MINNESOTA

Student Learning Loss and Recovery

2018-2022

Blandin Foundation™
STRENGTHENING RURAL MINNESOTA

ABOUT THE AUTHORS

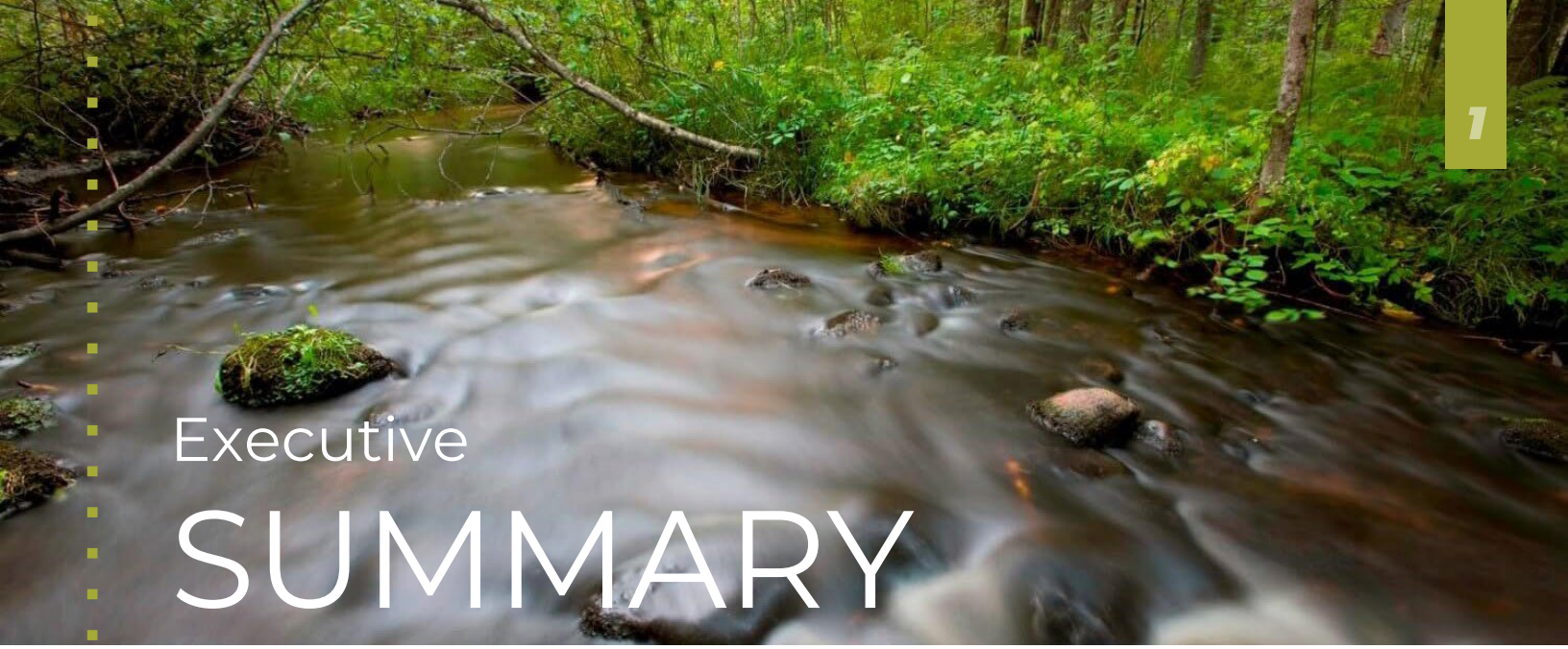
This report was conducted by external researchers at E&F Services, with funding provided by the Blandin Foundation.

Philip A. Jensen, PhD, is a former professor and college administrator. He lives in Duluth, MN, with his wife and son.

Fred Nolan, PhD, has been a teacher, principal, superintendent in rural Minnesota and executive director of the Minnesota Rural Education Association (MREA). He lives in Isanti, MN, with his wife and consults for school districts.

Disclaimer: This research report has been conducted by a third party and is being provided for informational purposes. The findings presented in this report are those of the third party and do not necessarily reflect the views of Blandin Foundation. The third party is responsible for the accuracy, completeness, and reliability of the information contained in this report.

Table of Contents



1

Executive SUMMARY

AMPLE EVIDENCE SHOWS that the COVID-19 pandemic had substantial effects on student learning as measured by standardized test scores.

» National Assessment for Educational Progress (NAEP) scores for fourth grade math dropped 5 points, to 2003 levels, and eighth grade math scores dropped 8 points, to 2000 levels. (Schneider M., 2022)

» Using 29 states' NAEP testing data, researchers found that "the average U.S. public school student in grades 3-8 lost the equivalent of a half-year of learning in math and a quarter-year in reading." (Kane, T.J. & Reardon, S., 2022)

But what about learning recovery after the pandemic, when students for the most part returned to in-person learning in the 2021-22 school year? Four scenarios of recovery have been proposed: “No recovery (academic downward spiral), L-shaped recovery, U-shaped recovery, and V-shaped recovery.” (Betebenner, D.W., Wenning, R.J.; 2021)

Coming out of the pandemic, the Blandin Foundation, the largest Minnesota-based foundation focused on rural communities, sought to explore the effects of the pandemic on student learning and post-pandemic academic recovery, with an emphasis on understanding any differences between rural and Metro districts.

The average U.S. public school student in grades 3-8 lost the equivalent of a half-year of learning in math and a quarter-year in reading.

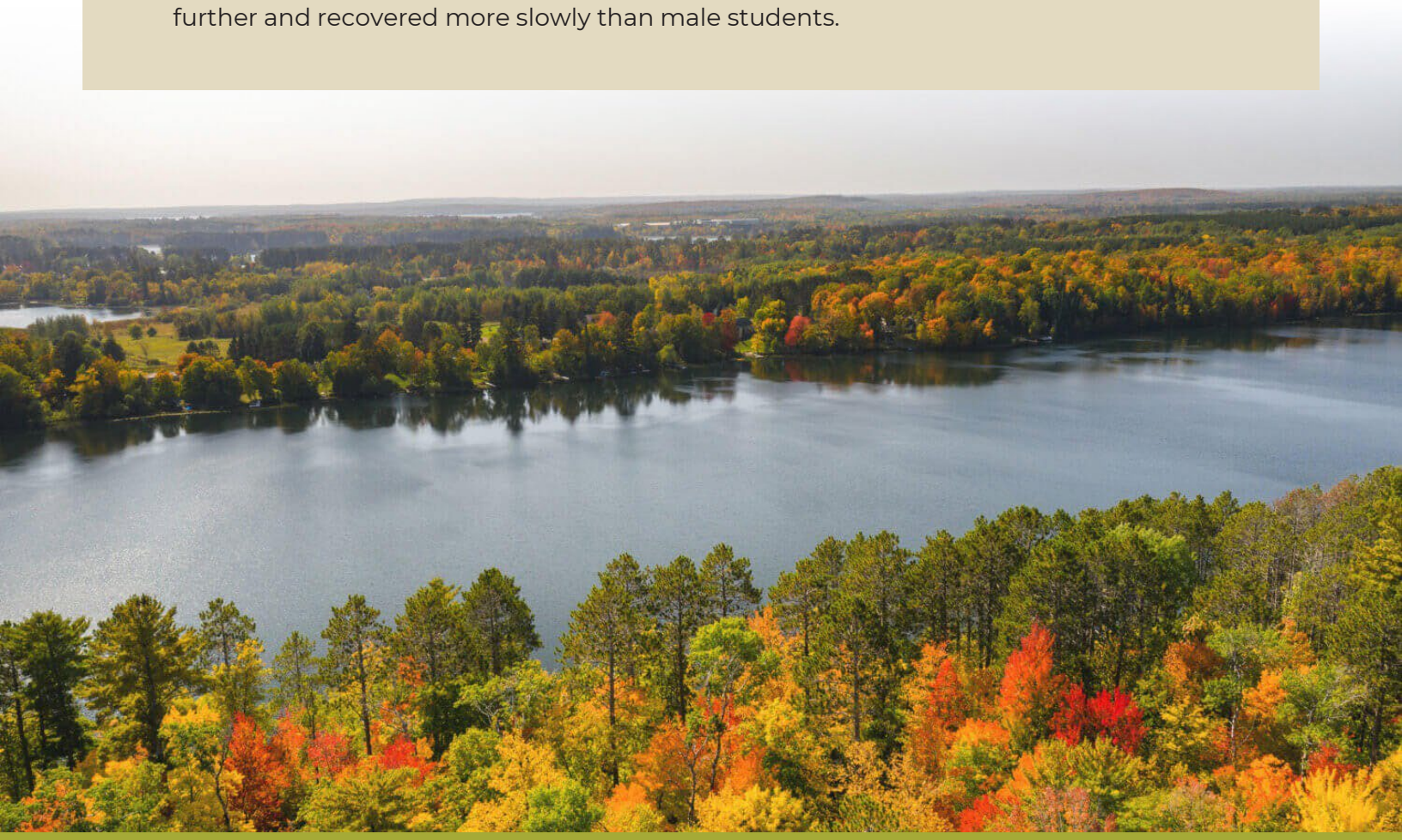
This study analyzed 2018-2022 statewide testing data from students in grades 3-8, 10 and 11 across 308 Minnesota K-12 school districts. Key findings from this analysis include:

A Decline in Test Scores — 2019-2021

- The average decrease in proficiency across districts statewide was 16% in reading and 22% in math between 2019 and 2021 (across all grades).
- Middle school grades experienced the biggest drops in proficiency, followed by elementary school then high school grades.
- The decline in scores had no relationship to high-speed broadband availability within households in the district.
- Rural reading proficiency dropped further than in metro districts, but rural and metro districts experienced similar drops in math.

An L-Shaped Recovery — 2021-2022

- Test score data reveal an L-shaped recovery from 2021 to 2022, with minimal gains or in some cases continued declines in the percent of proficient students. This pattern was evident in overall scores and at nearly every grade level.
- The scores revealed a difference in math achievement by gender: female students declined further and recovered more slowly than male students.



2

Context Within RECENT LITERATURE

IN OCTOBER 2022 the National Center for Education Statistics (NCES) and Harvard University released national reports with state- and district-level data showing substantial losses in student achievement from 2019-2022, with state-level reports that included Minnesota.

NCES used the National Assessment of Educational Progress (NAEP), which is normally administered every two years to a random sample of fourth and eighth graders, but due to the pandemic was administered with a three-year gap in 2019 and 2022.

Minnesota's average NAEP reading scores for fourth graders declined seven points, twice the national decline. Minnesota's average reading scores for eighth graders declined four points, similar to the national decline of three points (Nation's Report Card 2022, 2022 Reading State Snapshot, Minnesota Grade 4 and Grade 8).

Minnesota's average NAEP math scores for fourth graders declined nine points, nearly twice the national average decline. Minnesota's average math scores for eighth grade declined 11 points, compared to the national decline of eight points (Nation's Report Card 2022, 2022 Mathematics State Snapshot, Minnesota Grade 4 and Grade 8).

Reading scores for 4th graders declined 7 points – twice the national decline.

Math scores declined 9 points – nearly twice the national average.

The Harvard study (Education Recovery Scorecard) used district proficiency percentages for all students tested from 29 states that released 2022 district-level data. They used the NAEP scores to adjust each state's data to be comparable across the nation.

Their topline conclusion was a half-year loss in math achievement and a quarter-year loss in reading achievement. They also reported the following findings:

- Achievement losses varied dramatically among districts in the same state.
- In math, losses were larger in urban districts than in rural, suburban, or town districts.
- School closures do not appear to be the primary factor driving achievement losses.
- The losses were larger in higher-poverty districts, but there was considerable variation in the magnitude of losses among districts with similar poverty rates.

The Education Recovery Scorecard reinforced the Nation's Report Card's finding that Minnesota students lost a greater level of achievement than the 29-state national average:

> *Statewide, Minnesota lost almost an entire academic year (-0.97 grade equivalents) of learning in math between 2019 and 2022, and over four months (-0.52) in reading. The data for individual districts varies widely, with some districts' achievement losses amounting to over a year in one or more subjects (Education Recovery Scorecard, Minnesota State Report).*

In another study, NWEA reported on trends during and after the COVID-19 pandemic. More than 5.5 million students in grade three through eight take NWEA's Map Growth assessments in reading and math twice or three times a year. Tracking students' test scores in 2021-22 and into the fall of 2022, NWEA reported:

> *Most students are still years away from a full recovery, especially the youngest and oldest students we studied....Math gaps have shrunk by slightly larger percentages (15–43%) compared to reading (10–38%). The oldest (students in eighth grade in fall 2022) and the youngest cohorts (students in third grade in fall 2022) show less improvement in reading and math (gaps have only decreased by 10–17%) compared to the other cohorts (gaps have decreased by 23–43%). (Lewis, K., & Kuhfeld, M.; 2022)*

The contributions of our study reinforce and add Minnesota-specific nuance to many of the above findings with district-level data. Specifically, we explored relationships between test scores and broadband availability, gender, and rural or metro districts.

Data Limitations

- This analysis encompasses the first full year of academic recovery following the pandemic. Two years of recovery compared to two years of pandemic learning will likely provide a more complete picture of relevant patterns.
- 2020 MCA data was not available. However, this does not impact the trend analysis of test scores since baseline and end point data is still available.
- Aggregated gender data for students taking the MCA exams include only male and female options. 2018 gender data was not available so the baseline year for the gender analysis is 2019.
- Test score data are just one measurement of learning and can be supplemented with other evidence and information about student learning when being used in decision-making.

3

Findings

3.1 Mean District Scores in Reading and Math

The mean district proficiencies in reading and math dropped significantly during the COVID-19 pandemic, especially between the 2019 and 2021 MCA exams.[1] Proficiency dropped more sharply in math than in reading, even after correcting for baseline differences between the two subjects. Only a small proportion of learning loss, if any, was recovered in the 2021-22 school year.

Reading: In 2019, the last testing year before COVID-19, the mean district proficiency level in the seven grades that took the exam was 59%. This is only trivially different from the proficiency level on the same exam in 2018, which was a mere 0.5 percentage points higher. Mean district proficiency in reading dropped nine percentage points between 2019 and 2021, to 50% then did not change between 2021 and 2022.

In this report we will focus primarily on the percent change from pre-pandemic levels of proficiency, rather than on raw scores. Similarly, the figures show proficiency scores as a percentage of 2018 proficiency. This approach allows us to create consistent comparisons, correcting for different baseline levels of proficiency within each school district and across the math and reading exams.

Proficiency in reading dropped 9 percentage points to 50.0% from 2019 to 2021.

[1] In this report, the 'mean district proficiency' refers to the average of the individual districts' proficiency scores. We calculated the mean across grades for each district and then calculated the mean of these district-level scores to get a statewide score. This means that the average MN district's proficiency across all grades was 59% in 2019.

By this measure, districts' reading proficiencies saw an average drop of 16% from 2019 to 2021. (Again, this does not mean that proficiency itself dropped 16 percentage points – it means that the score dropped 16% from the 2019 level. For example, because the 2019 score was about 59% proficiency, this 16% change corresponds to about 9 actual percentage points in the 2019 figure). Mean reading proficiency scores showed no recovery from 2021-2022, and in fact decreased slightly by 0.1% between the two years. This "L-shaped" pattern of proficiency levels is shown in Figure 1.

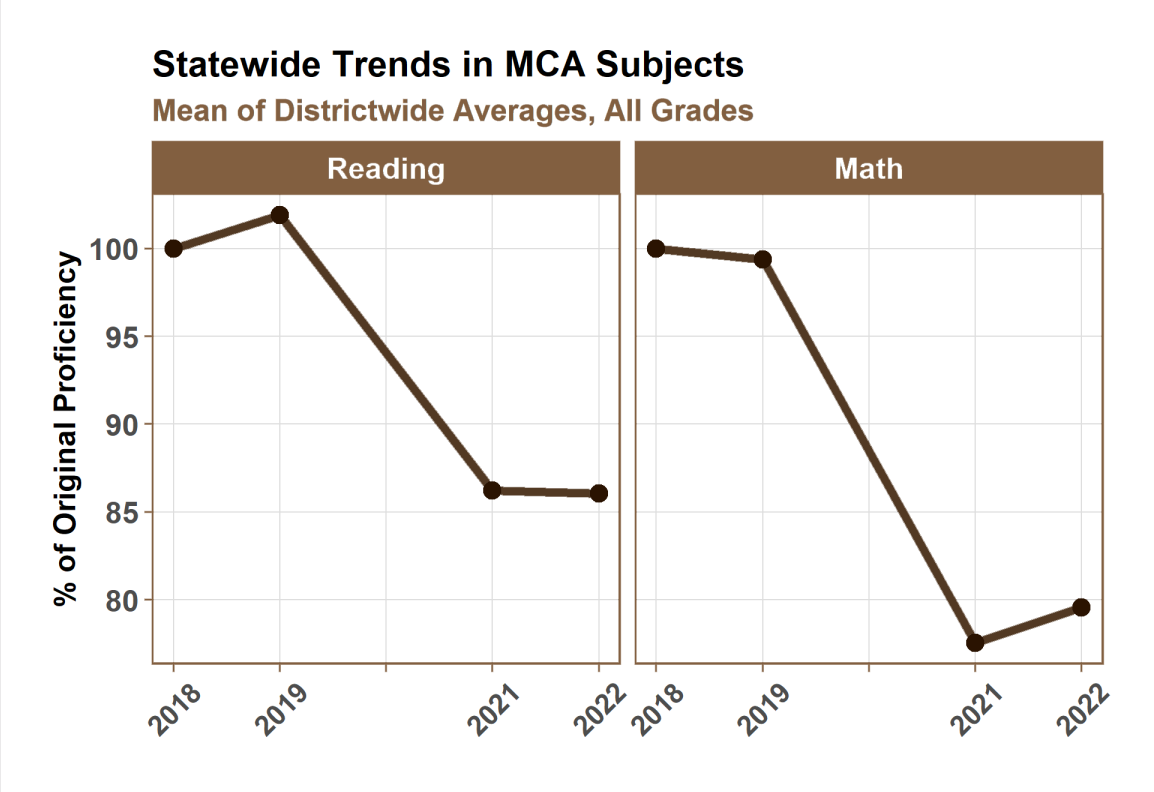


Fig. 1. Proficiency declined on both MCA Math and Reading exams during the pandemic, with little evidence of rebound. See Table 1 (Appendix) for subject-specific data.

Math: Figure 1 shows a similar, L-shaped pattern in math scores. In 2019, the year before the pandemic, the mean district proficiency on the MCA Math exam was lower than on the reading exam (54% vs. 59%) and was slightly lower than the previous year (54% vs. 56%). If we correct for baseline levels as described above, we see that math scores dropped almost 22% from 2019 to 2021. Unlike in reading, math scores increased a small but significant amount in 2022 (2%). As shown in Figure 1, these gains offset only a small portion of the losses in 2021.

3.2 Grade-Level Patterns in Reading and Math Scores

Statewide averages of different grade levels were calculated by averaging each district's grade level scores across Minnesota's public, K-12 school districts. Statewide losses in proficiency persisted across all grade levels in both reading and math.

Reading: In 2021, grade-level proficiency on the MCA Reading exam dropped anywhere from 9% to 22% of 2019 levels, depending on the grade. Middle school grades saw the largest declines in proficiency between 2019 and 2021, followed by elementary and then high school (see Figure 2 and Table 2 [Appendix]).

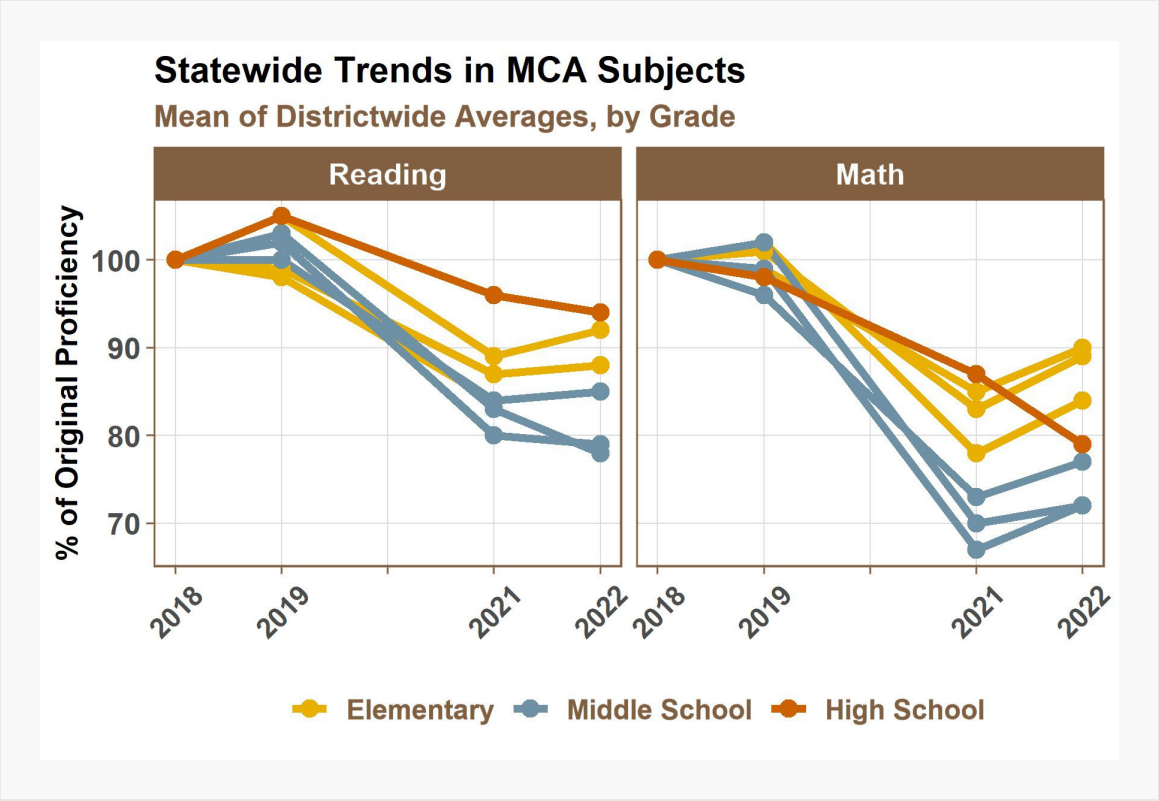


Fig. 2. Pandemic-related losses persisted across grade levels, with the largest losses occurring in middle school. For simplicity, grades were clustered as Elementary (Grades 3-5; gold), Middle School (Grades 6-8; blue), or High School (Grade 10 or 11; red). See Table 2 (Appendix) for grade-specific data.

Further, most grades saw no significant change of more than 1% in either direction between 2021 and 2022, and eighth-and tenth-graders saw slight declines (2%-5%). These results demonstrate significant losses in reading proficiency across all age groups during the pandemic, with no strong sign of recovery, and in some cases signs of continued decline.

Math: Like in reading, losses persisted in all grades that took the MCA Math exam, but losses were slightly larger from 2019 to 2021 (ranging from 11% to 32% of 2019 levels), while almost every grade saw a significant but modest rebound (2% to 6% of 2019 levels) between the 2021 and 2022 tests. The outlier is 11th-grade math, which saw the smallest decline of any grade (11%) from 2019-21 but also decreased another 8% from 2021 to 2022. Similar to reading, middle school proficiency dropped the most between 2019 and 2021, followed by elementary and then high school.

3.3 Patterns in Math and Reading Scores by Gender

Proficiencies in math and reading declined during the pandemic for male and female students, but the pattern of decline varied by subject. Male and female students saw nearly identical losses of 13% of proficiency levels between the 2019 and 2021 exams in reading, with minimal recovery in 2022 (Figure 3a; Table 3 in the Appendix). In math, however, female students' proficiency dropped significantly more than male students. (22% vs. 17%), a difference compounded by an even smaller rebound in 2022 (2% for females vs. 4% for males).

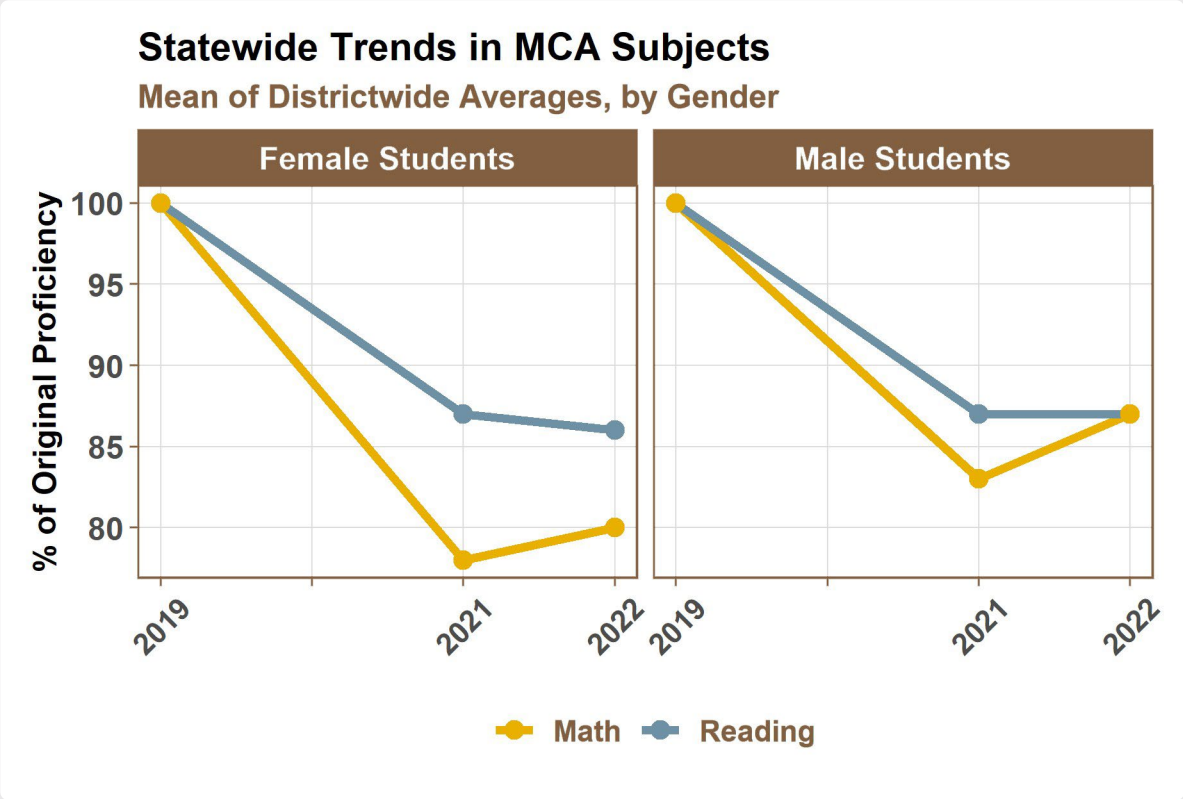


Fig. 3a. Pandemic-related losses in math, but not reading, varied by gender. See Table 3 (Appendix) for gender-specific data.

*NOTE: Test score data by gender is only available coded as binary (male/female). Coding of the gender data changed between 2018 and 2019, so we began with 2019 here to ensure comparability across years.

Reading: The grade-specific loss of proficiency in reading persisted among both male and female students (Figure 3b and Table 3 [Appendix]). For both male and female students, losses were highest among middle-school grades between 2019 and 2021 (18% in both math and reading in seventh grade, followed by 16% in both subjects in eighth grade).

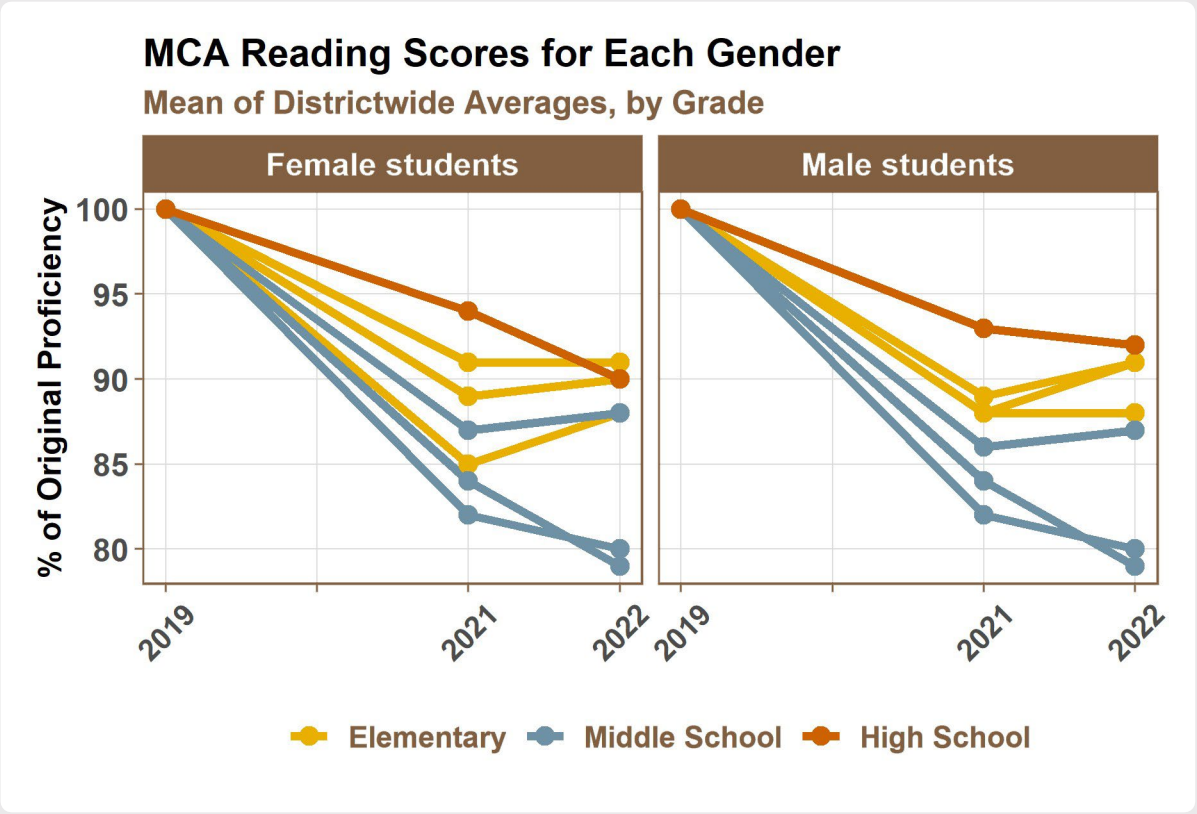


Fig. 3b. Pandemic-related losses in reading proficiency persisted across grade levels for students of each gender, with the largest losses occurring in middle school. For simplicity, grades were clustered as Elementary (Grades 3-5; gold), Middle School (Grades 6-8; blue), or High School (Grade 10 or 11; red). See Table 3 (Appendix) for grade- and gender-specific data.

Data divided by gender and grade level show that no group saw gains of more than 3% in 2021-22. Comparing grade-specific averages between male students and female students showed statistically similar losses in 2019-21 and stasis in 2021-22 across the pool of grades tested in reading (Figure 3b).

Math: On average, loss of proficiency in math differed between male and female students (Figure 3c). Comparing each gender's grade-specific proficiency reveals that female students dropped an average of 5% further from pre-pandemic levels in 2021 compared to male students in corresponding grades. Further, despite dropping less between 2019 and 2021, males rebounded slightly higher than females.

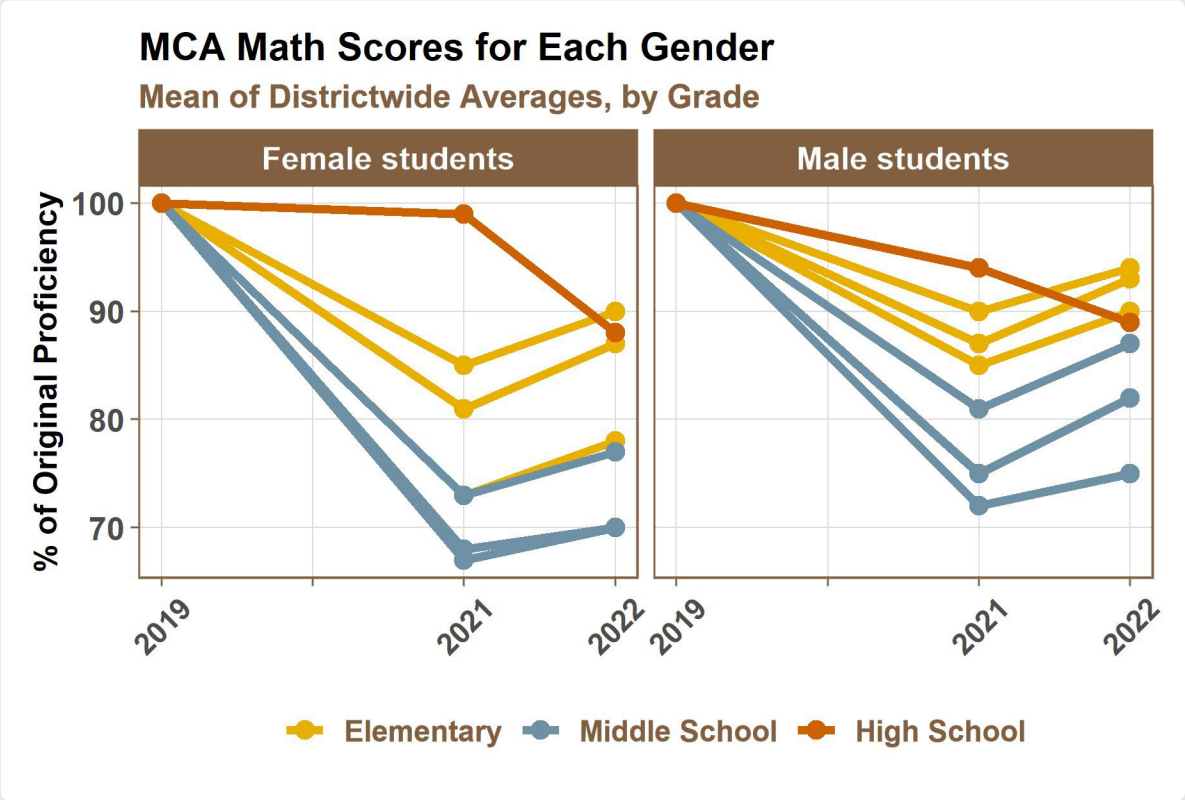


Fig. 3c. Pandemic-related losses in math proficiency persisted across grade levels for students of each gender, with larger losses among female students. For simplicity, grades were clustered as Elementary (Grades 3-5; gold), Middle School (Grades 6-8; blue), or High School (Grade 10 or 11; red). See Table 3 (Appendix) for grade- and gender-specific data.

Female students' math scores dropped more than male students for every grade except high school grades. Scores for female students in grade 11 dropped only 1% from 2019 to 2021, compared to a 6% decrease for male students in grade 11. From 2021 to 2022, however, scores for female students in grade 11 dropped 11%, compared to 5% for grade 11 male students.

3.4 Patterns in Minnesota's Metro and Rural Districts

For the purposes of this study and in accordance with the Minnesota Rural Education Association's classification, metro districts are defined as those within the seven-county metro or with more than 7,500 students. Rural districts are located outside the metro area or serve under 7,500 students.

Reading: Reading and math proficiency showed different patterns of loss and recovery in both metro and rural districts. Mean district proficiencies in reading dropped slightly more in rural districts than in metro districts between 2019 and 2022. Rural districts saw a decline of 16% of original values from 2019-22, while metro districts declined 13%.

Rural districts' proficiency declined nearly 17% between 2019 and 2021, with a negligible recovery (0.3%) from 2021-22. Metro districts, on the other hand dropped just over 10% between 2019 and 2021, with another modest drop of nearly 3% from 2021-2022 (see Figure 4 and Table 4 [Appendix]). Overall, we see statistically significant differences in the change in reading proficiencies between metropolitan and rural districts from 2019 to 2021, though both generally follow an "L-shaped" curve throughout the course of the pandemic overall.

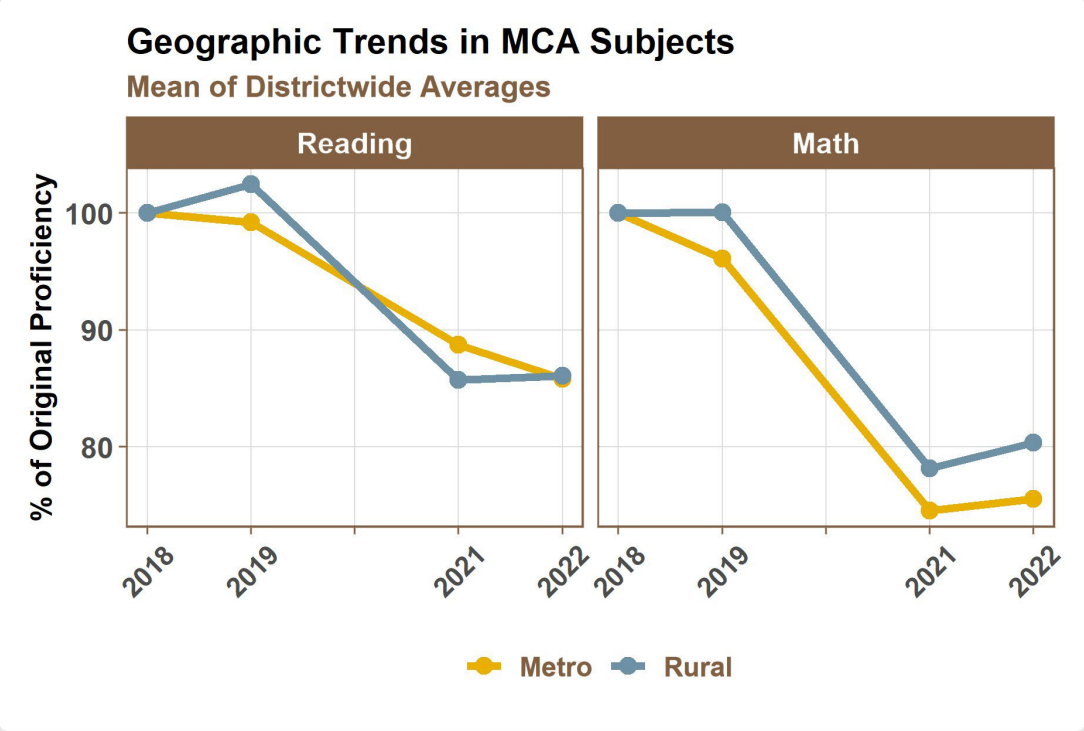


Fig. 4. Pandemic-related losses in reading and math proficiency persisted in both metro and rural school districts. See Table 4 (Appendix) for geography-specific data.

Math: In math, metro and rural districts saw statistically indistinguishable losses. From 2019-2021, mean district proficiencies in math dropped by 22% of original levels in metro districts, compared to 22% in rural districts. Both subgroups showed negligible recoveries between 2021 and 2022 (1% in metro districts vs. 2% in rural districts) (see Figure 4 and Table 4 [Appendix]).

3.5 Effect of Broadband Availability

Because many of the hybrid and distance-learning models implemented by school districts during the pandemic required access to the internet, we analyzed the relationship between districts' broadband availability patterns and proficiency changes. Changes in proficiency in both reading and math do not correlate with the availability of broadband at the district level. No change in mean district proficiency during any of the examined testing periods (i.e., 2018-19, 2019-21, 2021-22, or 2019-2022), regardless of subject, correlated significantly (i.e., $p < 0.05$ and $r > 0.1$) with districtwide rates of connectivity to any speed of broadband examined (i.e., 25Mbps download/3 Mbps upload, 100Mbps/20 Mbps, or 100Mbps/100Mbps).

4

Implications for POLICY & PRACTICE

THE SEVERITY OF DECLINE followed by slow, L-shaped post-pandemic recovery of students' reading and math skills has implications for policy and practice from the classrooms to our state and nation's capitals. Districts need to refer to their specific pattern of achievement from 2018-2022, as the great variability among districts will affect the applicability of these implications.

For Minnesota's Legislature and Policy Makers

With the one-time state funding surplus, consider strategies including:

» Providing school districts with the funding to support students from upper elementary into high school and allow districts to expend these funds over the next 3-4 years.

» Extending student learning time by engaging students in after-school and summer activities provided by the school or other organizations in which students apply the skills they missed in informal, noninstructional settings.

For the Nation's Congress and Policy Makers:

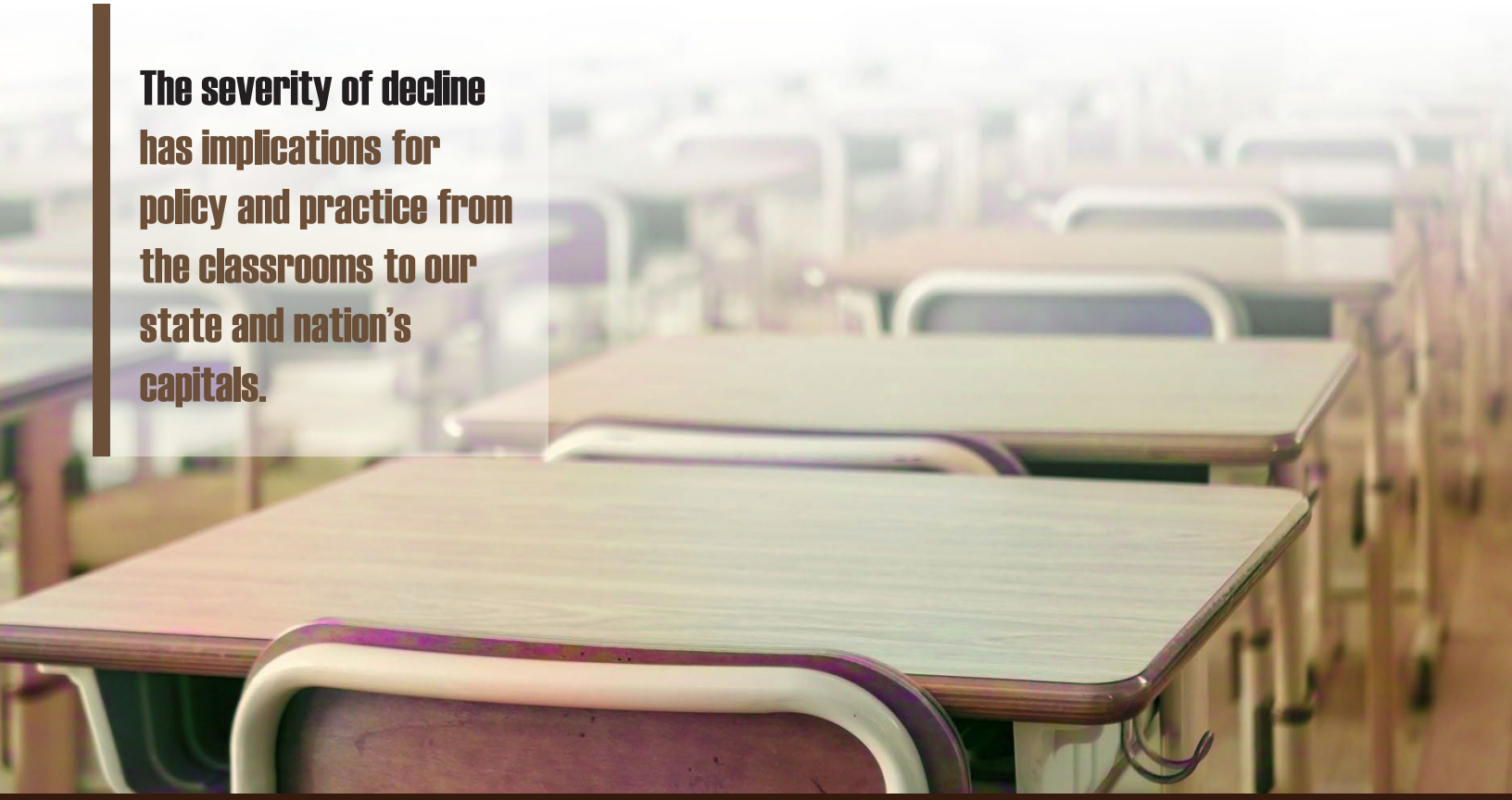
» Recognize that the effects of the COVID-19 pandemic on student learning are not in our rearview mirror, but are ongoing challenges, and provide assistance to local school districts with federal aid similar to the American Rescue Plan Act of 2021 (ARPA) and the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act with extended timelines for districts to expend these funds to support and extend student learning for the cohort of students most dramatically affected by the pandemic.

For Educational Researchers:

» Continue to track the district-level analysis for 2023 and subsequent years to see the shape of recovery. Do proficiency scores show an upward trajectory, or do they show signs of no recovery or further decline?

» Take this analysis to the student level to determine whether the district-level analysis is masking underlying decline and recovery trends by race/ethnicity and poverty, which are linked to individual MCA data. Furthermore, continue this analysis in subsequent years to see the shape(s) of recovery by student groups.

» Pay special attention to disparities. Do the L-shaped decline and recovery of district-level proficiency mask an individual-level decline and recovery "K" in Minnesota? "K-shaped recovery…would lead to ballooning achievement gaps in the years after the pandemic – beyond what they were before the onset of the pandemic – due to differential recovery rates" (Betebenner, D.W., Wenning, R.J.; 2021). A "K" recovery with NWEA student-level data may be suggested by a "…widened distance between low and high achievers given students with lower achievement experienced larger initial impacts at the onset of the pandemic and less improvement during 2021–22." (Lewis, K, Kuhfeld, M,, Langi, M, Peters,S., Fahle, E., November 2022) This potential outcome of the pandemic and recovery is certainly worth examining with Minnesota student-level data 2018-2022 when it becomes available.



5

Methods & REFERENCES

Methods

MCA Data: MCA proficiency data were downloaded from the Minnesota Department of Education's Data Reports and Analytics site in October 2022. Charter schools were not included in the analytical dataset. "Proficiency" was defined as the percentages of students in each cohort (i.e., by district, grade, or gender) who either met or exceeded the standards for the appropriate grade level.

Sample Sizes: Data were collected for all K-12 public school districts (Types 1 & 3, ISD # < 3,000), and districts with incomplete data (e.g., too few students in a cohort or incomplete year-over-year testing data due to consolidation) were removed from the sample. Nearly all samples studied included over 300 of Minnesota's 330-plus school districts (e.g., N = 308 for statewide trends shown in Figure 1 and Table 1), though small cohorts in the gender-specific analysis led to smaller sample sizes overall (i.e., N = 275 districts for grade- and gender-specific data shown in Figure 3 and Table 3).

Statistical Significance and Significant Figures: The threshold for "statistical significance" was $P<0.05$ by either t test or Wilcoxon test, depending on the outcome of the Shapiro-Wilk normality test for each sample, with (one-tailed) paired tests as appropriate. To improve readability, percentages were rounded to the nearest whole number except in cases where tenths of a percentage point provided clarity; data in the Appendix are rounded to the nearest tenth of a percent.

Broadband Availability: The percentage of households within each school district that had access to three different speeds of broadband connectivity (i.e., 25Mbps download/3 Mbps upload, 100Mbps/20 Mbps, or 100Mbps/100Mbps) was obtained via personal communication with the Minnesota Department of Employment and Economic Development's Office of Broadband Development (June 2022).

References

Betebenner, D. W.; Wenning, R. J. (2021, January). Understanding Pandemic Learning Loss and Learning Recovery: The Role of Student Growth & Statewide Testing. National Center for the Im- provement of Educational Assessment. Retrieved from https://eric.ed.gov/?id=ED611296

Kane, T. J., & Reardon, S. (2022, October 28). New Research provides the first clear picture of learning loss at local level. Education Recovery Scorecard. Retrieved from https://educationrecoveryscore- card.org/2022/10/28/new-research-provides-the-first-clear-picture-of-learning-loss-at-local-level/

Kane, T. J., & Reardon, S. (2022, October 28). New Research provides the first clear picture of learn- ing loss at local level. Education Recovery Scorecard, Minnesota state report. Retrieved from https:// educationrecoveryscorecard.org/2022/10/28/new-research-provides-first-clear-picture-of-district- level-learning-losses-in-minnesota/

Leichty, R.; On-Line Learning for Rural Students; National Association of State Boards of Educa- tion, State Education Standard, v21 n1 p12-17 Jan 2021 Retrieved from https://eric.ed.gov/?q=broad- band+learning+loss+pandemic&id=EJ1287240

Lewis, K., & Kuhfeld, M.; Progress toward pandemic recovery: Continued signs of rebounding achievement at the start of the 2022–23 school year; Dec. 2022. Retrieved from https://www.nwea.org/research/publication/progress-towards-pandemic-recovery-continued-signs-of-rebounding- achievement-at-the-start-of-the-2022-23-school-year/

Lewis, K, Kuhfeld, M,, Langi, M, Peters,S., Fahle, E. The widening achievement divide during COVID-19, November 2022. Retrieved from https:// www.nwea.org/research/publication/the-widening-achievement-divide-during-covid-19/

Lewis K., Kuhfeld, M., Ruzek, E., McEachi, A.; Learning during COVID-19: Reading and math achieve- ment in the 2020-21 school year; July 2021. Retrieved from https://www.nwea.org/research/publication/learning-during-covid-19-reading-and-math-achievement-in-the-2020-2021-school-year/

Schneider, M. (2022, November 2). Institute of Education Sciences (IES): NAEP release: What to know, what to admit we don't know. IES Director. Retrieved from https://ies.ed.gov/director/re- marks/11-2-2022.asp

6

APPENDIX

Table 1: Mean District Proficiency Change, MCA Math & Reading

Year	Reading	Math
2018-19	1.9%	-0.6%
2019-21	-15.7%	-21.8%
2021-22	-0.2%	2.V%

Table 2a: Mean District Proficiency Change, MCA Reading, by Grade

Grade	2018-19	2019-21	2021-22
3	-2.0%	-14.0%	1.0%
4	5.0%	-16.0%	3.0%
5	-1.0%	-12.0%	1.0%
6	0.0%	-16.0%	1.0%
7	2.0%	-22.0%	-1.0%
8	3.0%	-20.0%	-5.0%
10	5.0%	-9.0%	-2.0%

Table 2b: Mean District Proficiency Change, MCA Reading, by Grade

Grade	2018-19	2019-21	2021-22
3	-1.0%	-14.0%	5.0%
4	1.0%	-18.0%	6.0%
5	2.0%	-24.0%	6.0%
6	-4.0%	-23.0%	4.0%
7	-1.0%	-32.0%	5.0%
8	2.0%	-32.0%	2.0%
11	-2.0%	-11.0%	-8.0%

Table 3a: Mean District Proficiency Change, MCA Reading, by

Year	Female	Male
2019-21	-13.0%	-13.0%
2021-22	-1.0%	0.0%

Table 3b: Mean District Proficiency Change, MCA Math, by Gender

Year	Female	Male
2019-21	-22.0%	-17.0%
2021-22	2.0%	4.0%

Table 3c: Mean District Proficiency Change, MCA Reading, by Grade & Gender

Grade	Gender	2019-21	2021-22
3	Female	-11.0%	1.0%
3	Male	-12.0%	0.0%
4	Female	-15.0%	3.0%
4	Male	-11.0%	2.0%
5	Female	-9.0%	0.0%
5	Male	-12.0%	3.0%
6	Female	-13.0%	1.0%
6	Male	-14.0%	1.0%
7	Female	-18.0%	-2.0%
7	Male	-18.0%	-2.0%
8	Female	-16.0%	-5.0%
8	Male	-16.0%	-5.0%
10	Female	-6.0%	-4.0%
10	Male	-7.0%	-1.0%

Table 3d: Mean District Proficiency Change, by Grade & Gender

Grade	Gender	2019-21	2021-22
3	Female	-11.0%	1.0%
3	Male	-12.0%	0.0%
4	Female	-15.0%	3.0%
4	Male	-11.0%	2.0%
5	Female	-9.0%	0.0%
5	Male	-12.0%	3.0%
6	Female	-13.0%	1.0%
6	Male	-14.0%	1.0%
7	Female	-18.0%	-2.0%
7	Male	-18.0%	-2.0%
8	Female	-16.0%	-5.0%
8	Male	-16.0%	-5.0%
10	Female	-6.0%	-4.0%
10	Male	-7.0%	-1.0%

Table 4a: Mean District Proficiency Change, MCA Reading, by

Year	Metro	Rural
2018-19	-0.8%	2.5%
2019-21	-10.5%	-16.7%
2021-22	-2.9%	0.4%

Table 4b: Mean District Proficiency Change, MCA Math, by

Year	Metro	Rural
2018-19	-3.9%	0.0%
2019-21	-21.5%	-21.9%
2021-22	1.0%	2.2%