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### Examining the Impact of COVID-19 on the Education and Development of American Students

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Examining the Impact of COVID-19 on the Education  
and Development of American Students

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## **Abstract**

After the COVID-19 pandemic, the vast majority of American children have fallen behind on core subjects due to the ultimate ineffectiveness of remote learning. This study attempts to discover the degree to which children have fallen behind through the trends in the National Association of Educational Procurement's two most recent testing years. A database accessed from Google has been analyzed, filtered by state and visualized in tables in order to indicate any possible trends as a result of remote learning brought on by the pandemic. By looking at data in seven different states across the country, there is a notable decline in the performance scores of students in both elementary and middle school in math and reading. This indicates a need to allocate more resources toward getting American schoolchildren caught back up in learning core subjects.

## **Objectives**

This study aims to identify the degree of which American schoolchildren have fallen behind in core subjects as a result of the COVID-19 pandemic and remote learning. The focus group is children in American schools in Grade 4 and Grade 8, and data is collected in the form of standardized test score averages for a number of states over the course of the past few years.

## **Introduction**

Although the direct effects of the COVID-19 pandemic are subsiding, it is becoming increasingly apparent that we cannot avoid the long-term effects of partially halting global operations for two years. A number of societal and economic effects have indicated that there is much catching up to do. Among the groups most impacted by this halt are students, particularly children, who were unable to attend school for a large period of time. Although many teachers and institutions provided substitute methods of learning, such as asynchronous plans and learning through Zoom, these plans have proven to be much less effective in teaching students than their in-person counterparts. Due to this lack of an effective teaching plan, there are multiple grades of students who are startlingly behind in their education compared to their pre-pandemic counterparts.

In order to identify how severe the lack of in-person learning has been on the educational development of students, the project is utilizing resources published by the National Association of Educational Procurement, also known as the Nation's Report Card. The NAEP is a database that holds comprehensive data on the performance of students in all states. Although there are multiple core subjects that the organization records data for, they mainly focus on recording student's performances in math and reading. This study compares the scores for the year before the COVID-19 pandemic and 2022; shortly after the pandemic, the research can identify a downward trend in performance in all subjects.

## **Methods**

The primary source of this study was the NAEP database. The database is accessible to any search engine, such as Google search. Once accessed, the database then splits the data by state and grade, and displays a number of variables, including the grade, year, average score, and percentage of students that have reached one of three proficiency levels set by the NAEP. In any given state, the sample size for students is approximately 2,000. Although it is not extremely large, it is enough to remove most standard error in the data.

This study compiles the data from seven different states recorded in the database and displays data in two tables. One table displays data from students in Grade 4 (Table 1), and the second displays

data from students in Grade 8 (Table 2). Tables are split into states, and each state splits scores by the two core subjects focused on; Math and Reading, and the years that the tests were administered; 2019 and 2022.

The tables focus on two dependent variables. The first variable to be measured is the average state score. The average state score, set on a scale of 0 - 500, describes the average score of the sample of students in one given state. The second variable in this research is the percentage of students who tested into the NAEP's *Proficient* level. Students who perform at a *Proficient* level demonstrate a solid understanding and competency over the subject matter. Although the NAEP's grading system has three different achievement levels, the project focuses most on the *Proficient* level, because it best resembles the benchmark of what is expected of most students in schools. Compared to the *Basic* level, which measured understanding at only a fundamental level, and the *Advanced* level, which measured an understanding above and beyond what is generally required of a student, the *Proficient* level was the best choice to measure the level of understanding that is required of students in schools and the real world.

The change in both of these dependent variables will also be displayed in the tables.

**Table 1:** Compiled Scores and Proficiency Rates (Grade 4)

Source	State	Subject	2019 Score	2022 Score	% Proficient in 2019	% Proficient in 2022	Δ Score	Δ Proficiency
[6]	California	Math	234.72	230.36	33.63	30.08	-4.36	-3.55
		Reading	216.48	214.39	32.15	30.96	-2.09	-1.19
[5]	Texas	Math	243.62	238.58	43.67	38.13	-5.04	-5.54
		Reading	216.04	214.2	30.27	29.94	-1.84	-0.33
[7]	New York	Math	236.73	227.09	36.94	28.42	-9.64	-8.52
		Reading	219.6	213.57	34.26	29.65	-6.03	-4.61
[2]	Illinois	Math	237.4	237.08	38.5	37.52	-0.32	-0.98
		Reading	218.17	217.78	34.37	33.3	-0.39	-1.07
[3]	Kansas	Math	239.44	235.03	40.31	34.87	-4.41	-5.44
		Reading	219.13	214.68	33.82	30.55	-4.45	-3.27
[4]	North Carolina	Math	241.41	235.96	41.37	35.4	-5.45	-5.97
		Reading	221.28	216.43	35.99	32.32	-4.85	-3.67
[1]	Ohio	Math	241.14	237.76	41.13	39.99	-3.38	-1.14
		Reading	221.97	218.56	36.06	34.51	-3.41	-1.55

**Table 2:** Compiled Scores and Proficiency Rates (Grade 8)

Source	State	Subject	2019 Score	2022 Score	% Proficient in 2019	% Proficient in 2022	Δ Score	Δ Proficiency
[6]	California	Math	275.61	269.81	28.51	22.97	-5.8	-5.54
		Reading	258.83	258.79	29.84	29.88	-0.04	0.04
[5]	Texas	Math	279.65	272.67	29.55	23.77	-6.98	-5.78
		Reading	255.74	255.17	25.04	23.22	-0.57	-1.82
[7]	New York	Math	280.41	274.27	33.52	28.39	-6.14	-5.13
		Reading	261.75	261.66	32.46	32.3	-0.09	-0.16
[2]	Illinois	Math	282.56	275.2	33.84	26.52	-7.36	-7.32
		Reading	264.7	261.89	35.45	32.37	-2.81	-3.08
[3]	Kansas	Math	282.21	271.96	32.88	23.22	-10.25	-9.66
		Reading	262.82	256.18	32.3	25.81	-6.64	-6.49
[4]	North Carolina	Math	283.66	273.7	36.51	25.38	-9.96	-11.13
		Reading	262.53	256.16	32.93	25.69	-6.37	-7.24
[1]	Ohio	Math	285.71	276.06	37.52	29.02	-9.65	-8.5
		Reading	267.05	262	38.09	33.13	-5.05	-4.96

**Table 3:** Summary of Data

	2019 Score	2022 Score	% Proficient in 2019	% Proficient in 2022	Δ Score	Δ Proficiency
Grade 4 Math	239.21	234.55	39.36	34.92	-4.66	-4.44
Grade 4 Reading	218.95	215.66	33.85	31.6	-3.29	-2.25
Grade 4 Total	229.08	225.11	36.61	33.26	-3.97	-3.35
Grade 8 Math	281.4	273.38	33.19	25.61	-8.02	-7.58
Grade 8 Reading	261.92	258.84	32.3	28.91	-3.08	-3.39
Grade 8 Total	271.66	266.11	32.75	27.26	-5.55	-5.49
Composite	250.37	245.61	34.68	30.26	-4.76	-4.42

## Results

Data that was focused on included the average math and reading scores for seven states, the rate that students are proficient in said subjects, and the change in scores and proficiency over time.

There are multiple trends that can be identified in both tables. The most notable is the overall decrease in both scores and proficiency. From 2019 to 2022, the average score between all states, subjects and grades decreased by 4.76 points, from 250.37 points in 2019 to 245.61 points in 2022. Similarly, the total percentage of students that qualified as *Proficient* when testing decreased by 4.42 percent, from 34.68 percent to 30.26 percent in 2022.

There was a greater decrease in the test scores and Proficiency rates of 8th graders than in those of 4th graders. From 2019 to 2022, the average test score of the 4th graders decreased from 229.08 to 225.11, showing a 3.08-point decrease. Similarly, the percentage of 4th grade students qualifying as *Proficient* decreased from 36.61 to 33.26, showing a 3.97 percent decrease. This is much smaller than the trend in 8th graders. From 2019 to 2022, the average score of the 8th grade students who tested decreased from 271.66 to 266.11, showing a 5.49 point decrease. The percentage of students who qualified as *Proficient* decreased from 32.75 to 27.26, showing a 5.49 percent decrease.

In regards to which core subject showed the biggest trend, the subject whose score and proficiency percentage decreased the most remained consistent across both grade levels. At both the 4th grade levels and the 8th grade levels, the scores and proficiency rates for math decreased significantly more than those for reading. In Grade 4, the math test scores decreased by 4.66 points, while the reading test scores decreased by only 3.29 points. Similarly, the percentage of students in Grade 4 who tested at the *Proficient* level decreased by 4.44 percent in the math section, which is much greater than the 2.25 percent decrease in the reading section. The results are similar at Grade 8; the Grade 8 math test scores decreased by a startling 8.02 points between the two tests, while the Grade 8 reading scores decreased by a much smaller 3.08 points. Similarly, the proficiency rates in the Grade 8 math section decreased by 7.58 percent, while the proficiency rates in the Grade 8 Reading section decreased by 3.39 percent.

There are also a high amount of patterns seen among the seven selected states. Between the seven selected states, the range of scores remained relatively small, with the students in the highest-scoring state seldom scoring an average of more than 10 points above students in the lowest-scoring state. For example, in the Grade 4 math section, the students in the highest testing state, Texas, scored an average of 243.62 points, which is only 8.9 points above that of the lowest-scoring state, California, whose students scored an average of 234.72 points. However, while the scores themselves did not vary significantly, the degree to which the scores and proficiency rates decreased varied dramatically among the states.

The three states whose scores and proficiency rates decreased the most were New York, North Carolina, and Kansas. The decrease in the average scores of the students who tested in those three states, respectively, were 9.64 points, 5.45 points, and 4.41 points for Grade 4 math; 6.03 points, 4.85 points, and 4.45 points for Grade 4 reading; 6.14 points, 9.96 points, and 10.25 points for Grade 8 math; and finally, a surprisingly small 0.09 points, 6.37 points, and 6.64 points for Grade 8 reading. Similarly, there were significant drops in proficiency rates in all of these states. New York showed an 8.52 percent drop in Grade 4 math proficiency rates, a 4.61 percent drop in Grade 4 reading proficiency rates, a 5.13 percent drop in Grade 8 math proficiency rates, and a comparatively small 0.16 percent drop in Grade 8 reading proficiency rates. In North Carolina, there was a 5.97 percent drop in Grade 4 math proficiency rates, a 3.67 percent drop in Grade 4 reading proficiency rates, an 11.13 percent drop in Grade 8 math proficiency rates, and a 7.24 percent drop in Grade 8 reading proficiency rates. Kansas showed a 5.44 percent drop in Grade 4 math proficiency rates, a 3.27 percent drop in Grade 8 reading proficiency rates, a 9.66 percent drop in Grade 8 math proficiency rates, and a 6.49 percent increase in Grade 8 reading proficiency rates.

On a different note, the three states whose scores and proficiency rates were the least altered in the past three years were Illinois, Ohio, and California. The decrease in the average scores of the students who tested in these three states, respectively, were 0.32 points, 3.38 points, and 4.36 points for Grade 4 math; 1.07 points, 1.55 points, and 1.19 for Grade 4 reading; 7.36 points, 9.65 points, and 5.8 points for Grade 8 math; and 3.08 points, 4.96 points, and a 0.04 point increase for Grade 8 reading. The proficiency rate drops reflect this pattern as well. Illinois showed a 0.98 percent decrease in Grade 4 math proficiency rates, a 1.07 percent decrease in Grade 4 reading proficiency rates, a 7.32 percent decrease in Grade 8 math proficiency rates, and a 3.08 percent decrease in Grade 8 reading proficiency rates. In Ohio, there was a 1.14 drop in proficiency rates for Grade 4 math, a 1.55 percent drop in proficiency rates for Grade 4 reading, a 8.5 percent drop in proficiency rates for Grade 8 math, and a 4.96 drop in proficiency rates for Grade 8 reading. Similarly, California saw a 3.55 percent drop in proficiency rates for Grade 4 math, a 1.19 percent drop in proficiency rates for Grade 4 reading, a 5.54 percent drop in proficiency rates for Grade 8 math, and a surprising 0.04 percent increase in Grade 8 reading.

It was also found that students fell behind more in Math than in Reading for the majority of states. 4th graders in California, Texas, and New York, and 8th graders in all seven states have seen a drop in both test scores and proficiency rates in Math that is significantly more than English. 4th graders in Illinois, Kansas, North Carolina, and Ohio have seen a drop in test scores and proficiency rates that is generally the same across both subjects.

## **Discussion**

It is widely apparent that there is a universal decrease in the performance of students across the country that is largely due to remote and asynchronous learning brought on by the COVID-19 pandemic. Should the goal be to bring children back to the academic level that was seen before the pandemic, one of the most necessary measures is to allocate more time and resources to teaching children the important core subjects that were unable to be taught during the pandemic. The patterns found in the data in this study have indicated that there are a few ways to make this arduous process more efficient. One of the patterns in the data is the fact that in almost every state, students in 8th grade have fallen behind more than students in 4th grade. This indicates that, although all grade levels should be focused on, more resources should be allocated to middle school students than elementary school students, in order to make up for the most loss. Another pattern in the data is that there is generally a much greater drop in performance when testing students in Math, compared to Reading. Similarly, this indicates that more

resources should be allocated to catching students back up in math than in reading. Taking these two measures will best optimize the resources available in order to make up for the most possible lost time.

### **Limitations**

The data in this study has revealed the degree to which students have fallen behind in core subjects due to remote learning, as well as how severely progress in each core subject, state, and grade level has been impacted. However, there are a few limitations to this study, and a few steps that should be taken if this topic were to be looked into further. The first limitation to this study is the sample size. Although 2,000 students per state is a relatively large sample size, it still leaves room for some degree of standard error. If there had been more time to conduct this study, the author could utilize sources that recorded data on a scale much greater than 2,000 samples. Another drawback to this study is the fact that there are only seven states were examined. Although the states are intended to be representative of multiple regions and demographics, the author believes that more research should be done on more areas, in order to get a better idea of how the entire student population was affected by remote learning brought on by the COVID-19 pandemic. Finally, and perhaps the most important drawback is the fact that only one database was used for this study. One large obstacle of collecting test scores to research student performance is the fact that almost every single standardized test uses a different scoring scale. For example, while the NAEP uses a score system of 1 - 500, another standardized test, such as the PARCC test, utilizes 5 proficiency zones to grade students instead. This makes it difficult to compile and analyze multiple different tests at once. If more time were to be allocated to this study, the author plans to standardize (scaling) the test scores of different standardized tests, such as PARCC, the ISAT, and the SAT to get a better idea of how far students have fallen behind academically. Regardless, the utilization of many different states, even within the same database, has provided enough variation within the tests.

### **Conclusion**

Although remote learning was only in effect for no more than a year for most locations, it is apparent that it has been more than long enough to heavily impact the academic development of students. Should schools make an effort to catch children up, there would need to be a substantial increase in the amount of resources and time dedicated to reinforcing what would have been taught in the time that students were not in person. If this does not happen, there will be an upcoming generation of children that are missing large parts of their education.

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