TECHNICAL BRIEF

Technical appendix for:
"Academically diverse classrooms, deeper needs: What teachers face after the pandemic"

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Megan Kuhfeld, Emily Morton, Karyn Lewis, Scott Peters

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1. Introduction

The purpose of this technical appendix is to share detailed results and to more fully describe the sample and methods used in the research included in the brief, ***Academically diverse classrooms, deeper needs: What teachers face after the pandemic***. We investigated three main research questions in this brief:

1. Within the typical elementary classroom in 2019, what percentage of students were off track for grade-level proficiency, on track for grade-level proficiency, or on track for advanced?
2. Did the percentage of students who were on and off track for grade-level proficiency within a classroom shift substantially between 2019 and 2024?
3. How much growth is needed for off track students to reach grade-level proficiency within each year?

2. Data

Sample

The data for this study are from the NWEA anonymized longitudinal student achievement database. School districts use NWEA® MAP® Growth™ assessments to monitor elementary and secondary students' reading and math achievement and gains, with assessments typically administered in the fall (usually between August and November), winter (usually December to March), and spring (late March through June).

In this study, we examined the test scores of third- to fifth-grade students in fall 2019 (pre-COVID) and fall 2024 (post-COVID). We focused on fall test scores in each year because we wanted to understand the academic diversity that teachers face when students enter their classrooms each year. Additionally, we focused on these specific elementary grades for two reasons. First, we were interested in general classrooms where students are not sorted by achievement levels (e.g., tracking), which occurs more frequently in elementary classrooms than middle school classrooms. Second, we were interested in grade-level proficiency cut scores, which are available starting in third grade.

We restricted the sample to public schools that tested in the same grade/subject across both years. In total, our sample included two million students from 33,000 classrooms. Table 1 presents the demographic characteristics of the sample. Approximately half of the students in sample were white, 14% were Black, and 21% were Hispanic.

Measure of achievement

Student test scores from the NWEA MAP Growth reading and math assessments, called RIT scores, were used in this study. MAP Growth is a computer adaptive test that precisely measures achievement (even for students above or below grade level) and is vertically scaled to allow for the estimation of gains across time. MAP Growth assessments are typically administered three times a year (fall, winter, and spring) and are aligned to state content standards. Test scores are reported on the RIT (Rasch unIT) scale,[1] which is a linear transformation of the logit scale units from the Rasch item response theory model.

[1] In the 2023-24 school year, NWEA began the phased implementation of an enhanced item-selection algorithm for the MAP Growth assessment. The enhanced item-selection algorithm (EISA) prioritizes grade-level content while still adapting to off-grade items where necessary to provide items of appropriate difficulty for students. All scores in this study are converted to be on the EISA scale.

Test score percentiles within each grade/subject/year were calculated based on the national 2025 MAP Growth norms.

Classroom assignments

This study used deidentified teacher IDs and course names (a free-text field with the names used by the school to identify elementary classrooms) from school roster data to identify classroom assignments in elementary grades. The school roster data were submitted each year to NWEA by school data administrators. In some schools, each student was matched to a single teacher, while in other schools each student was matched to multiple teachers (a primary classroom teacher plus teachers for art/gym/music/etc). We used a combination of the teacher ID and free-text course name to match students to the teacher who was most likely providing the primary instruction during the school day. We removed classrooms and teachers where it was not possible to identify the primary provider of instruction.

Measuring grade-level proficiency

States define grade-level proficiency relative to their own state standards and summative test cut scores. NWEA conducts linking studies to estimate the MAP Growth scores associated with the proficiency cut scores from state summative assessments. States vary widely in the score associated with meeting grade-level proficiency or advanced performance levels. Given this variability, NWEA produces a set of default cut scores that can be used by partners to classify students into three performance levels (off track for grade-level proficiency, on-track for grade-level proficiency, and on track for advanced level). These cut scores are based on the median of all available individual state linking studies for mathematics and reading in grades 3-8. As such, they can be seen as the middle-ground benchmark for grade-level proficiency for all states. These default spring cut scores and their associated percentiles are reported in Table 2.

Since students who meet their expected growth targets (e.g., grow at the 50th percentile) remain at the same percentile level across terms, we applied the percentiles associated with the spring cut scores to our fall test data. Students are classified as off track to meet grade-level proficiency if their fall percentile is below the proficiency percentile. If their fall score percentile is above the proficiency percentile but below the advanced percentile, they are classified as on track to meet grade-level proficiency. Finally, if their fall score percentile is above the advanced percentile, students are classified as on track for the advanced level.

3. Methods

RQ1. Within the typical elementary classroom in 2019, what percentage of students were off track for proficiency, on track for proficiency, or on track for advanced?

In each grade/subject/classroom in 2019, students were classified as off track for grade-level proficiency, on track for grade-level proficiency, or on track for the advanced level based on their MAP Growth fall percentiles and the percentiles associated with the cut scores listed in Table 2. To get the percentage of students in each achievement level within a typical classroom, we took the average across all the classrooms within a grade/subject in fall 2019. Table 3 reports the average percentages within a grade/subject/year. Figure A1 shows these distributions for all grade/subject combinations in fall 2019.

Figure 1 in the main brief shows these percentages for 5th grade math. The results for all grades/subjects are presented in Figure A1 in the appendix. To translate the percentages into number of students in a typical classroom within each achievement level (Figure 1), we multiply the percentages by 20 students and round to the nearest integer.

RQ2. Did the percentage of students who are on- and off track for grade-level proficiency within a classroom shift substantially between 2019 and 2024?

To compare the shifts in achievement levels in the average classroom between fall 2019 and fall 2024, we repeated the same set of calculations from RQ1 using the fall 2024 data. The results for both fall 2019 and 2024 are reported in Table 3 and presented in Figure A1.

RQ3. How much growth is needed for off-track students to reach grade-level proficiency within each year?

To estimate how much growth is needed for off-track students to reach grade-level proficiency, we first estimated the average fall RIT score of the off-track students in a grade/subject /classroom. We then used the 2025 MAP Growth norms to estimate the expected fall-spring growth for a student starting at average off-track student's fall RIT score between weeks 4 and 32. The expected fall-spring growth was then compared to the growth needed to reach proficiency (spring proficiency cut score reported in Table 2 minus the average off-track student's fall RIT score). The ratio of these two numbers provides an estimate of the "years of typical growth" needed to reach proficiency for an off-track student (see Table 4).

In all grade levels, off-track students would have to grow 1.5 to 3 times their expected growth rate to reach proficiency. The rate of growth needed to reach proficiency is consistently higher in fall 2024 than fall 2019.

4. Supplemental Analyses

In addition to the analyses presented in the brief, we also estimated shifts in the achievement levels within a classroom using two additional approaches. First, we examined the shifts in the distribution of students within each achievement quintile based on the national NWEA norms (1-19th percentile, 20-39th percentile, 40-59th percentile, 60-79th percentile, and 80-99th percentile) between 2019 and 2024. Table 3 presents the percentage of students falling in each national achievement quintile within the average classroom in each grade/subject/year. The biggest observed shift is among the percentage of students in the bottom national achievement quintile, which grew 3-7 percentage points between 2019 and 2024.

Second, we also estimated the observed gaps between low- and high-achieving students in each classroom in both years. Specifically, we calculated the observed 10th and 90th percentile of RIT scores within each classroom and then averaged these values across the classrooms in a grade/subject/year. Figure A2 shows the 10-90 gaps by grade/subject/year. While the overall spread did not increase notably, the distribution shifted downward between 2019 and 2024.

Table 1. Description of the pre-COVID and COVID student samples

			Counts				Race/ethnicity Percentages						
Year	Subject	Grade	Students	Classes	Schools	Male	White	Black	Hispanic	Asian	AIAN	Multi-ethnic	Other Race
2019	Math	3	419,055	7,382	5,448	51%	50%	14%	20%	5%	1%	4%	6%
2019	Math	4	407,080	6,573	5,149	51%	50%	14%	20%	5%	1%	4%	5%
2019	Math	5	416,523	5,527	4,901	51%	50%	14%	21%	5%	1%	4%	5%
2024	Math	3	413,823	5,185	5,448	51%	47%	14%	22%	6%	1%	5%	4%
2024	Math	4	391,832	4,351	5,149	51%	47%	14%	22%	6%	1%	5%	5%
2024	Math	5	395,889	3,914	4,901	51%	47%	14%	22%	6%	1%	5%	4%
2019	Reading	3	398,182	7,329	5,193	51%	51%	14%	18%	5%	1%	4%	6%
2019	Reading	4	391,006	6,354	4,985	51%	51%	14%	19%	5%	1%	4%	5%
2019	Reading	5	402,271	5,486	4,764	51%	51%	14%	20%	5%	1%	4%	5%
2024	Reading	3	393,863	5,038	5,193	51%	48%	15%	20%	6%	1%	5%	5%
2024	Reading	4	376,934	4,158	4,985	51%	48%	14%	21%	6%	1%	5%	5%
2024	Reading	5	382,860	3,756	4,764	51%	48%	14%	21%	6%	1%	5%	4%

Table 2. Proficiency cut scores

		Proficient		Advanced	
Subject	Grade	Spring RIT score	Percentile	Spring RIT score	Percentile
Math	3	205	64	218	87
Math	4	218	67	232	89
Math	5	227	72	240	90
Reading	3	201	65	214	87
Reading	4	207	61	219	83
Reading	5	213	61	225	83

Table 3. Percentage of students on and off track for grade-level proficiency by subject/grade/year

				Percentage of students on track for grade-level proficiency			Percentage of students in each national achievement quintile				
Subject	Grade	Term	Avg. N. students per class	Off track for proficiency	On track for proficiency	On track for advanced	Q1	Q2	Q3	Q4	Q5
Math	3	Fall 2019	21	55%	31%	14%	10%	17%	24%	25%	24%
Math	3	Fall 2024	21	58%	29%	12%	14%	18%	23%	24%	20%
Math	4	Fall 2019	22	57%	33%	10%	10%	16%	24%	26%	24%
Math	4	Fall 2024	21	62%	27%	11%	13%	17%	25%	24%	21%
Math	5	Fall 2019	23	65%	23%	13%	11%	16%	23%	28%	23%
Math	5	Fall 2024	22	72%	18%	10%	15%	18%	25%	24%	18%
Reading	3	Fall 2019	21	52%	31%	17%	13%	15%	19%	27%	26%
Reading	3	Fall 2024	21	60%	26%	14%	20%	17%	19%	23%	21%
Reading	4	Fall 2019	22	49%	31%	20%	13%	15%	21%	28%	23%
Reading	4	Fall 2024	22	54%	28%	18%	17%	16%	21%	26%	21%
Reading	5	Fall 2019	23	50%	30%	19%	13%	16%	21%	28%	22%
Reading	5	Fall 2024	22	54%	29%	17%	17%	16%	20%	27%	19%

Note. National achievement quintiles are based on the 2025 MAP Growth norms.

Table 4. Growth to reach proficiency for off-track students in 2019 and 2024

Subject	Grade	Term	Average Fall RIT for Off-track Students	Expected Fall-Spring Gain	Required Fall-Spring Gain to Reach Proficiency	Growth Ratio
Math	3	Fall 2019	178.91	15.19	26.09	1.72
Math	3	Fall 2024	177.32	15.24	27.68	1.82
Math	4	Fall 2019	192.46	12.96	25.54	1.97
Math	4	Fall 2024	191.32	12.95	26.68	2.06
Math	5	Fall 2019	203.17	9.69	23.83	2.46
Math	5	Fall 2024	201.32	9.63	25.68	2.67
Reading	3	Fall 2019	177.57	10.00	23.43	2.34
Reading	3	Fall 2024	175.59	10.27	25.41	2.47
Reading	4	Fall 2019	187.75	7.22	19.25	2.66
Reading	4	Fall 2024	186.36	7.49	20.64	2.76
Reading	5	Fall 2019	195.77	5.75	17.23	3.00
Reading	5	Fall 2024	193.94	6.02	19.06	3.17

Figure A1. Percentage of students who are off and on track for proficiency by grade/subject/year in Fall 2019 and Fall 2024

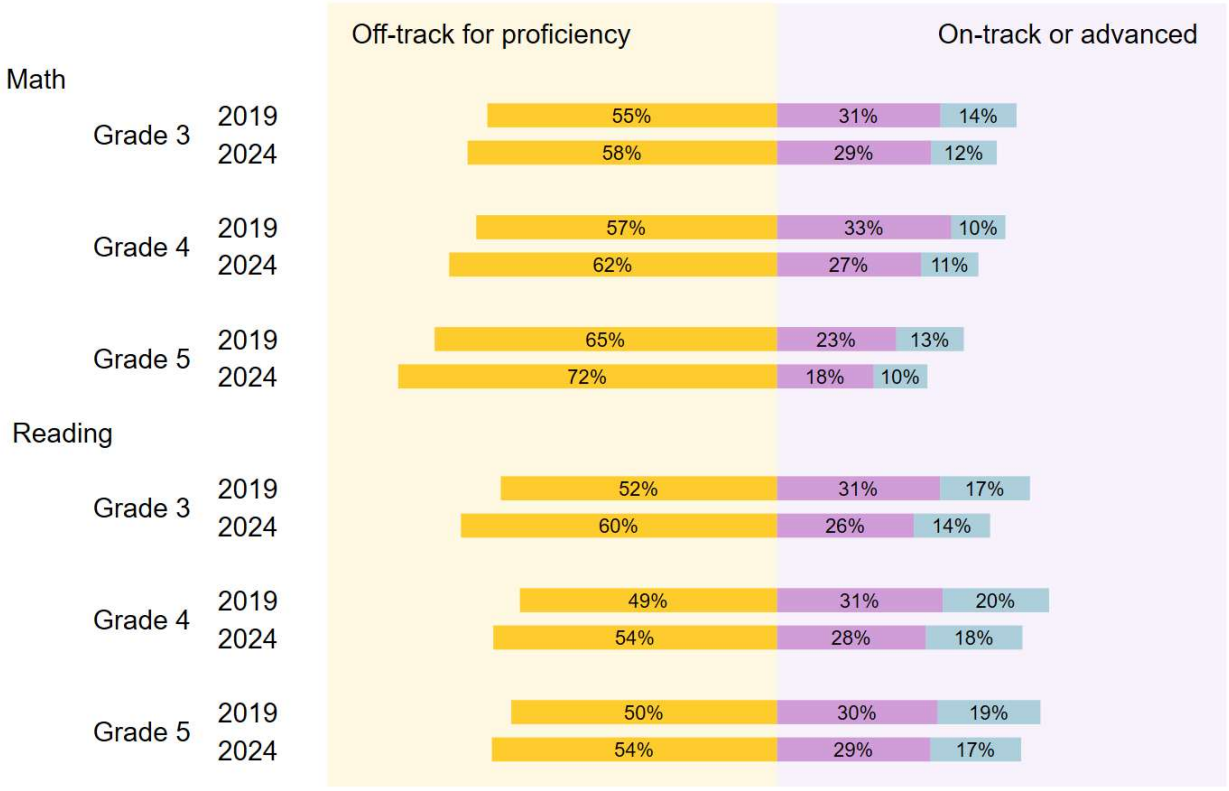

Figure A2. Range of achievement in a typical classroom in Fall 2019 and Fall 2024