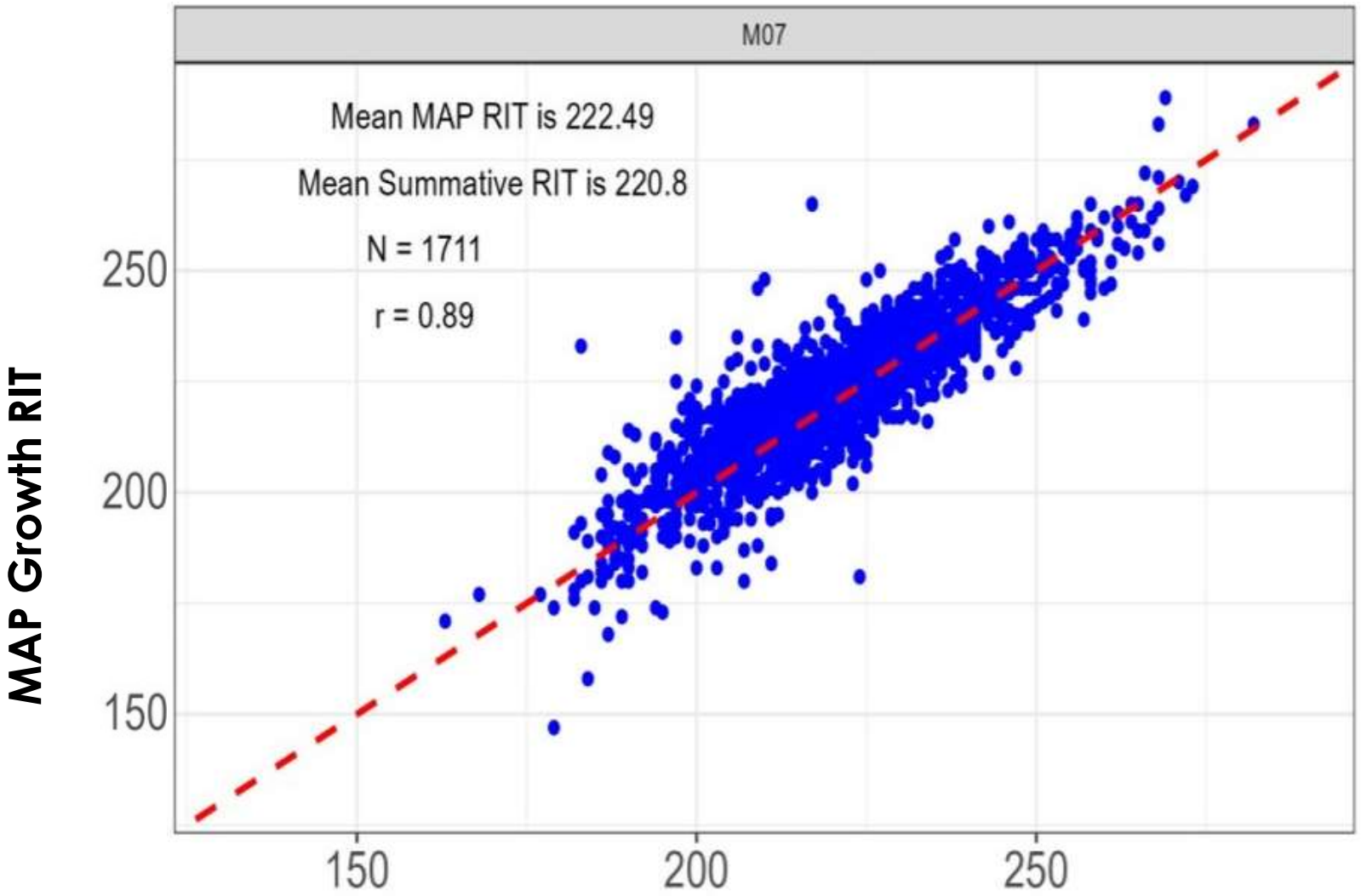
Mean Difference (MTYA - MAP) = -1.63

Math RIT Score Comparison: Grade 7



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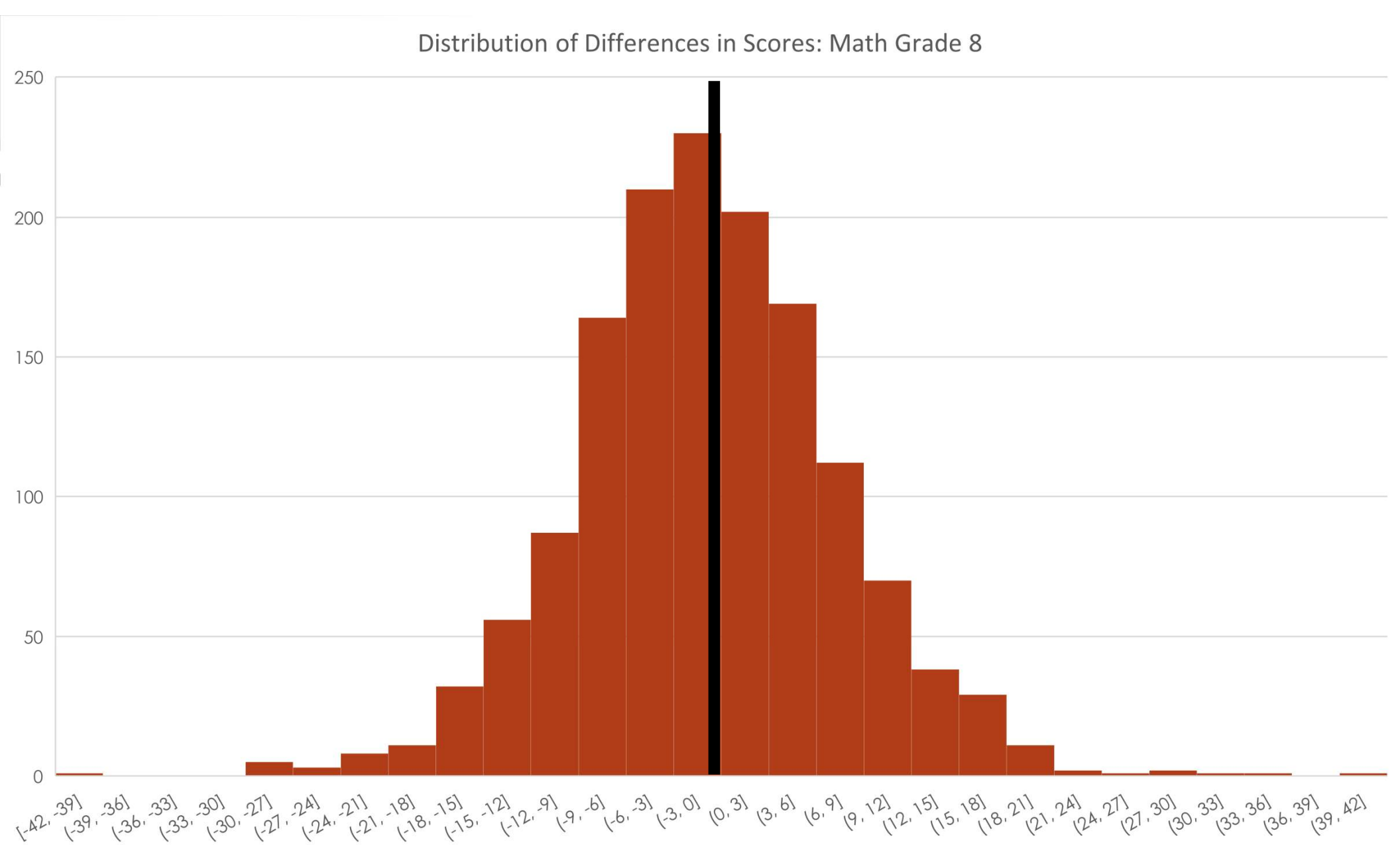

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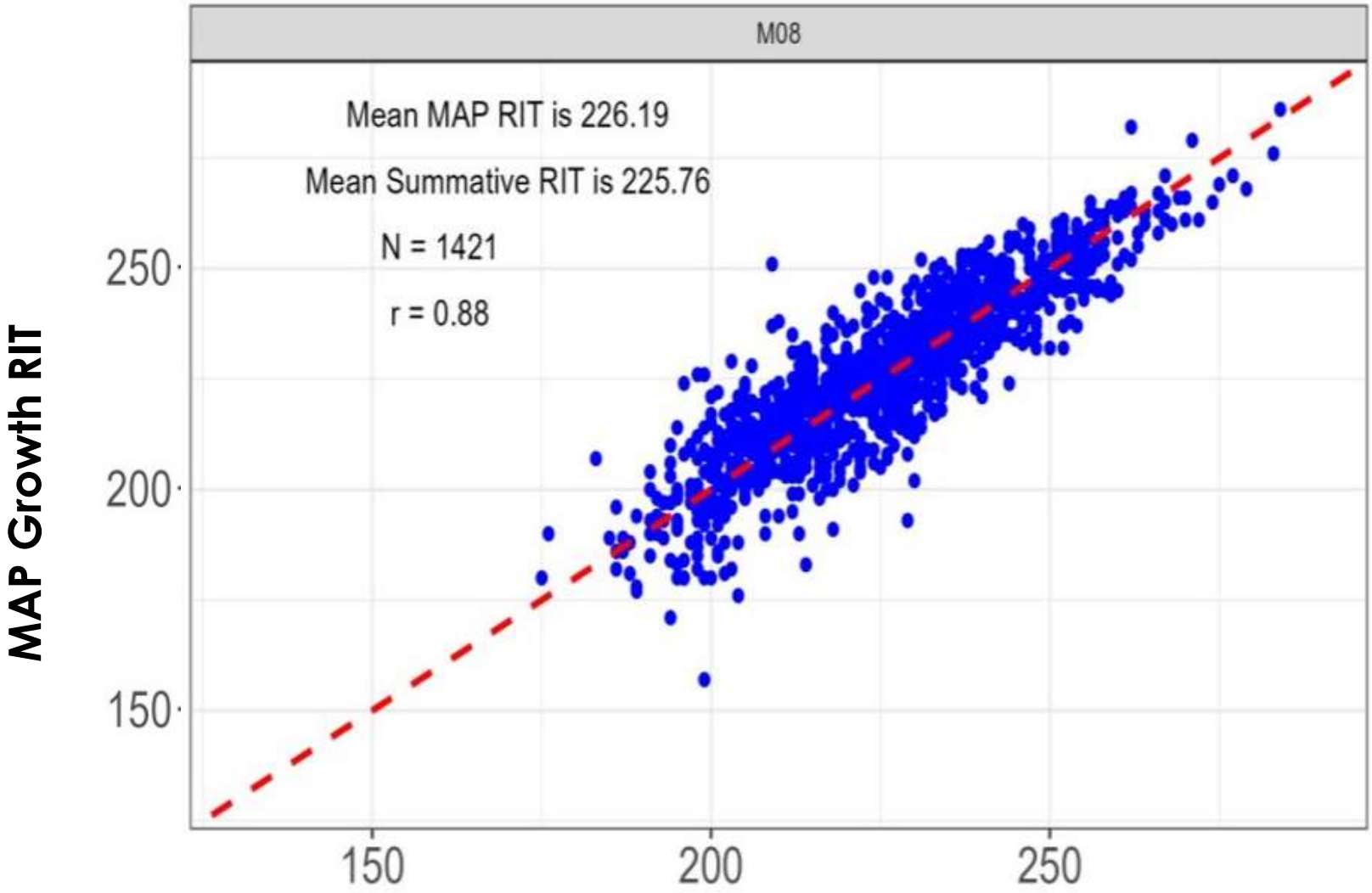
Mean Difference (MTYA - MAP) = -0.37

Math RIT Score Comparison: Grade 8



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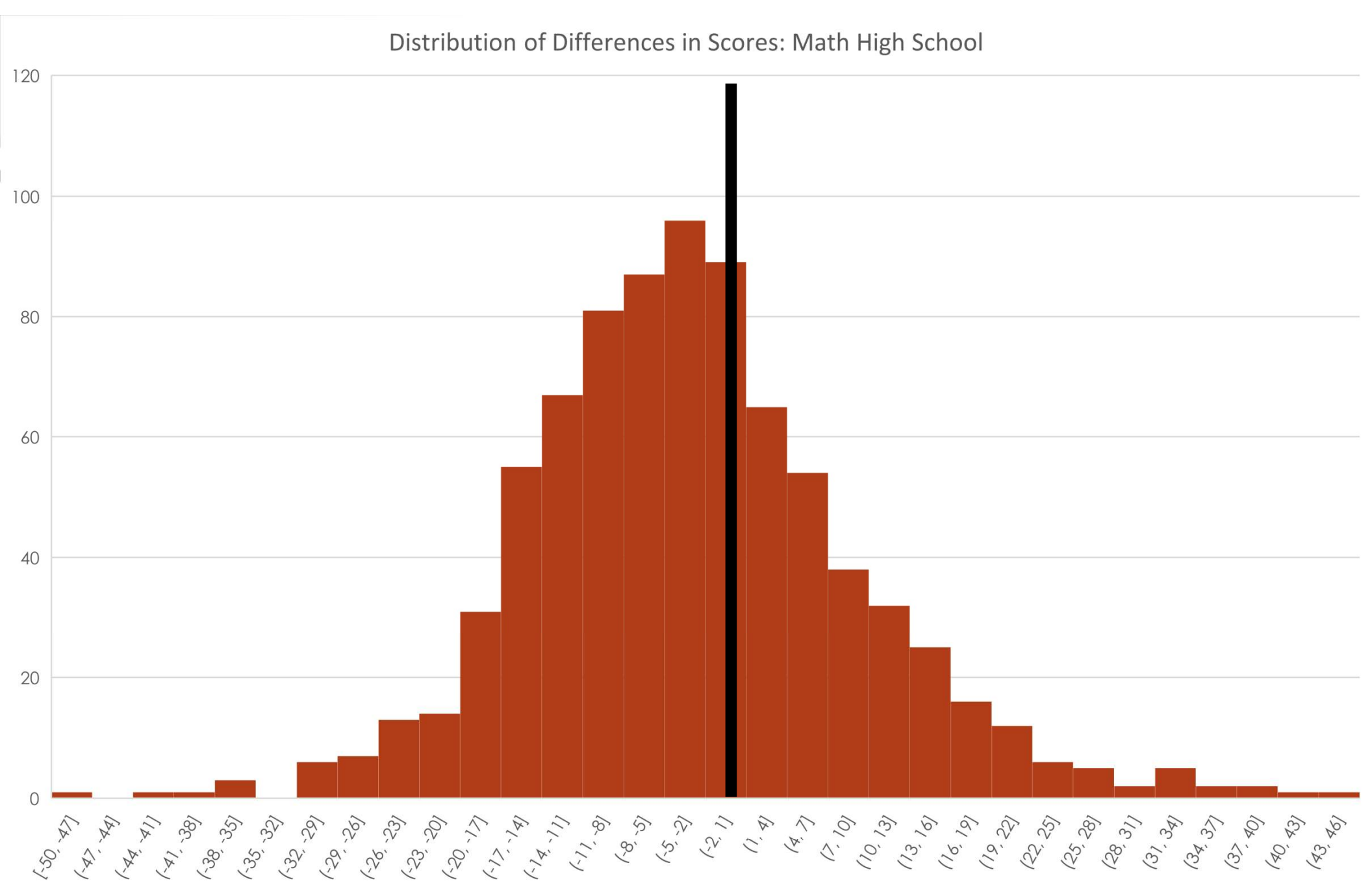

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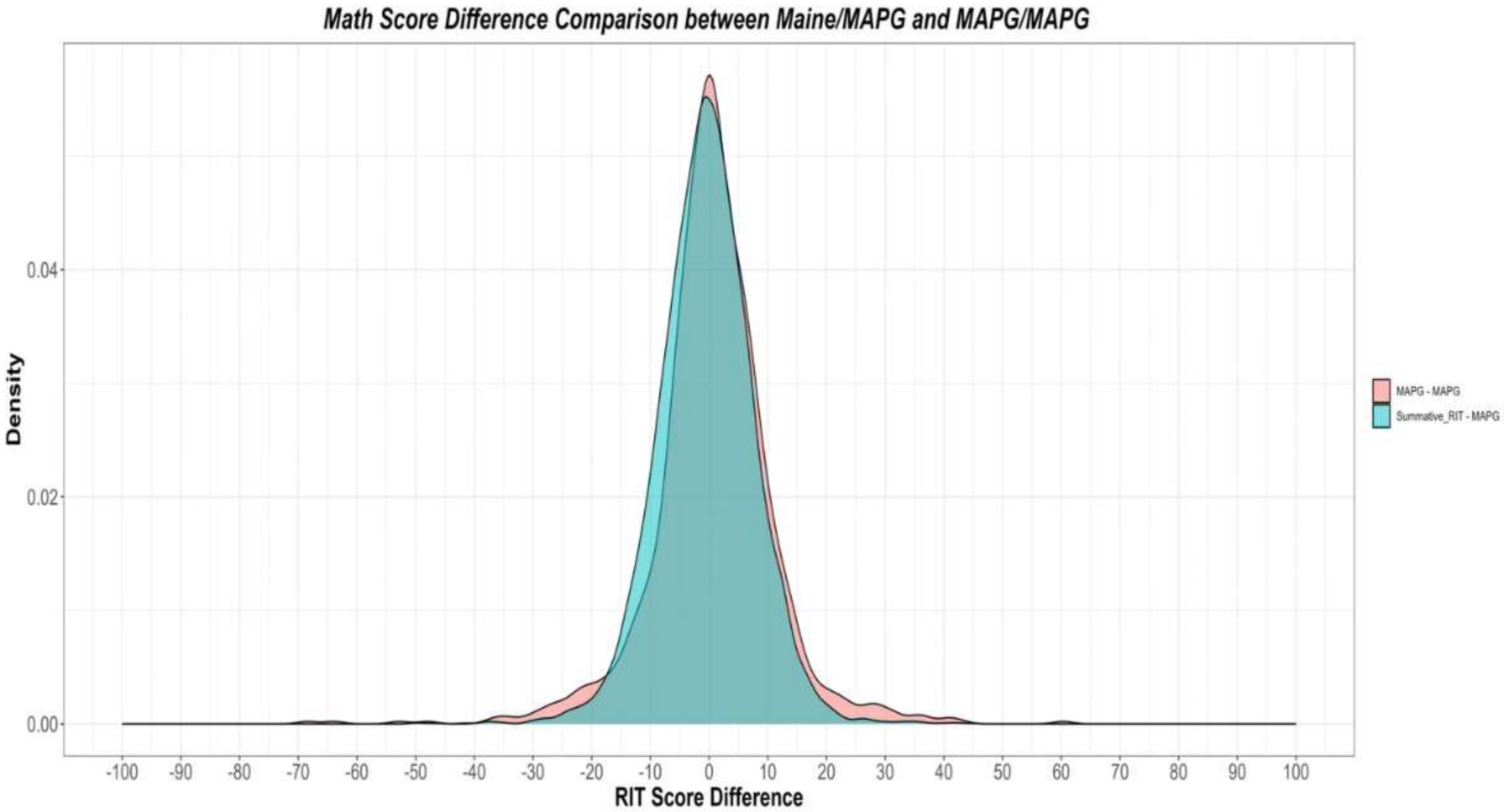
Mean Difference (MTYA - MAP) = -2.45

RIT Score Difference Comparison



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nwea

What are the next steps to improve comparability for Math RIT?

- High School
  - Operational field test
    - NWEA's other through-year assessment state partners do not use NWEA for their high school assessments.
    - All summative questions were new and never previously administered to students.
    - Given the timeline for submission of evidence to US DOE for peer review, a true field test was not possible.
  - Maine DOE is working with NWEA to examine the most difficult clusters of summative items.
    - Difficulty is determined by the percentage of students who answered the item correctly.
    - Opportunity to learn
    - Complexity of items – Many of the same standards are taught in Algebra I and Algebra II, at varying levels of complexity.

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Trends in Fall-to-Spring RIT Score Growth

2021-2022

and

2022-2023

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NWEA Research Brief: 2022-23 Achievement Data

- Education's long COVID: 2022-23 achievement data reveal stalled progress toward pandemic recovery
  - July 2023
  - Center for School and Student Progress, research branch of NWEA
- Achievement gains during 2022-23 fell short of prepandemic trends.
  - The 2020 NWEA national norms currently used to determine achievement and growth percentiles are based on data from 2015-2018.
  - NWEA releases new norms every 4-5 years.

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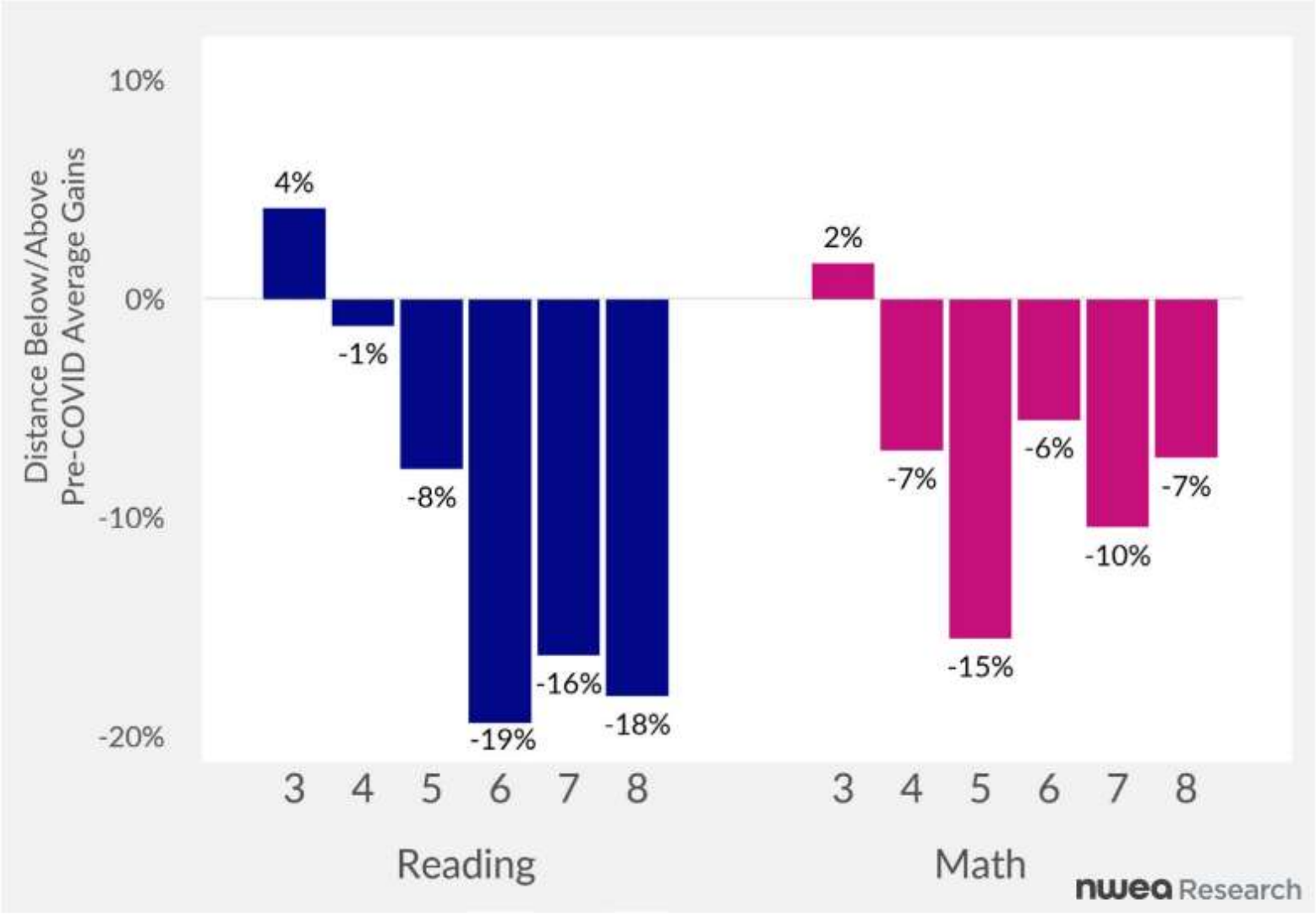
Fall-to-spring achievement gains during 2022–23 relative to pre-COVID trends



Note. The bars depict the percentage difference between 2022–23 fall-to-spring growth and pre-COVID growth trends. These relative gains ratios were calculated by taking the average fall-to-spring change in RIT score for the COVID sample and dividing by the average for the pre-COVID sample. The pre-COVID baseline was the aggregate fall-to-spring growth across the 2016–17, 2017–18, and 2018–19 school years.

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According to NWEA's report, this trend in 2022-23 achievement gains (i.e., growth) was lower than what was observed in 2021–22.

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What are we seeing in Maine?

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What data does ME DOE have?

- No access to MAP Growth reports
  - No *projected RIT*
  - No *percentage of students who met or exceeded their projected RIT*
  - No *percent of projected growth met*

- We do have…
  - NWEA's 2020 achievement and growth norms
  - Fall and Spring RIT scores for 2021-22 and 2022-23 for grades 3-8

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Calculation of an Unrestricted Growth Index

Using 2020 national norms, an individual student growth index is calculated by taking actual fall-to-spring growth and dividing by expected fall-to-spring growth.

2020 Reading Student Growth Norms						
	Fall-to-Winter		Winter-to-Spring		Fall-to-Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	9.63	5.75	6.81	5.30	16.45	7.50
1	9.92	5.85	5.55	5.37	15.47	7.74
2	8.85	5.86	4.37	5.37	13.22	7.77
3	7.28	5.86	3.22	5.37	10.50	7.77
4	5.82	5.76	2.33	5.31	8.16	7.53
5	4.64	5.75	1.86	5.30	6.50	7.49
6	3.64	5.65	1.55	5.24	5.19	7.26
7	2.89	5.60	1.27	5.21	4.16	7.15
8	2.51	5.73	1.14	5.29	3.65	7.46
9	1.62	6.06	0.88	5.50	2.51	8.22
10	1.43	5.88	0.60	5.38	2.04	7.80
11	1.11	6.27	0.08	5.62	1.18	8.68
12	0.05	6.38	0.47	5.70	0.52	8.92

2020 Mathematics Student Growth Norms						
	Fall-to-Winter		Winter-to-Spring		Fall-to-Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	10.57	5.15	6.97	4.77	17.54	6.63
1	10.13	5.22	6.22	4.82	16.35	6.81
2	9.03	5.11	5.35	4.75	14.38	6.54
3	7.75	4.99	4.85	4.68	12.60	6.26
4	6.50	4.98	4.46	4.67	10.96	6.24
5	5.56	5.10	4.05	4.75	9.61	6.53
6	4.81	5.04	3.32	4.71	8.13	6.38
7	3.83	4.96	2.69	4.66	6.52	6.18
8	3.20	5.27	2.18	4.85	5.38	6.93
9	2.24	5.48	1.36	4.98	3.60	7.41
10	2.14	5.46	1.21	4.97	3.35	7.37
11	1.77	5.92	0.76	5.25	2.52	8.37
12	0.30	6.09	0.88	5.36	1.18	8.75

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Calculation of an Unrestricted Growth Index: Examples for Individual Students

For Reading, grade 3 expected fall-to-spring growth is, on average, 10.5 RIT points.

2020 Reading Student Growth Norms						
	Fall-to-Winter		Winter-to-Spring		Fall-to-Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	9.63	5.75	6.81	5.30	16.45	7.50
1	9.92	5.85	5.55	5.37	15.47	7.74
2	8.85	5.86	4.37	5.37	13.22	7.77
3	7.28	5.86	3.22	5.37	10.50	7.77
4	5.82	5.76	2.33	5.31	8.16	7.53
5	4.64	5.75	1.86	5.30	6.50	7.49
6	3.64	5.65	1.55	5.24	5.19	7.26
7	2.89	5.60	1.27	5.21	4.16	7.15
8	2.51	5.73	1.14	5.29	3.65	7.46
9	1.62	6.06	0.88	5.50	2.51	8.22
10	1.43	5.88	0.60	5.38	2.04	7.80
11	1.11	6.27	0.08	5.62	1.18	8.68
12	0.05	6.38	0.47	5.70	0.52	8.92

Example 1:

Student's actual growth is 11 RIT points.

Actual growth / expected growth = Growth index

11/10.5 = **1.05**

Example 2:

Actual growth = 0 RIT points

0/10.5 = **0.00**

Example 3:

Actual growth = 21 RIT points

21/10.5 = **2.00**

Example 4:

Actual growth = -5 RIT points

-5/10.5 = **-0.48**

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Average Unrestricted Growth Indices (Statewide)

What does "unrestricted" mean?

- There are no limits on values for individual students.
- Negative values are allowed.
- Outliers are included in the average.
- Given the population size (all students in grades 3-8 who took the state's reading/math assessments), an unrestricted measure is acceptable for statewide data for the purpose of this analysis.
- If looking at smaller populations (i.e., school or SAU), applying restrictions would be appropriate to reduce the impact of extreme outliers on the average.

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Average Unrestricted Growth Indices (Statewide)

Reading

Grade	AY22	AY23
3	0.83	0.82
4	0.8	0.57
5	0.74	0.63
6	0.72	0.38
7	0.69	0.25
8	0.47	0.35
ALL	0.71	0.5

Math

Grade	AY22	AY23
3	0.87	0.98
4	0.85	0.81
5	0.79	0.69
6	0.81	0.59
7	0.77	0.43
8	0.74	0.62
ALL	0.80	0.69

AY22 = Fall 2021 to Spring 2022
AY23 = Fall 2022 to Spring 2023

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Questions?

Please reach out to

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