COVID Learning Loss: A Call to Action

Nathan D. Grawe
Carleton College, ngrawe@carleton.edu

Follow this and additional works at: https://digitalcommons.usf.edu/numeracy

Part of the Curriculum and Instruction Commons, Educational Assessment, Evaluation, and Research Commons, Educational Methods Commons, Elementary Education Commons, Scholarship of Teaching and Learning Commons, and the Secondary Education Commons

Recommended Citation

Authors retain copyright of their material under a Creative Commons Non-Commercial Attribution 4.0 License.
COVID Learning Loss: A Call to Action

Abstract
The COVID-19 pandemic and policy responses designed to mitigate transmission have caused deep and persistent mathematics learning loss among K–12 students. While initial data might have been read optimistically as a blip that would reverse once schools returned to normal, 2023 data from the National Assessment of Educational Progress (NAEP) show that losses persist. While the NAEP does not directly measure quantitative reasoning (QR), the data present a disturbing picture for QR instruction and call for new lines of research that inform QR pedagogical response.

Keywords
quantitative reasoning, learning loss, COVID-19, pedagogical reform

Creative Commons License
This work is licensed under a Creative Commons Attribution-Noncommercial 4.0 License

Cover Page Footnote
Nathan D. Grawe is Professor of Economics at Carleton College and Executive Editor of Numeracy.

This editorial is available in Numeracy: https://digitalcommons.usf.edu/numeracy/vol16/iss2/art3
In early 2022, this editorial page noted the emerging evidence that COVID-19 and responses to the pandemic were causing a crisis for quantitative reasoning (QR) education (Grawe 2022). Even at that time, the evidence of learning loss was evident in newspaper coverage of state testing as well as formal research on large-sample databases. (See Bowie [2021], Halloran et al. [2021], Lewis and Kuhfeld [2021], and Lewis et al. [2021] for examples of early studies.) What was not clear at that time was whether the observed losses represented temporary blips caused by ongoing pandemic mitigation or long-term setbacks that would lower student achievement for an extended period of time. Unfortunately, National Assessment of Educational Progress (NAEP) scores released by the federal government earlier this year make clear that learning losses are growing over time despite relaxation of pandemic restrictions. Rather than seeing scores “bounce back,” we have seen declines which suggest that losses will persist.

The 2023 average NAEP mathematics test score for 13-year-olds fell 9 points relative to 2020 scores. Given that 2020 scores had fallen 5 points relative to those in 2012, in total scores are off by 14 points in about one decade. As seen in Figure 1, recent declines are unprecedented and erase all learning gains achieved over three previous decades. To put the decline in perspective, in 2019 the 25th and 75th percentile scores were 255 and 309, respectively; the recent 14-point loss represents one-quarter of the interquartile range.

![Figure 1. Average NAEP mathematics scores for age-13 students, 1978–2023.](https://www.nationsreportcard.gov/)

1. [https://www.nationsreportcard.gov/](https://www.nationsreportcard.gov/)
Not only have losses been large, they have been widely experienced. The NAEP shows lower scores at the 10th, 25th, 50th, 75th, and 90th percentiles, with losses at lower percentiles about four times as large as those in upper percentiles. All but nine states experienced statistically significant declines. The same is true for all but one race/ethnicity group. Lower scores were posted by male and female students; students of all parental education categories; students at public and Catholic schools; students in urban, suburban, town, and rural schools; and students in all four Census regions.

To be sure, the NAEP was not designed as a QR assessment. Questions about the definition of QR and how it is assessed are real and important. It is crucially important to define the boundaries of our discipline (e.g., Karaali et al. [2016]) and develop QR-specific assessment tools (e.g., Jacobbe et al. [2022]). However, we cannot let these important discussions lead us to dismiss the NAEP data as irrelevant to our discipline. While the NAEP mathematics test includes much content that might better be described as mathematics literacy than QR, it also asks students to engage in proportional reasoning, consider methods that might produce random samples, and create and interpret graphs—all critical aspects of QR.

The NAEP mathematics assessment results suggest an urgent QR research agenda. While past literature might suggest general best practices in QR education, the consequences of pandemic policy may have produced unique challenges implying distinct educational needs. NAEP data point to at least four critical lines of inquiry.

- What QR education practices mitigate pandemic learning losses seen among elementary and secondary students?
- Assuming that we will not successfully eliminate losses in the K–12 system, what QR teaching strategies close gaps once students arrive in college classrooms?
- Assuming that K–12 gaps will not be fully closed through subsequent efforts in higher education, how should general education and major-specific curricula and pedagogy adjust to meet students where they are?
- Noting the particularly large losses among students at the bottom of the performance distribution, how might pedagogical reform be tailored to this subgroup?

If one considers these questions alongside research previously published by Numeracy, a troubling mismatch appears. Existing research on QR skews strongly toward higher education while COVID learning gaps clearly emerge in elementary and secondary schools. Moreover, learning losses were greater at the bottom of the distribution among students disproportionately likely to attend two-year institutions, but the majority of Numeracy papers studying post-secondary education focus on students in four-year degree programs. Given the challenges produced by COVID-era policies and the existing literature, in coming years Numeracy will preferentially consider submissions addressing QR education in elementary, secondary, and two-year college contexts. The editors hope readers
will join us in generating a knowledge base to address this critical moment in QR education.

References


