Improvements in English Language Arts Test Scores Among Virtual School Students During the COVID-19 Pandemic

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Abstract

This study examines changes in academic performance, specifically in English Language Arts (ELA), among elementary students enrolled in a statewide virtual school during the pandemic. Previous studies suggest that school closures and online instruction resulted in learning losses, but no published studies have investigated how students in an accredited virtual school faired academically. Standardized test scores are analyzed to assess students' academic progress before and during the pandemic, revealing substantial gains. The findings suggest that, in contrast to some traditional educational settings, students in this virtual school not only maintained but also significantly improved their ELA test scores during the pandemic. This positive outcome underscores the potential effectiveness of the school's instructional model, which emphasizes online learning methods and personalized education. This research contributes valuable insights into the efficacy of virtual education during exceptional circumstances, encouraging further examination of instructional methods and their impact on student outcomes.

Keywords: English Language Arts, virtual school, COVID-19, academic progress

Introduction

The purpose of this study was to examine changes in English Language Arts (ELA) test scores among students enrolled in a statewide virtual school during the pandemic. Numerous studies and media reports have suggested that school closures and online instruction were detrimental to students and resulted in missed learning opportunities as well as learning losses (Dorn et al., 2021; Kuhfeld et al., 2022). Most traditional schools had little to no experience with remote instruction at the start of the pandemic and lacked the necessary resources for students to learn new material (Leech et al., 2022; Lurye & Camera, 2022). However, few, if any, published studies have investigated how students enrolled in an accredited virtual school faired academically. The goal was to explore the academic performance of virtual school students during the pandemic based on their standardized test scores in ELA. Student achievement differences among students who are accustomed to online learning and those who engaged in online learning remotely due to the pandemic may have important implications for the efficacy of full-time virtual school. In this context, we aimed to address the following research question: How did ELA standardized test scores among students enrolled in a statewide virtual school during the COVID-19 pandemic compare to their scores before the pandemic?

Rationale and Background

Research suggests that academic achievement in K–12 students throughout the United States has declined as a result of the disruptions in education caused by the COVID-19 pandemic. Recent large-scale studies suggest that standardized test scores have dropped since 2019, and achievement gaps by race and economic status have widened (Kane, 2022). Some researchers note that the reversal of these learning losses can only be accomplished through "aggressive action over the next several years," while others suggest that some students could recover sooner (Barshay, 2022; Kane, 2022).

Longitudinal Trends in Academic Achievement

Several studies indicate that student achievement at the end of 2020–21 was lower than historical levels, with larger declines in math than reading (Dorn et al., 2021; Kuhfeld et al., 2022; Morales & Sass, 2021; Renaissance Learning, 2022). For example, in a nationwide sample of students who completed the i-Ready diagnostic assessments, fewer students were on grade level during the pandemic relative to historical averages. Additionally, reports suggest that the disruptive effect of the pandemic has persisted, with students scoring lower on standardized tests in early 2021–22 as compared to the same period in 2020–21, indicating that the pandemic has continued to negatively influence student achievement (Renaissance Learning, 2022).

Similar trends are evident among students in Florida's public schools according to assessment data reported in the Education Information Portal maintained by the Florida Department of Education (http://edudata.fldoe.org/). For example, 57% of students in Grades 3–10 scored on or above grade level in 2019 in English Language Arts (ELA), but this number dropped to 53% in both 2021 and 2022. Math scores followed a slightly different trajectory. In 2019, 60% of students in Grades 3–12 scored on or above grade level in Math, but this dropped to 48% in 2021. However, there was a slight improvement to 53% in 2022.

Disparities in Academic Achievement

Published reports of decline have also indicated that there were greater disparities in academic achievement during the 2020–21 school year as compared to a typical year, particularly among students in some racial and ethnic minority groups and students from economically disadvantaged households. For example, several descriptive studies found that Black students had lower average achievement gains than White students during the pandemic (Dorn et al., 2021; Kuhfeld et al., 2022; Morales & Sass, 2021). Students in majority-Black schools ended the 2020–21 school year six months behind in both math and reading, while students in majority-White schools ended up just four months behind in math and three months behind in reading (Dorn et al., 2021). Studies also suggest that students in low-income schools and in urban locations had lower achievement gains than their peers in high-income rural and suburban schools (Dorn et al., 2021; Kogan & Lavertu, 2021; Pier et al., 2021). These results highlight the pressing need to address the inequities prevalent in the education system nationwide (Dorn et al., 2021).

In Florida, approximately 45% of students in Grades 3–10 who were classified as economically disadvantaged scored at or above grade level in ELA in 2019. In 2021, this number dropped to 41%, and by 2022 had increased to just 42%. Math scores for economically disadvantaged students followed a similar pattern. In 2019, 45% scored at or above grade level, dropping to 40% in 2021 and then improving to 45% in 2022. Among Black students, 38% scored at or above grade level in ELA in 2019, followed by 34% in 2021 and 35% in 2022.

Barbour (2022) indicates that most schools experienced a sudden shift from face-to-face instruction to emergency remote teaching during the pandemic. However, instructional methods that are intended for a physical classroom environment can be ineffective when streamed online (Digital Learning Collaborative, 2022). As Hodges et al. (2020) suggest, well-planned virtual learning is meaningfully

different from courses offered online during a crisis. The decline in academic achievement among students nationwide begs the question of whether students who experienced more educational continuity during the pandemic in an established virtual school exhibited the same declines as their peers in traditional schools.

Statewide Virtual School

While the 2022 data show evidence of some improvement from 2021, the difference between pre-pandemic and 2022 performance is still notable and indicates that student achievement in Florida has not reached pre-pandemic levels. However, despite these trends, this study highlights a state virtual school that has demonstrated increased achievement throughout the pandemic. This study contributes to the ongoing discourse by displaying the performance of students enrolled in a statewide virtual school throughout the pandemic. The virtual school utilizes an online learning platform that offers a combination of synchronous and asynchronous learning experiences, a structured curriculum, and personalized learning paths tailored to individual students' needs. Students can interact with certified teachers through email, chat, and video conferencing while also utilizing discussion forums for peer collaboration. Progress reports and grades are accessible online for ongoing tracking of student performance.

While previous research has illuminated the broader challenges faced by students, especially those from vulnerable demographics, this study investigates how a specific instructional approach within the context of virtual education may have influenced academic outcomes. We aimed to examine its potential impact on academic outcomes, offering insights into alternative approaches to learning in the context of virtual education during exceptional circumstances.

Method

The data source for this study was a student-level data set from the statewide virtual school consisting of Florida Standards Assessment (FSA) English Language Arts (ELA) scale scores. The data set also included demographic information, including each student's gender, race and ethnicity, economic status as defined as eligibility for free or reduced-price lunch (FRL), and disability status as defined as a student needing exceptional student education services (SWD).

Our analysis primarily focuses on ELA scores because literacy skills provide the foundation for overall educational development. ELA and Math, being core subjects, are typically assessed through standardized tests, allowing for consistent measurement. We chose to begin with ELA to explore the specific impact of the COVID-19 pandemic on this academic domain.

Students were classified into a "Pre-COVID group," consisting of students in Grades 3, 4, or 5 who were enrolled during school years 2017–18 or 2018–19, whereas the "COVID group" consisted of students in Grades 3, 4, or 5 who were enrolled during school years 2020–21 or 2021–22. Individual students were not followed over time to measure growth; thus, for example, comparisons are made between students in Grade 3 prior to COVID and a different group of students in Grade 3 during COVID. Group characteristics were comparable across the two periods, with the exception of students eligible for free or reduced-price lunch, who comprised a significantly greater proportion of the COVID group, χ^2 (1, n = 1,845) = 5.05, $p < .05$. The overall proportion of Black students (χ^2 (1, n = 628) = 7.04, $p < .01$) and Asian students (χ^2 (1, n = 214) = 26.08, $p < .001$) also differed by time period.

The outcome measure was the student's FSA ELA scale score, which ranges from 240–360 in Grade 3, 251–372 in Grade 4, and 257–385 in Grade 5. The selected independent variables were dummy-coded predictors representing a student's demographic characteristics. Independent samples t-tests were used to compare the mean scale scores during the pre-COVID and COVID periods by subgroup. Multiple linear regression models examined the degree to which subgroup membership (i.e., gender,

race and ethnicity, economic status, and disability status) predicted ELA scores, while also controlling for the effects of other predictors during each period.

Results

Table 1 provides descriptive information about virtual school enrollment by subgroup before and during the pandemic. As indicated in the final column, student enrollment nearly doubled across most of the subgroups. This increase may be attributed to school closures and ongoing health concerns related to the pandemic. However, the proportion of students comprising each subgroup was similar for both time periods.

Table 1. *Virtual School Enrollment Trends by Subgroup*

Subgroup	Pre-COVID		COVID		Enrollment Increase
	n	%	*n*	%	%
3rd Grade	512	30	1,010	32	97
4th Grade	519	31	1,009	32	94
5th Grade	660	39	1,121	36	70
Female	843	50	1,588	51	88
Male	848	50	1,552	49	83
White	940	56	1,548	50	65
Black	190	11	438	14	131
Asian	40	2	174	6	335
Hispanic	394	23	703	22	78
Multiracial	117	7	264	8	
FRL[1]	682	40	1,163	37	126
Non-FRL	1,009	60	1,977	63	96
SWD[2]	145	9	263	8	81
Non-SWD	1,546	91	2,877	92	86

Note. Pre-COVID consists of students enrolled in 2017–18 or 2018–19. COVID consists of students enrolled in 2020–21 or 2021–22.

[1] Students eligible for free or reduced-price lunch programs.

[2] Students who require exceptional student education services, often due to special learning needs or disabilities.

Changes in Mean Scale Scores

Table 2 shows the results of several independent samples *t*-tests by subgroup along with their associated effect sizes. The skewness and kurtosis values for the scale scores across subgroups were all close to zero, suggesting that the distribution of scores was approximately normal. The assumption of equal variances was assessed with Levene's test for equality of variances, and the corresponding *t*-statistic is reported. Results reveal several noteworthy trends in academic performance among the subgroups. First, it is evident that fourth- and fifth-grade students experienced statistically significant

increases in their test scores during the pandemic. This suggests that these grade levels demonstrated growth in the face of challenging learning conditions, which is an encouraging finding given the disruptions caused by the COVID-19 pandemic.

Furthermore, a notable finding is the substantial academic improvement observed among students with disabilities, with an effect size (*d*) of 0.30. This result signifies a significant positive impact on the academic outcomes of these students during a period of remote learning. Such progress may be attributed to the flexibility and individualized support provided by the virtual school's instructional model, which has proven to be effective even in challenging circumstances.

Table 2. *Mean Scale Scores on the FSA ELA by Subgroup*

Subgroup	Pre-COVID Scale Score *Mean (SD)*	During COVID Scale Score *Mean (SD)*	*t*	*df*	*p*	*d*
3rd Grade	304.65 (21.72)	306.13 (19.16)	1.31	921	ns	.07
4th Grade	315.68 (19.36)	319.21 (18.79)	3.45	1,526	< .001	.19
5th Grade	325.93 (19.91)	330.92 (19.85)	5.12	1,779	< .001	.25
Female	319.54 (20.86)	320.66 (21.58)	1.23	2,429	ns	.05
Male	313.16 (22.89)	317.68 (21.97)	4.74	2,398	< .001	.20
White	316.28 (22.39)	321.07 (21.49)	5.31	2,486	< .001	.22
Black	309.81 (22.00)	312.64 (21.71)	1.50	626	ns	.13
Asian	325.80 (23.34)	328.16 (21.31)	0.62	212	ns	.11
Hispanic	318.95 (19.78)	317.39 (21.51)	1.18	1,095	ns	.07
Multiracial	314.87 (24.84)	317.73 (21.91)	1.13	379	ns	.13
FRL[1]	312.58 (21.89)	312.66 (21.71)	0.08	1,843	ns	.00
SWD[2]	304.14 (24.65)	311.17 (23.34)	2.86	406	< .01	.30

Note. "ns" stands for "not significant" ($p > .05$)
[1] Students eligible for free or reduced-price lunch programs.
[2] Students who require exceptional student education services, often due to special learning needs or disabilities.

Pre-COVID Regression Results

As shown in Table 2, the largest effect size among grade levels was observed for students in Grade 5. To explore this relationship further, multiple linear regression was used to examine the degree to which demographic variables predicted ELA scores for these students. The decision to focus on Grade 5 was based on the observed larger effect size in this grade level, indicating significant academic changes during the pandemic.

In this first regression model, we used pre-COVID FSA ELA scale scores for students in Grade 5 as the dependent variable, along with categorical demographic variables as predictors. The adjusted R^2 value for the pre-COVID model was 0.09, suggesting that about 9% of the variance in test scores was accounted for by the set of demographic predictors and was statistically significant ($p < .001$); however, the computed effect size of 0.10 was small.

When controlling for other predictors, virtual school students who were male, Black, economically disadvantaged, or had disabilities had significantly lower test scores than their corresponding reference group counterparts prior to the pandemic.

Table 3. *Pre-COVID Multiple Linear Regression: Grade 5 FSA ELA*

Comparison	*B*	*95% CI LL*	*95% CI UL*	*β*	*t*	*p*
Male (v. Female)	–4.98	–7.92	–2.05	–.13	–3.34	< .001
Asian (v. White)	7.85	–0.71	16.41	.07	1.80	.072
Black (v. White)	–7.37	–12.23	–2.51	–.12	–2.98	.003
Hispanic (v. White)	1.19	–2.49	4.87	.03	0.64	ns
Multiracial (v. White)	3.60	–3.08	10.29	.04	1.06	ns
FRL (v. non-FRL)[1]	–4.91	–7.98	–1.83	–.12	–3.13	.002
SWD (v. non-SWD)[2]	–15.37	–20.85	–9.90	–.21	–5.52	< .001

Note. Subsample consists of students enrolled in Grades 3–5.
[1] Students eligible for free or reduced-price lunch programs.
[2] Students who require exceptional student education services, often due to special learning needs or disabilities.

COVID Regression Results

The second regression model included FSA ELA scale scores during the pandemic among Grade 5 students as the dependent variable, along with the same set of categorical demographic variables as predictors. The adjusted R^2 value for this model was 0.08, suggesting that about 8% of the variance in test scores was accounted for by the predictors and was statistically significant ($p < .001$), but the computed effect size of 0.09 was small.

The results of the regression model for the COVID period were similar to the pre-pandemic model. Again, students who were Black, economically disadvantaged, or had disabilities scored significantly lower than their counterparts. With the exception of economically disadvantaged students, the achievement gap appears to have narrowed for other subgroups, as evidenced by the difference in the standardized coefficients between the pre-COVID and COVID models.

Table 4. *COVID Multiple Linear Regression: Grade 5 FSA ELA*

Comparison	*B*	*95% CI LL*	*95% CI UL*	*β*	*t*	*p*
Male (v. Female)	–1.66	–3.99	0.66	–.04	–1.41	NS
Asian (v. White)	5.34	0.42	10.26	.07	2.13	.033
Black (v. White)	–6.13	–9.66	–2.59	–.11	–3.40	< .001
Hispanic (v. White)	0.40	–2.55	3.35	.01	0.27	ns
Multiracial (v. White)	–0.14	–4.28	4.00	–.00	–0.07	ns
FRL (v. non-FRL)[1]	–8.26	–10.60	–5.91	–.21	–6.91	< .001
SWD (v. non-SWD)[2]	–9.29	–13.64	–4.93	–.13	–4.19	< .001

Note. Subsample consists of students enrolled in Grades 3–5.
[1] Students eligible for free or reduced-price lunch programs.
[2] Students who require exceptional student education services, often due to special learning needs or disabilities.

Discussion

Contrary to studies claiming that students experienced learning losses or failed to show academic growth during the pandemic (Dorn et al., 2021; Kuhfeld et al., 2022), FSA ELA scores for elementary students enrolled in the statewide virtual school improved or remained stable. The size of the achievement gaps between most subgroups also improved. This is notable because the virtual school's enrollment nearly doubled between 2019–20 and 2020–21, yet it appears that educators were able to meet students' learning needs. These encouraging findings support the effectiveness of the instructional model used by the virtual school and suggest that there are vast differences between emergency remote learning and full-time virtual education (Watson, 2022).

Additionally, a closer examination of Tables 3 and 4 reveals several noteworthy trends. In Table 3, the pre-COVID multiple linear regression results highlight that specific demographic factors, such as gender, ethnicity, economic status (FRL), and disability status (SWD), were associated with differences in FSA ELA scale scores among Grade 5 students. Notably, students with disabilities (SWD) demonstrated lower scores compared to their non-SWD counterparts, indicating the existence of educational disparities.

Table 4, on the other hand, presents the results of the multiple linear regression analysis during the COVID period. Similar to the pre-COVID findings, disparities persist among subgroups. However, it is intriguing to observe that while economically disadvantaged students (FRL) continued to show lower scores, the achievement gap appeared to narrow for other subgroups during the pandemic. These trends suggest a complex interplay of factors influencing academic performance during this challenging period and warrant further investigation.

The implications of our research extend beyond the realm of virtual education. Traditional brick-and-mortar schools can draw valuable insights from the experiences of virtual schools during the pandemic. The adoption of technology-enhanced learning methods, teacher training in online pedagogy, and the development of contingency plans for remote instruction could help traditional schools better prepare for future disruptions.

Limitations

In this study, students were not matched to track their individual change or growth over time, nor was a hierarchical data structure accounted for, which can lead to less accurate estimates. It is also possible that a sampling bias exists, with higher academic performers enrolling in the virtual school during the pandemic. Future research will use probabilistic matching of students within the subgroups to minimize this confound. Further, the adjusted R^2 values for both models were small, indicating that the set of predictors included in the model did not account for much of the variability in scores. We will need to examine whether the subgroups in both periods are comparable, include additional predictors in the models, and determine whether individual students experienced academic growth.

References

Barbour, M. K. (2022). Introducing a special collection of papers on K–12 online learning and continuity of instruction after emergency remote teaching. *TechTrends, 66*(2), 298–300. https://doi.org/10.1007/s11528-022-00712-1

Barshay, J. (2022, January 10). Proof points: More studies mark the pandemic's toll on student achievement. *The Hechinger Report*. https://hechingerreport.org/proof-points-more-studies-mark-the-pandemics-toll-on-student-achievement/

Digital Learning Collaborative. (2022, January). Snapshot 2022: An inflection point or digital learning? Digital Learning Collaborative. https://digitallearningcollab.com

Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, E. (2021, July 27). COVID-19 and education: The lingering effects of unfinished learning. *McKinsey & Company*. https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Kane, T. (2022, May 2). Kids are far, far behind in school. *The Atlantic*. https://www.theatlantic.com/ideas/archive/2022/05/schools-learning-loss-remote-covid-education/629938/

Kogan, V., & Lavertu, S. (2021, January 27). *The COVID-19 pandemic and student achievement on Ohio's third-grade English Language Arts assessment*. The Ohio State University. https://glenn.osu.edu/sites/default/files/2021-09/ODE_ThirdGradeELA_KL_1-27-2021.pdf

Kuhfeld, M., Soland, J., Lewis, K., & Morton, E. (2022, March 3). The pandemic has had devastating impacts on learning. What will it take to help students catch up? *Brookings*. https://www.brookings.edu/blog/brown-center-chalkboard/2022/03/03/the-pandemic-has-had-devastating-impacts-on-learning-what-will-it-take-to-help-students-catch-up/

Leech, N. L., Gullett, S., Howland Cummings, M., & Haug, C. A. (2022, March). The challenges of remote K–12 education during the COVID-19 pandemic: Differences by grade level. *Online Learning Journal*, *26*(1), 245–267.

Lurye, S., & Camera, L. (2022, March 15). How traditional public, private and charter schools responded to the pandemic. *U.S. News & World Report*. https://www.usnews.com/news/education-news/articles/2022-03-15/how-traditional-public-private-and-charter-schools-responded-to-the-pandemic

Morales, C. N., & Sass, T. (2021). Effects of an intensive English program on students' math and English scores. *Georgia Policy Labs Reports*, *24*. https://doi.org/10.57709/30728974

Pier, L., Christian, M., Tymeson, H., & Meyer, R. H. (2021 , June). *COVID-19 impacts on student learning: Evidence from interim assessments in California* [Report]. Policy Analysis for California Education. https://edpolicyinca.org/publications/covid-19-impacts-student-learning

Renaissance Learning. (2022). *How kids are performing: A snapshot of K–12 academic performance and growth*. https://www.renaissance.com/how-kids-are-performing/

Watson, J. (2022, August 24). *The newest terrible idea*. Digital Learning Collaborative. https://www.digitallearningcollab.com/blog/2022/8/24/the-newest-terrible-idea