



ADDENDUM

Assessing Student Performance Before and During Virtual Learning: A Cohort Comparison of Student Performance on 2019-20 Winter and 2020-21 Winter aimswebPlus and Star Assessments

This report extends the analysis described [in a report published in January 2021](#) describing the reading and math test performance of students from 2019-20 Winter (prior to closing schools due to the Covid-19 pandemic) to 2020-21 Fall (during virtual learning for all students). In this addendum, we examined the performance of the same set of 2019-20 Winter test takers and analyzed their 2020-21 Winter reading and math performance. The main metric used in this addendum, as in the report, is the National Percentile Rank (NPR). NPR is a norm-referenced measure that compares student performance to a national sample of students.

Key Findings

- On average, decline in student National Percentile Rank (NPR) performance from 2019-20 Winter (in-person instruction) to 2020-21 Winter (virtual instruction) was highest (9 percentiles) for aimswebPlus Reading (grades 1-5).
- Students in our sample in grades 1-3 and 5 experienced further decline from 2020-21 Fall when looking at 2020-21 Winter performance; fourth-grade students performed marginally better in 2020-21 Winter than they did in 2020-21 Fall.
- Students who were in kindergarten in 2019-20 and in first grade in 2020-21 had the largest decline in Winter-to-Winter (full year) performance, a larger decline compared to their Winter-to-next-Fall performance.
- Similar to the findings of the January 2021 report, year-to-year comparisons show that existing overall performance differences across demographic groups persisted despite the fact that all demographic groups experienced Winter-to-Winter declines almost equally.

Ebru Erdem,
Policy Research Analyst

Joy Lesnick,
Deputy Chief

Office of Evaluation,
Research,
and Accountability

April 2021

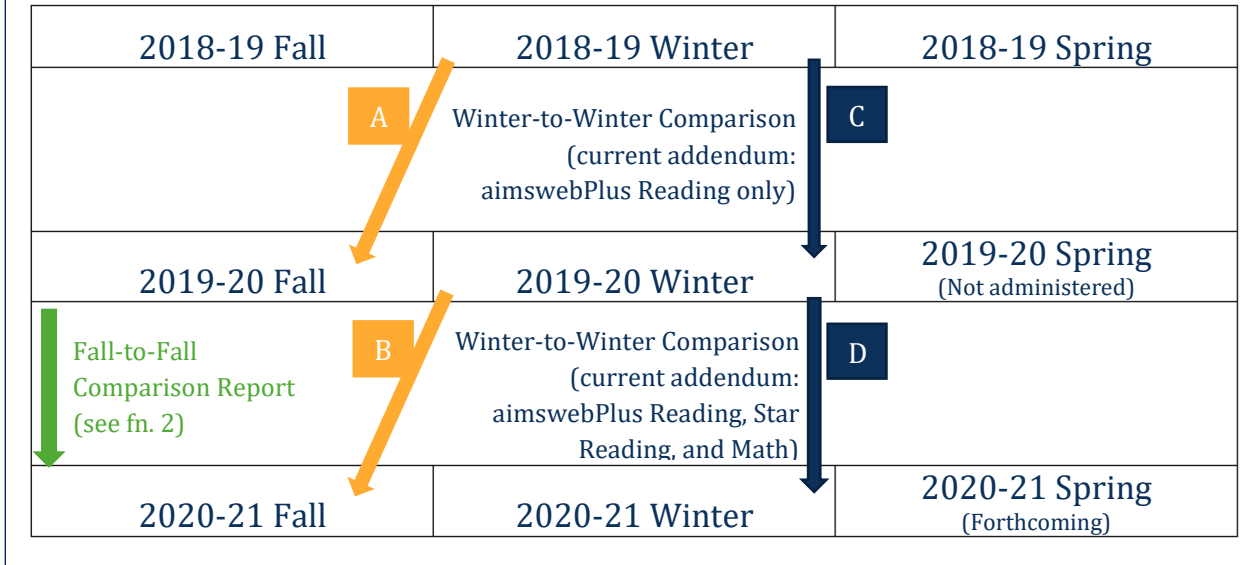
Contents

| | |
|--|----|
| Overview: 2020-21 Winter Assessments at the School District of Philadelphia | 3 |
| Research Questions..... | 3 |
| National Percentile Rank (NPR) metric and the Norm Samples | 3 |
| Comparable Tests and the Cohort Sample | 4 |
| Findings | 5 |
| AimswEBPlus Reading | 5 |
| Analysis of Winter-to-Winter Changes in Average National Percentile Rank: 2019-20 to 2020-21 and 2018-19 to 2019-20..... | 5 |
| Star..... | 12 |
| Star Reading: Analysis of 2019-20 Winter to 2020-21 Winter Changes in National Percentile Rank..... | 12 |
| Star Math: Analysis of 2019-20 Winter to 2020-21 Winter Changes in National Percentile Rank | 15 |
| Conclusions | 18 |
| Appendix..... | 19 |

Keeping Track of School Years and Testing Windows

Looking across different testing windows in different school years can be confusing. In this report, we always refer to the school year first, followed by the testing window (e.g., 2020-21 Fall).

Figure 1. A Visual Map of Multi-Year Assessment Performance Analyses



The two diagonal arrows (labeled A and B) help illustrate the analyses presented in the report dated January 2021.¹ That report first analyzed student performance from 2019-20 Winter to 2020-21 Fall (arrow B) and then compared the change in performance to the previous year for aimswebPlus Reading (arrow A). The current addendum analyzes student performance from 2019-20 Winter to 2020-21 Winter (arrow D) and compares the change in performance to the Winter to Winter changes in the previous year for aimswebPlus Reading (Arrow C). The green vertical arrow represents a Fall-to-Fall comparison of student performance published in a November 2020 report.²

The dates of the 2019-20 and 2020-21 administration windows are as follows:

- 2019-20 Fall: aimswebPlus (grades K-5)-September 3-October 31, 2019; Star (grades 6-12)-Term 1, September 19-October 4, 2019.
- 2019-20 Winter: aimswebPlus (grades K-5)- January 2-31, 2020; Star (grades 6-8)-Term 3, March 2-12, 2020; Star (9-12)-Term 2, February 5-21, 2020.
- 2020-21 Fall: September 14-October 23, 2020 for both tests, all grades.
- 2020-21 Winter: December 14, 2020-January 29, 2021 for both tests, all grades.³

¹ See [Assessing Student Performance Before and During Virtual Learning: A Cohort Comparison of Student Performance on 2019-20 Winter and 2020-21 Fall aimswebPlus and Star Assessments](#), January 2021.

² See: [K-12 Student Participation and Performance on aimswebPlus and Star Assessments, Fall 2019 and Fall 2020](#), November 2020.

³ Results from schools that started aimswebPlus 2020-21 Winter testing on December 1, 2021 were included.

Overview: 2020-21 Winter Assessments at the School District of Philadelphia

Our January 2021 report includes detailed descriptions of the assessments administered at the School District of Philadelphia (SDP) in 2019-20, before the pivot to virtual instruction in response to COVID-19, as well as in 2020-21 Fall, during virtual instruction. The analyses in that report focused on the changes in performance between 2019-20 Winter, the last in-person/at-school assessments administered, and 2020-21 Fall, the first online/at-home assessments administered. This addendum repeats the same analyses, comparing the 2019-20 Winter results to the performance of *the same cohort of students* in the 2020-21 Winter assessment window.

Research Questions

The results presented in this report provide complementary analyses to our previous reports by examining students' performance on their last in-person/at-school test (2019-20 Winter) compared to their latest online/at-home test (2020-21 Winter) at the time of writing.

Two primary research questions guided this analysis:

1. What were the differences in student performance, as measured by National Percentile Rank, between 2019-20 Winter and 2020-21 Winter for aimswebPlus Reading (2020-21 grade 1-5 students) and Star Reading and Math (2020-21 grade 7-11 students)?
 - 1.a. Were there identifiable patterns in aimswebPlus Reading and Star Reading and Math performance differentials between 2019-20 Winter and 2020-21 Winter with respect to grade level, race/ethnicity, English learner status, 2020-21 Winter performance tier on the test, and Economic Disadvantage?
2. How did the change in aimswebPlus Reading performance between 2019-20 Winter and 2020-21 Winter compare to the change in student performance on the same assessments the previous school year (between 2018-19 Winter and 2019-20 Winter)?

The findings from this addendum complement the conclusions from our January 2021 report, following the progress of the same set of students into another quarter of virtual instruction. As in the January 2021 report, the primary metrics we examine in this addendum are the National Percentile Rank (NPR) for aimswebPlus and Star.

The National Percentile Rank (NPR) metric

NPR is a norm-referenced score that measures a student's performance in reference to the performance of a national sample of students (the norm sample) at the same grade level. It shows what percentage of students in the norm sample scored lower than the particular student. Vendors for aimswebPlus as well as Star Reading and Math have established norm samples which are representative of the national demographic distributions of K-12 students. AimswebPlus conducted a norming process using a sample of test takers who were tested during the 2013-14 school year. Star Reading and Math conducted a norming process using samples of test takers between August 15, 2014, and June 30, 2015. It is important to note that the norm samples used to

identify NPR were established prior to school closures as part of Covid-19 containment efforts. Therefore, NPR is not affected by any Covid/virtual learning related performance changes.⁴

Comparable Tests and the Cohort Sample

The comparable aimswebPlus Reading tests in this addendum are the same as in the January 2021 report. NPR based on Nonsense Word Fluency (NWF) performance was used for the comparisons of reading performance of students who were in kindergarten in 2019-20 Winter and first grade in 2020-21 Winter in the analyses below (Table 1). All comparisons for students who were first to fourth grade in 2019-20 Winter and second to fifth grade in the 2020-21 Winter are based on Oral Reading Fluency (ORF) NPR performance. In this addendum, as in the report, we compare the National Percentile Rank based on the composite Star Reading and Math scores only for students who were in sixth to tenth grade in 2019-20, and we exclude the grade levels for which the assessment was not required prior to 2020-21.

Table 1. Comparable Tests

| Test | Possible Comparisons |
|---------------------|---|
| aimswebPlus Reading | NPR based on NWF for grades K-1 and ORF for grades 1-5 |
| aimswebPlus Math | No comparisons possible |
| Star Reading | 2020-21 Grades 7-11 (2019-20 Grades 6-10), NPR based on composite score |
| Star Math | 2020-21 Grades 7-11 (2019-20 Grades 6-10), NPR based on composite score |

Note: See Appendix Table A.1. in the January 2021 report for more details about the cohorts and comparable aimswebPlus Reading tests.

Students who completed the tests identified as comparable in both 2019-20 Winter and 2020-21 Winter testing windows are the cohort of students used for this analysis.⁵ The 2019-20 Winter testing window was the last window in which assessments were administered before District school buildings were closed on March 13, 2020, due to Covid-19 containment efforts in Philadelphia. Among the 2019-20 Winter test-takers, those who took a comparable test in the 2020-21 Winter testing window were identified. For each of the three tests analyzed in this report, the number of identified students (that is, students with results during both windows pairs) varies.⁶

Note that the students whose performance is analyzed in this addendum are not necessarily the same set of students whose performance was analyzed in the January 2021 report. The January 2021 report analyzed students who were both in 2019-20 Winter and 2020-21 Fall. While there is a big overlap between the 2019-20 Winter test takers who were then tested in either window of the 2020-21 school year, there are students who have participated in only one of the 2020-21

⁴ More details about the norm samples can be found in the technical reports for these tests: [aimswebPlus Reading](#), p.3; [Star Reading](#), p. 89; [Star Math](#), p. 74.

⁵ The 2020-21 Winter analysis studies the outcomes for students who took comparable tests in both 2019-20 Winter and 2020-21 Winter. The January 2021 report studied the outcomes for students who took the same tests in both 2019-20 Winter and 2020-21 Fall. We did not restrict the analysis to students who took all three tests; thus, although the two sets of students analyzed highly overlap, they are not exactly the same.

⁶ These figures are reported in the Totals row of the Number of Students Columns in each table in the aimswebPlus Reading, Star Reading, and Star Math sections.

assessment windows. See Table A.1. in the appendix at the end of the addendum for a comparison of the cohort in this analysis to all 2020-21 Winter test takers, 2020-21 Fall analysis cohort and all 2020-21 Fall test takers. A demographic breakdown of the 2020-21 Winter cohort for each three tests analyzed in this addendum is presented in Table A.2. in the appendix.

Findings

The results from the analyses for student performance on aimswebPlus and Star are presented separately below. First, the comparison of 2020-21 Winter and 2019-20 Winter aimswebPlus Reading performance is presented, including the performance of student subgroups. In the same section we address Research Question 2, comparing Winter-to-Winter performance differentials in two consecutive years for the same base cohort of 2019-20 Winter aimswebPlus test takers. In the next section, the 2020-21 Winter and 2019-20 Winter comparison and subgroup analyses are repeated for both Star Reading and Star Math.

AimswebPlus Reading

Analysis of Winter-to-Winter Changes in Average National Percentile Rank: 2019-20 to 2020-21 and 2018-19 to 2019-20

There were 40,480 grade 1-5 students in 2020-21 who took the aimswebPlus reading test in 2019-20 Winter and 2020-21 Winter. Of these students, 19,883 were female and 20,597 were male students. A great majority (85%) of them were non-English Learners (34,537) and 5,943 were English Learners. Black/African American students constituted the highest number in this cohort with 18,471 students (46%), followed by 9,925 Hispanic/Latino, 6,512 White, 3,867 Asian, 1,595 Multiracial, 55 Native Hawaiian/Pacific Islander, and 55 American Indian/Alaskan Native students. Consistent with District averages, 30,636 of the students were economically disadvantaged and 9,800 were not.

Winter-to-Winter Changes by Grade Level

Table 2 shows the average NPR for students in grades 1 to 5 in 2020-21, who were enrolled in grades K to 4 in 2019-20. It presents average NPR for 2019-20 Winter and 2020-21 Winter, in addition to the difference between the two. The overall average decline in NPR between the two testing periods was 8.46 percentiles. This represents a 2-percentile difference from the Winter to next-Fall average decline of 6.37 percentiles reported in our previous analysis. That is, the Winter to next-Fall decline, which encompasses some expected “Summer Slide” effect,⁷ continued further into the Winter.

While the average NPR declined about 4-8 percentiles for grades 2 to 5, students who progressed from kindergarten to first grade experienced a larger drop in average NPR (19 percentiles). In comparing Winter to next-Fall and Winter-to-Winter performance differences, all grade levels except 2020-21 fourth grade showed further decline from 2020-21 Fall. First and fifth grades scored, respectively, 4.5 and 3.5 percentiles lower than where they were in 2020-21 Fall.

⁷ See: [A Four-Year Summary of “Summer” Learning Loss: Changes in K-2 Independent Reading Levels from June to November, 2016-2019](#), June 2020.

Table 2. aimswebPlus Reading National Percentile Rank by Grade Level, 2019-20 Winter to 2020-21 Winter

| Grade Level in 2020-21 | Number of students | Average 2019-20 Winter NPR* | Average 2020-21 Winter NPR** | Average NPR Differential |
|------------------------|--------------------|-----------------------------|------------------------------|--------------------------|
| 1 | 7436 | 42.49 | 23.34 | -19.15 |
| 2 | 8438 | 31.85 | 26.55 | -5.29 |
| 3 | 8500 | 32.38 | 25.68 | -6.70 |
| 4 | 8314 | 31.62 | 27.36 | -4.26 |
| 5 | 7792 | 32.39 | 24.32 | -8.07 |
| Total | 40480 | 33.97 | 25.51 | -8.46 |

* Last assessment window before Covid-19 school closure

** Latest assessment administered during Covid-19 school closure

How to read this table: The table shows performance in 2019-20 Winter and 2020-21 Winter for each grade level and the change from Winter to Winter. For example, there were 7,436 2020-21 first graders, who took an aimswebPlus Reading test who also took the comparable test in the 2019-20 Winter window, when they were kindergarteners. These students’ average NPR was 42nd percentile in 2019-20 Winter and 23rd percentile in 2020-21 Winter. The change from Winter to Winter for 2020-21 first graders was 19 percentiles.

In order to examine how much of the decline in NPR across grade levels observed in Table 2 is due to the change to virtual learning as a result of Covid-19, Table 3 presents a retrospective analysis of the past performance of the 19-20 Winter test takers included in the analysis in Table 2. Studying the patterns for the changes in average NPR between 2018-19 Winter and 2019-20 Winter, where instruction and testing happened completely in person and at school, can show us whether the decline in Table 2 is expected or due to online learning conditions.

Comparing the overall average NPR for the Winter test scores across the three years shows a changing pattern in 2020-21 (Tables 2 and 3). While the corresponding overall average NPR for 2018-19 and 2019-20 Winter assessments held steady around the 33rd percentile, the overall average NPR was the 26th in 2020-21 Winter, a difference of 7 percentiles. The January 2021 report had found a 2-percentile Winter-to-next-Fall decline under usual learning conditions, and Table 3 suggests that most students recover from that summer decline by the Winter assessment window.

When K-5 students were attending school in person, overall average NPR increased by .19 percentiles between 2018-19 Winter and 2019-20 Winter (Table 3). Table 3 also shows that students who were kindergarteners in 2018-19 Winter and first-graders in 2020-21 Winter experienced a decline in average NPR, unlike other grades. However, the Winter-to-Winter decline for first-graders in 2019-20 Winter was 3 percentiles compared to 19 percentiles for 2020-21 Winter first-graders. In addition, higher grade levels mostly experienced Winter-to-Winter improvements between 2018-19 Winter and 2019-20 Winter, in contrast to the 4-8 percentile decline from 2019-20 Winter to 2020-21 Winter. In previous years, all grade levels recovered from the “Summer Slide,” albeit to varying extents, by the Winter assessment window. In 2020-21, the expected Fall-to-Winter recovery was replaced with a further decline in performance.

Table 3. aimswebPlus Reading National Percentile Rank by Grade Level, 2018-19 Winter to 2019-20 Winter

| Grade Level in 2019-20 | Number of students | Average 2018-19 Winter NPR | Average 2019-20 Winter NPR | Average NPR Differential |
|------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| 1 | 7711 | 42.65 | 39.89 | -2.76 |
| 2 | 8797 | 30.78 | 32.56 | 1.78 |
| 3 | 8823 | 31.66 | 31.69 | 0.03 |
| 4 | 8832 | 30.73 | 32.41 | 1.69 |
| 5 | 7916 | 31.73 | 31.57 | -0.16 |
| Total | 42079 | 33.31 | 33.50 | 0.19 |

Winter-to-Winter Changes by Race/Ethnicity

In the section above, Tables 2 and 3 showed how the overall 9-percentile decline from 2019-20 Winter to 2020-21 Winter and the overall .19 percentile improvement from 2018-19 Winter to 2019-20 Winter were distributed across grade levels. Examining the 2019-20 Winter to 2020-21 Winter average NPR changes across racial/ethnic groups shows that the overall decline in average NPR was similar across all groups. All groups experienced declines in the 7-10 percentile range (Table 4), although Asian and Black/African American students experienced the largest declines (10 and 9 percentiles, respectively). The small group of 55 American Indian/Alaskan Native students were the only group that experienced any recovery from 2020-21 Fall, a marginal .07 percentiles.

Table 4. aimswebPlus Reading National Percentile Rank by Race/Ethnicity, 2019-20 Winter to 2020-21 Winter

| Race/Ethnicity | Number of students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|----------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| American Indian/Alaskan Native | 55 | 29.76 | 23.05 | -6.71 |
| Asian | 3867 | 47.54 | 37.89 | -9.66 |
| Black/African American | 18471 | 30.36 | 21.29 | -9.08 |
| Hispanic/Latino | 9925 | 25.90 | 19.04 | -6.86 |
| Multiracial/Other | 1595 | 40.83 | 32.44 | -8.40 |
| Native Hawaiian/Pacific Islander | 55 | 38.47 | 30.25 | -8.22 |
| White | 6512 | 46.77 | 38.30 | -8.47 |
| Total | 40480 | 33.97 | 25.51 | -8.46 |

The overall change from 2018-19 Winter to 2019-20 Winter was less than a 1-percentile improvement; NPR changes ranged from -0.6 to 1.5 percentiles for all groups except American Indian/Alaskan Native students. The 55 American Indian/Alaskan Native students performed 3 percentiles higher from 2018-19 Winter to 2019-20 Winter (Table 5). Again, compared to the Winter-to-next-Fall results reported earlier, Table 5 suggests an expected recovery for all groups, which did not materialize for any.

Table 5. aimswebPlus Reading National Percentile Rank by Race/Ethnicity, 2018-19 Winter to 2019-20 Winter

| Race/Ethnicity | Number of Students | Average 2018-19 Winter NPR | Average 2019-20 Winter NPR | Average NPR Differential |
|----------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| American Indian/Alaskan Native | 55 | 27.31 | 29.89 | 2.58 |
| Asian | 3660 | 46.38 | 46.77 | 0.39 |
| Black/African American | 19618 | 30.14 | 29.58 | -0.56 |
| Hispanic/Latino | 10306 | 25.63 | 27.08 | 1.45 |
| Multiracial/Other | 1917 | 38.49 | 38.63 | 0.14 |
| Native Hawaiian/Pacific Islander | 71 | 38.34 | 38.24 | -0.10 |
| White | 6452 | 46.24 | 46.61 | 0.37 |
| Total | 42079 | 33.31 | 33.50 | 0.19 |

The comparison of Winter-to-Winter average NPR performance shows mostly equal changes across students of different racial/ethnic groups; however, the change under in-person learning is a minor improvement, whereas it is a decline under online learning for all groups (Tables 4 and 5). As was concluded in the January 2021 report, **the year-to-year comparison shows the persistence of differences across racial/ethnic groups in overall performance as measured by NPR**. Asian and White students in this sample consistently scored at or above 35th percentile, despite the recent declines. Black/African American students in this sample consistently scored within the 20-30th average NPR range. Hispanic/Latino students in this sample scored lower, at the 19-27th average NPR rate.

Winter-to-Winter Changes by English Learner Status

AimswebPlus Reading average NPR performance from 2019-20 Winter to 2020-21 Winter by English Learner status is examined in Table 6. Interestingly, the Winter-to-Winter decline during this period of online learning was smaller for English Learners (5 percentiles) compared to non-English Learners (9 percentiles). However, the average NPR for English Learner students was at least 10 percentiles lower than non-English Learners, despite a higher decline for non-English Learners.

Table 6. aimswebPlus Reading National Percentile Rank by English Learner Status, 2019-20 Winter to 2020-21 Winter

| English Learner Status | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Non-English Learner | 34537 | 36.10 | 26.98 | -9.12 |
| English Learner | 5943 | 21.63 | 17.02 | -4.62 |
| Total | 40480 | 33.97 | 25.51 | -8.46 |

Note: English Learner status as of Winter 2020-21.

This pattern—overall lower performance by English Learners but a smaller decline in performance from Winter to Winter when compared to non-English Learners—holds for the in-person instruction and testing period results of 2018-19 Winter to 2019-20 Winter (Table 7). In fact, English Learners did not show a Winter-to-Winter decline in this period, while non-English

Learners showed a 0.16-percentile decline. However, the overall reading performance of English Learners (21-24th percentiles on average) was lower than non-English learners' (35th percentile on average).

Table 7. aimswebPlus Reading National Percentile Rank by EL Status, 2018-19 Winter to 2019-20 Winter

| English Learner Status | Number of Students | Average 2018-19 Winter NPR | Average 2019-20 Winter NPR | Average NPR Differential |
|------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Non-English Learner | 36442 | 35.18 | 35.02 | -0.16 |
| English Learner | 5637 | 21.20 | 23.66 | 2.46 |
| Total | 42079 | 33.31 | 33.50 | 0.19 |

Note: English Learner status as of Winter 2019-20.

Winter-to-Winter Changes by 2020-21 Winter Performance Tiers

As detailed in the January 2021 report,⁸ SDP uses performance tiers based on the number of correct answers on aimswebPlus for targeting necessary interventions. In order to understand whether students who were at different performance levels experienced Winter to Winter performance changes differently, Tables 8 and 9 compare the Winter to Winter change in average NPR by the performance tiers the students were placed in based on their performance in 2020-21 and 2019-20 Winter testing windows. For example, Table 8 shows the change from 2019-20 Winter to 2020-21 Winter for students who placed in the three performance tiers based on their aimswebPlus Reading scores in the 2020-21 Winter window for NWF for first grade and ORF in other grades. Because performance tiers are indirectly associated with NPR, it is expected that students in Tier 1 have a higher average NPR and those in Tier 3 have a lower average NPR.

The change in average NPR from Winter to Winter varies by tier (Tables 8 and 9). Students who placed in Tier 2 in 2020-21 Winter experienced the largest decline, on average, from 41st percentile in 2019-20 Winter to 29th percentile in 2020-21 Winter. This 13-percentile decline is higher than the decline experienced by students who placed in Tier 1 (4 percentiles) or Tier 3 (9 percentiles) showed (Table 8).

⁸ See [the January 2021 report](#), p. 5.

Table 8. aimswebPlus Reading National Percentile Rank by 2020-21 Winter Performance Tiers, 2019-20 Winter to 2020-21 Winter

| 2020-21 Winter Performance Tier | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|---------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Tier 1 | 11032 | 66.96 | 63.04 | -3.92 |
| Tier 2 | 7080 | 41.17 | 28.70 | -12.47 |
| Tier 3 | 22368 | 15.42 | 6.00 | -9.43 |
| Total | 40480 | 33.97 | 25.51 | -8.46 |

How to read this table: This table includes 40,480 students who were in grades 1-5 in 2020-21 Winter, in grades K-4 in 2019-20 Winter and took comparable tests in both testing windows. These students are grouped according to the performance tiers they placed in based on their 2020-21 Winter performance and average NPR were calculated for the three groups for the two testing windows. According to the table, 11,032 students placed in Tier 1 in 2020-21 Winter and these students, on average, scored at 67th percentile in 2019-20 Winter and at 63rd percentile in 2020-21 Winter. These represent, on average, a 4-percentile decline between the two windows.

In our Winter-to-next-Fall analysis, we observed that students who placed in Tier 1 based on their 2019-20 Fall aimswebPlus Reading scores showed an 8-percentile decline from their average NPR performance from 2018-19 Winter. When this analysis is repeated for students who placed in Tier 1 in 2019-20 Winter, we observe that the average NPR for 2019-20 Winter Tier 1 students is 6 percentiles higher compared to their average 2018-19 Winter NPR.

In 2020-21 Winter, Tier 2 students showed a 13-percentile Winter-to-Winter decline under online learning. In comparison, students who placed in Tier 2 in 2019-20 Winter showed only a 3-percentile Winter-to-Winter decline. Tier 3 students in the sample also experienced Winter-to-Winter average NPR decline of 4 percentiles for 2019-20 Winter Tier 3 students and 9 percentiles for 2020-21 Winter Tier 3 students.

Table 9. aimswebPlus Reading National Percentile Rank by 2019-20 Winter Performance Tiers, 2018-19 Winter to 2019-20 Winter

| 2019-20 Winter Performance Tier | Number of Students | Average 2018-19 Winter NPR | Average 2019-20 Winter NPR | Average NPR Differential |
|---------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Tier 1 | 16261 | 59.53 | 65.21 | 5.68 |
| Tier 2 | 7777 | 31.43 | 28.80 | -2.63 |
| Tier 3 | 18041 | 10.48 | 6.95 | -3.54 |
| Total | 42079 | 33.31 | 33.50 | 0.19 |

How to read this table: This table includes 42,079 students who were in grades 1-5 in 2019-20 Winter, in grades K-4 in 2018-19 Winter, and took comparable tests in both testing windows. These students are grouped according to the performance tiers they placed in based on their 2019-20 Winter performance, and average NPR was calculated for the three groups for the two testing windows. According to the table, 16,261 students placed in Tier 1 in 2020-21 Winter and these students, on average, scored at 60th percentile in 2018-19 Winter and at 65th percentile in 2019-20 Winter. This represents, on average, a 6-percentile increase between the two windows.

Winter-to-Winter Changes by Economic Disadvantage

We analyze the average NPR and changes from 2019-20 Winter to 2020-21 Winter with respect to economic disadvantage status in Tables 10 and 11. Results are similar to the results of other demographic breakouts: Winter-to-Winter change is minimal during in-person instruction, but

there is an 8-10-percentile decline under online instruction. This decline is similar among economically disadvantaged and non-disadvantaged students. However, looking across the results presented in Tables 10 and 11 shows the persistence of differences in average NPR in Reading scores between economically disadvantaged and non-disadvantaged students. In all testing windows studied, students who are not economically disadvantaged perform, on average, about 14 percentiles higher than economically disadvantaged students. One relatively positive finding might be that the performance difference between the two groups has not increased during the period of online instruction.

Table 10. aimswebPlus Reading National Percentile Rank by Economic Disadvantage, 2019-20 Winter to 2020-21 Winter

| Economic Disadvantage Status | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|-------------------------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------------|
| Economically Disadvantaged | 30636 | 30.48 | 22.13 | -8.35 |
| Not Economically Disadvantaged | 9800 | 44.90 | 36.11 | -8.79 |
| Total | 40480 | 33.97 | 25.51 | -8.46 |

Note: There were 44 students whose economic disadvantage status was not known. They are included in the counts; however, data on their performance are not reported.

Table 11. aimswebPlus Reading National Percentile Rank by Economic Disadvantage, 2018-19 Winter to 2019-20 Winter

| Economic Disadvantage Status | Number of Students | Average 2018-19 Winter NPR | Average 2019-20 Winter NPR | Average NPR Differential |
|-------------------------------------|---------------------------|-----------------------------------|-----------------------------------|---------------------------------|
| Economically Disadvantaged | 31750 | 29.82 | 30.29 | 0.47 |
| Not Economically Disadvantaged | 10037 | 44.45 | 43.72 | -0.74 |
| Status Unknown | 292 | 29.31 | 31.30 | 1.99 |
| Total | 42079 | 33.31 | 33.50 | 0.19 |

Star

Star Reading: Analysis of 2019-20 Winter to 2020-21 Winter Changes in National Percentile Rank

Students who were required to take Star Reading and Math assessments in both 2019-20 Winter and 2020-21 Winter are in grades 7-11 in the current (2020-21) school year. For these students, the overall average NPR for Star Reading was the 25th percentile in all windows analyzed: 2019-20 Winter, 2020-21 Fall, and 2020-21 Winter windows (a 0.09 percentile Winter-to-next-Fall decline and 0.06 percentile Winter-to-Winter decline).

The number of students in grades 7-11 in 2020-21, who were in grades 6-10 in 2019-20 and who took Star Reading in both 2019-20 Winter and 2020-21 Winter, was 23,732. Black/African American students constituted 47% of the cohort, in addition to 21% Hispanic/Latino students, 15% White students, and 11% Asian students. Of these students, 12% were English Learners and 68% were economically disadvantaged. Demographic distributions conform with the profiles of 2020-21 Fall test takers. Forty-one percent of the students in this cohort were placed in the Intensive Intervention tier based on their 2020-21 Winter Star Reading performance (compared to 40% in the previous window).

Winter-to-Winter Changes by Grade Level

Examining the average NPR differences by grade level shows that grades 7 to 9 experienced a 0.3- to 0.6-percentile decline, while grades 10 and 11 experienced a 0.7 and 1.5-percentile respective improvement in average NPR (Table 12). Average NPR did not vary much between grade levels, ranging from 23 to 26th percentiles.

Table 12. Star Reading National Percentile Rank by Grade Level, 2019-20 Winter to 2020-21 Winter⁹

| Grade Level in 2020-21 | Number of Students | Average 2019-20 Winter NPR* | Average 2020-21 Winter NPR | Average NPR Differential |
|------------------------|--------------------|-----------------------------|----------------------------|--------------------------|
| 7 | 5926 | 25.82 | 25.18 | -0.64 |
| 8 | 5325 | 25.25 | 24.77 | -0.48 |
| 9 | 4019 | 25.94 | 25.66 | -0.29 |
| 10 | 4636 | 22.32 | 22.99 | 0.68 |
| 11 | 3826 | 23.16 | 24.66 | 1.50 |
| Total | 23732 | 24.60 | 24.66 | 0.06 |

* The students whose results are shown here are those who have been tested both in 2019-20 Winter and 2020-21 Winter. This is not necessarily the same set of students who have been tested both in 2019-20 and 2020-21 Fall. For this reason, results for 2019-20 Winter may differ from the January 2021 report.

⁹ Average NPR for the 36,464 students who took Star Reading in 2020-21 Winter was 26. Comparing the 2020-21 Winter average NPR for all test takers vs. study cohort, 7th and 8th grade cohort students performed about 1 percentile better than all test takers, 9th grade outcomes were the same, and 10th and 11th grade cohort students performed 3-4 percentiles worse than the whole sample of test takers.

Winter-to-Winter Changes by Race/Ethnicity

Among racial/ethnic groups with large enough sample sizes, the only notable differences between 2019-20 Winter and 2020-21 Winter Star Reading average NPR were Asian students performing 3 percentiles higher and White students performing 1 percentile lower (Table 13). The subgroup differences in the average NPR itself continue to give us a more nuanced picture than the subgroup differences in Winter-to-Winter changes. Asian and White students scored around the 35th percentile, while Black/African American and Hispanic/Latino students scored around 15 percentiles lower, at the 20th percentile.

Table 13. Star Reading National Percentile Rank by Race/Ethnicity, 2019-20 Winter to 2020-21 Winter

| Race/Ethnicity | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|----------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| American Indian/Alaskan Native | 64 | 31.47 | 29.67 | -1.80 |
| Asian | 2707 | 33.01 | 36.11 | 3.10 |
| Black/African American | 11231 | 20.74 | 20.44 | -0.30 |
| Hispanic/Latino | 4877 | 19.41 | 19.66 | 0.25 |
| Multiracial/Other | 1189 | 28.02 | 27.82 | -0.20 |
| Native Hawaiian/Pacific Islander | 31 | 29.87 | 32.58 | 2.71 |
| White | 3633 | 35.96 | 34.69 | -1.26 |
| Total | 23732 | 24.60 | 24.66 | 0.06 |

Winter-to-Winter Changes by English Learner Status

English Learners improved their Star Reading average NPR by 2 percentiles from 2019-20 Winter to 2020-21 Winter (Table 14). However, the average NPR for English Learners was around the 9th percentile, compared to the 27th percentile for non-English Learners. This is a persistent difference of more than 15 percentiles between the two groups.

Table 14. Star Reading National Percentile Rank by EL Status, 2019-20 Winter to 2020-21 Winter

| English Learner Status | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Non-English Learner | 20794 | 27.13 | 26.87 | -0.27 |
| English Learner | 2938 | 6.69 | 9.05 | 2.36 |
| Total | 23732 | 24.60 | 24.66 | 0.06 |

Winter-to-Winter Changes by Winter Performance Tier

Students who placed at the At/Above Benchmark tier based on their 2020-21 Winter Star Reading performance improved from their 2019-20 Winter NPR performance by 8 percentiles (Table 15). Students who placed at the On Watch tier also improved, but only marginally. Students who placed in either intervention tiers, on average, showed a 3-4-percentile decline from their average NPR in 2019-20 Winter.

Table 15. Star Reading National Percentile Rank by 2020-21 Winter Performance Tiers

| 2020-21 Winter Performance Tier | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|---------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| At/Above Benchmark (40-100%) | 6123 | 52.50 | 60.71 | 8.20 |
| On Watch (25-39%) | 3329 | 30.69 | 31.53 | 0.84 |
| Strategic Intervention (10-24%) | 4656 | 19.54 | 16.37 | -3.16 |
| Intensive Intervention (<10%) | 9624 | 7.19 | 3.35 | -3.83 |
| Total | 23732 | 24.60 | 24.66 | 0.06 |

How to read this table: This table includes 23,732 students who took the Star Reading assessment when they were in grades 6-10 in 2019-20 Winter and in grades 7-11 in 2020-21 Winter. These students are grouped into four performance tiers based on their 2020-21 Winter performance. Unlike aimswebPlus, Star performance tiers are based on NPR: At/Above Benchmark students have scored between the 40th and 100th percentiles. Students who scored at the At/Above Benchmark tier in 2020-21 scored, on average, at the 61st percentile, whereas they had scored, on average, at the 53rd percentile the previous winter. Thus, high-performing students showed an 8-percentile improvement, on average.

Winter-to-Winter Changes by Economic Disadvantage

Similar to patterns observed in other demographic categories, the change in average NPR in Star Reading from 2019-20 Winter to 2020-21 Winter was minimal for both economically disadvantaged and non-economically disadvantaged students (Table 16). Also similar to previous findings, the two groups differed in average NPR consistently across testing windows. Economically Disadvantaged students scored at the 22nd percentile, and non-economically disadvantaged students scored at the 31st percentile, a 9-percentile difference.

Table 16. Star Reading National Percentile Rank by Economic Disadvantage, 2019-20 Winter to 2020-21 Winter

| Economic Disadvantage Status | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|--------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Economically Disadvantaged | 16228 | 21.63 | 21.83 | 0.20 |
| Not Economically Disadvantaged | 7472 | 31.04 | 30.81 | -0.23 |
| Total | 23732 | 24.60 | 24.66 | 0.06 |

Note: There were 32 students whose economic disadvantage status was not known. They are included in the counts; however, data on their performance are not reported.

Star Math: Analysis of 2019-20 Winter to 2020-21 Winter Changes in National Percentile Rank

For students who were in grades 7-11 in 2020-21 Winter and took Star Math in both Winter testing windows, the overall average NPR for Star Math was the 36th percentile in 2019-20 Winter and the 39th percentile in 2020-21 Winter (a 2.89-percentile improvement).

The number of students who took Star Math in both 2019-20 Winter and 2020-21 Winter was 22,335. Students who took Star Math in both windows were similarly distributed across racial/ethnic groups: 47% of students were Black/African American, 20% were Hispanic/Latino, 15% were White, and 12% were Asian. Of the cohort, 13% were English Learners and 68% were economically disadvantaged. In terms of overall 2020-21 Winter Star Math performance, 25% of the students in this cohort were placed in the Intensive Intervention tier.

Winter-to-Winter Changes by Grade Level

Although there was not a considerable change in average NPR from 2019-20 Winter to 2020-21 Winter overall, the 3-percentile change was not even observed in all grade levels. Students who were ninth-graders in 2019-20 and tenth-graders in 2020-21 improved by 5 percentiles (Table 17). According to our previous analysis, 2020-21 seventh- and eighth-graders each experienced a Winter-to-next-Fall decline of around 5 percentiles; these students' average NPR improved 2-4 percentiles Winter to Winter. The average NPRs in both testing windows vary in a narrow 35 to 41st percentile range across grade levels.

Table 17. Star Math National Percentile Rank by Grade Level, 2019-20 Winter to 2020-21 Winter¹⁰

| Grade Level in 2020-21 | Number of Students | Average 2019-20 Winter NPR* | Average 2020-21 Winter NPR | Average NPR Differential |
|------------------------|--------------------|-----------------------------|----------------------------|--------------------------|
| 7 | 5299 | 35.07 | 37.50 | 2.44 |
| 8 | 5236 | 34.66 | 38.34 | 3.68 |
| 9 | 3875 | 37.90 | 40.40 | 2.50 |
| 10 | 4482 | 35.62 | 40.65 | 5.03 |
| 11 | 3443 | 40.20 | 40.22 | 0.02 |
| Total | 22335 | 36.37 | 39.25 | 2.89 |

*The students whose results are shown here are those who have been tested in both 2019-20 Winter and 2020-21 Winter. This is not necessarily the same set of students who have been tested in both 2019-20 and 2020-21 Fall. For this reason, results for 2019-20 Winter may differ from the January 2021 report.

Winter-to-Winter Changes by Race/Ethnicity

Except for the small number of American Indian/Alaskan Native students, all students of all racial/ethnicity groups experienced an increase in average NPR from 2019-20 Winter to 2020-21 Winter. The increase was highest for the small group of Native Hawaiian/Pacific Islander students (8 percentiles) and Asian students (6 percentiles), and it was in the 2-4-percentile range for other groups.

¹⁰ Average NPR for the 35,773 students who took Star Math in 2020-21 Winter was 40.12, about 1 percentile higher than the study cohort students. All tenth and eleventh grade Star Math test takers respectively scored 4 and 5 percentiles higher than the tenth- and eleventh-graders in the cohort. For other grade levels cohort students performed up to 2 percentiles higher than the whole sample of test takers.

Table 18. Star Math National Percentile Rank by Race/Ethnicity, 2019-20 Winter to 2020-21 Winter

| Race/Ethnicity | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|----------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| American Indian/Alaskan Native | 59 | 43.22 | 40.92 | -2.31 |
| Asian | 2644 | 58.78 | 64.85 | 6.07 |
| Black/African American | 10495 | 29.99 | 32.12 | 2.14 |
| Hispanic/Latino | 4553 | 29.94 | 33.18 | 3.24 |
| Multiracial/Other | 1161 | 36.76 | 40.40 | 3.64 |
| Native Hawaiian/Pacific Islander | 30 | 48.03 | 55.77 | 7.73 |
| White | 3393 | 46.89 | 48.93 | 2.04 |
| Total | 22335 | 36.37 | 39.25 | 2.89 |

Winter-to-Winter Changes by English Learner Status

Changes in Average NPR for Star Math from 2019-20 Winter to 2020-21 Winter by English Learner status show that English Learners demonstrated a higher increase (6 percentiles) than non-English Learners (2 percentiles) (Table 19). As with our Winter-to-next-Fall analysis and our analyses of aimswebPlus Reading and Star Reading results above, the more interesting finding in the average NPR comparison between the two testing windows is the persistence of performance differentials between the two groups. Despite showing more improvement, English Learners scored, on average, about 10 percentiles lower than non-English Learners (31st and 41st percentiles, respectively).

Table 19. Star Math National Percentile Rank by English Learner Status, 2019-20 Winter to 2020-21 Winter

| English Learner Status | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Non-English Learner | 19418 | 38.05 | 40.45 | 2.40 |
| English Learner | 2917 | 25.15 | 31.27 | 6.12 |
| Total | 22335 | 36.37 | 39.25 | 2.89 |

Winter-to-Winter Changes by Winter Performance Tier

Students who performed best in the 2020-21 Winter Star Math assessment improved their performance on the 2019-20 Winter Star Math assessment by 11 percentiles, on average (Table 20). Students who performed at the two intervention tiers showed a decline from 5 to 6 percentiles.

Table 20. Star Math National Percentile Rank by 2020-21 Winter Performance Tiers

| 2020-21 Winter Performance Tier | Number of Students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|---------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| At/Above Benchmark (40-100%) | 10487 | 57.03 | 68.07 | 11.03 |
| On Watch (25-39%) | 2538 | 31.15 | 32.10 | 0.95 |
| Strategic Intervention (10-24%) | 3662 | 21.43 | 16.18 | -5.25 |
| Intensive Intervention (<10%) | 5648 | 10.01 | 3.92 | -6.09 |
| Total | 22335 | 36.37 | 39.25 | 2.89 |

How to read this table: This table includes 22,335 students who took the Star Math assessment when they were in grades 6-10 in 2019-20 Winter and in grades 7-11 in 2020-21 Winter. These students are grouped into four performance tiers based on their 2020-21 Winter performance. Star performance tiers are based on NPR: At/Above Benchmark students have scored between 40th to 100th percentiles. Students who scored at the At/Above Benchmark tier in 2019-20 Winter scored, on average, at the 57th percentile, and in 2020-21 Winter they scored, on average, at the 68th percentile, an improvement of 11 percentiles. Students who scored in the Intensive Intervention Tier in 2020-21 Winter decreased an average of 6 percentiles in their performance from 2019-20 Winter to 2020-21 Winter.

Winter-to-Winter Changes by Economic Disadvantage

Economically disadvantaged students in the analytic sample consistently performed at the 34-36th percentile range, on average, compared to non-economically disadvantaged students who performed at the 44-47th percentile range, on average (Table 21). Both groups of students demonstrated an increase of 3 percentiles in the average NPR between 2019-20 Winter to 2020-21 Winter.

Table 21. Star Math National Percentile Rank by Economic Disadvantage, 2018-19 Winter to 2019-20 Winter

| Economic Disadvantage Status | Number of students | Average 2019-20 Winter NPR | Average 2020-21 Winter NPR | Average NPR Differential |
|--------------------------------|--------------------|----------------------------|----------------------------|--------------------------|
| Economically Disadvantaged | 15199 | 33.45 | 36.10 | 2.66 |
| Not Economically Disadvantaged | 6811 | 43.49 | 46.91 | 3.42 |
| Status Unknown | 325 | 23.61 | 26.10 | 2.50 |
| Total | 22335 | 36.37 | 39.25 | 2.89 |

Note: There were 19 students whose economic disadvantage status was not known. They are included in the counts; however, data on their performance are not reported.

Conclusions

As a result of the Covid-19 school closures in spring 2020, SDP did not administer the planned District-wide assessments for reading and math (aimswebPlus for grades K-5 and Star for grades 6-12) nor the state standardized assessments (PSSA). To examine whether student performance declined as a result of Covid-19 school closures and the resulting online learning approach, we examined student performance on the last available test in 2019-20 (the Winter testing window) and compared it to their performance on the first available test in 2020-21 (the Fall testing window) in a previous report. In this addendum, we report on 2020-21 Winter assessment results from the same set of students who took comparable tests in the 2019-20 Winter testing window.

We found that aimswebPlus Reading performance for students in grades 1-5 in 2020-21 (who were in K-4 in 2019-20) declined an average of 8.5 percentiles from 2019-20 Winter to 2020-21 Winter. Under usual conditions, students might experience a “summer learning loss” from the previous year to the first testing window in the fall, which was observed in both 2018-19 to 2019-20 and 2019-20 to 2020-21. However, under usual conditions, students are also expected to recover from the summer learning loss by the subsequent testing window. This recovery was observed in Winter-to-Winter comparisons of 2018-19 to 2019-20 performance; however, 2019-20 to 2020-21 comparisons showed further decline. The Winter-to-Winter decline was most pronounced for the 2020-21 first graders.

For students in grades 7 to 11 (who were in grades 6-10 in 2019-20), performance on Star Reading and Star Math, as measured by NPR, did not change significantly from 2019-20 Winter to 2020-21 Fall. Analysis of performance details across demographic groups highlight no difference in the way performance changed before and after the transition to online learning, aside from persistent performance differences between subgroups that remained consistent during this period of change.

For both aimswebPlus and Star results, the changes from 2019-20 Winter to 2020-21 Fall are not very different between demographic groups; that is, online learning did not impact different groups disproportionately. However, as the January 2021 report found, the pre-online learning performance differences between demographic groups continued to persist.

Appendix

Table A.1. Comparison of the Winter-to-Winter Cohort to all 2020-21 Winter test takers and the Fall to Winter Cohort (January 20201 Report)

| | Assessed in both 2019-20 Winter and 2020-21 Winter (Addendum Cohort) | All Students Assessed in 2020-21 Winter* | Assessed in both 2019-20 Winter and 2020-21 Fall (Report Cohort) | All Students Assessed in 2020-21 Fall* |
|-------------------------------|---|---|---|---|
| aimswwebPlus Reading | | | | |
| Number of Students | 40,480 | 44,247 | 41,145 | 44,202 |
| Average NPR in 2020-21 Window | 25.51 (Winter) | 25.01 | 27.29 (Fall) | 26.78 |
| Star Reading | | | | |
| Number of Students | 23,732 | 36,464 | 25,263 | 38,217 |
| Average NPR in 2020-21 Window | 24.66 (Winter) | 26 (Winter) | 24.73 | 26.1 |
| Star Math | | | | |
| Number of Students | 22,335 | 35,773 | 23,642 | 37,231 |
| Average NPR in 2020-21 Window | 39.25 (Winter) | 40.12 (Winter) | 38.29 | 39.6 |

*Only "All Students" who were in the grade levels studied here were included. These grade levels are grades 1-5 for aimswwebPlus and 7-11 for Star.

Table A.2. Demographic Breakdown of 2019-20 Winter to 2020-21 Winter Cohort

| Race/Ethnicity | aimswebPlus Reading | | Star Reading | | Star Math | |
|----------------------------------|---------------------|-------------|--------------------|-------------|--------------------|-------------|
| | Number of Students | % of Cohort | Number of Students | % of Cohort | Number of Students | % of Cohort |
| American Indian/Alaskan Native | 64 | .1% | 64 | .3% | 59 | .3% |
| Asian | 2707 | 10% | 2707 | 11% | 2644 | 12% |
| Black/African American | 11231 | 46% | 11231 | 47% | 10495 | 47% |
| Hispanic/Latino | 4877 | 25% | 4877 | 21% | 4553 | 20% |
| Multiracial/Other | 1189 | 4% | 1189 | 5% | 1161 | 5% |
| Native Hawaiian/Pacific Islander | 31 | .1% | 31 | .1% | 30 | .1% |
| White | 3633 | 16% | 3633 | 15% | 3393 | 15% |
| | | | | | | |
| Non-English Learner | 34537 | 85% | 20794 | 88% | 19418 | 87% |
| English Learner | 5943 | 15% | 2938 | 12% | 2917 | 13% |
| | | | | | | |
| Economically Disadvantaged | 30636 | 76% | 16228 | 68% | 15199 | 68% |
| Not Economically Disadvantaged | 9800 | 24% | 7472 | 31% | 6811 | 30% |
| Status Unknown | 44 | .1% | 32 | .1% | 325 | 1% |
| | | | | | | |
| Total | 40480 | 100% | 23732 | 100% | 22335 | 100% |