REDUCING LEARNING LOSS CAUSED BY COVID-19 IN DISADVANTAGED STUDENTS

Will VanOrden

Prepared for: Fairfax County Public Schools
April 2021

Acknowledgements

I would like to thank Professors Lucy Bassett and Brad Carson of the Frank Batten School for Leadership & Public Policy for their advice and assistance with my project. I would also like to thank Karin Williams of Fairfax County Public Schools for providing such an interesting and challenging topic to discover and work on. I am very grateful for all of the aid provided to me in pursuit of this project.

I also want to thank my family who provided me the opportunity to attend the University of Virginia. I am grateful for the lifetime of support you have provided me.

Disclaimer

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership & Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency.

Honor Pledge

On my honor as a University of Virginia student, I have neither given nor received unauthorized aid on this assignment.

William Gregg VanOrden

Table of Contents

Glossary

List of Acronyms

CDC	Centers for Disease Control and Prevention
DOE / ED	United States Department of Education
FCPS	Fairfax County Public Schools
GDP	Gross Domestic Product
ELL	English Language Learner
NAEP	National Assessment of Educational Progress
NIH	National Institutes of Health
ORSI	FCPS Office of Research and Strategic Improvement
VDOE	Virginia Department of Education

Key Terms

COVID-19 – Coronavirus Disease 2019. Referred to the ongoing pandemic due to this contagious disease. Resulted in widespread shutdowns of in-person educational programs.

Disadvantaged student groups – Specific demographic groups who, on average, face greater education hardship due to social or economic conditions outside of their control. Disproportionately comprised of students with disabilities, minority, and low-income students.

Economically disadvantaged student – A student living in a household with income below 200% of the federal poverty threshold.

English learner student – A student who is unable to communicate fluently or learn effectively in English.

Online / Remote learning – Educational programs, classes, and school activities not physically present in a traditional classroom environment.

Student with disability – According to ED Section 504, defined as a student having a physical or mental impairment which substantially limits one or more major life activities.

Executive Summary

Research has shown that education is important for youth development, and the COVID-19 pandemic is challenging the way we educate our children. FCPS serves around 200,000 students. Before COVID-19, one in three students in FCPS were economically disadvantaged. The problem is therefore that existing disadvantaged groups are posed to be at even greater learning and performance disadvantage and compared to their white or wealthy peers.

COVID-19 is exacerbating existing learning inequalities; there is a disproportionate impact of COVID-19 on disadvantaged students as well as in Fairfax County. As this paper will show, there are consistent disparities in academic success and achievement across income levels and between white students and black and Hispanic students. FCPS facility shutdowns and transference to online instruction highlights the threat of disproportionate learning loss, lack of access, and dropout rates. If unaddressed, this problem in Fairfax County and the United States will have long-term effects on both the wellbeing and life outcomes of affected students and the economy.

A good way to quantify this impact and concern is using achievement gaps and average yearly income. Achievement gaps are statistically significant and consistent differences in academic performance, usually measured through various standardized tests, GPA, and college enrollment. A systematic reduction in attendance in virtual learning is also indicative of a greater lack of reliable technology to access class materials. This problem is urgent for FCPS to solve because research shows that significant impacts can occur with only a few months of education loss. A lack of response in Fairfax County will result in poor educational outcomes and negatively affect the lives of thousands of students.

This report analyzes three potential solutions for FCPS to adopt that have the potential to minimize positively trending achievement gaps:

1. Allow in-person instruction for all students with two or more “F” grades
2. Bolster programs that address and solve student-specific technology needs
3. Implement district-wide asynchronous learning

They were selected against evaluative criteria of effectiveness, cost, administrative feasibility, and equity. Of the three solutions, I recommend bringing failing students back into the classroom in a “first wave”, following COVID-19 precautions, to reverse failure trends caused by remote learning (Alternative 1). This alternative is most cost-efficient and directly addressed the primary variable causing this increase in failure rates: being out of school. It also has many positive externalities because schools provide students with many services beyond education, such as consistent meals, guidance counselors, and a learning environment.

Problem Statement

FCPS estimates that one in three high school students do not have access to effective remote learning during the 2020-2021 school year from COVID-19 disruptions. This disproportionally affects racial minority and economically disadvantaged students. This is cause for concern because poor access to remote learning will increase the achievement gap between student demographics. This increase in achievement gap will result in disproportionate learning loss for minority and low-income students.

Client Mission

Fairfax County is home to a racially and economically diverse population (Han et al., 2019). Past studies have shown that minority households make less money, have less wealth, and are less protected against natural disasters and other significant events (Burton et al., 2020) (Rice University, 2018). Unequal health outcomes have been shown to disproportionately affect those in poverty and without access to social resources or a financial safety net (U.S. Department of Health and Human Services, 2020). Because Fairfax County already struggles with racial inequality, it is no surprise that COVID-19 exposes these inequalities in the form of household technology access. Households with less money and wealth have less access to technology, thereby causing extra burden on these families when required to do remote learning (Fox, 2011).

The problem regarding remote learning and technology access in FCPS has increased in scale with the advent of COVID-19. FCPS needs actionable solutions to increase the quality of education. Tens of thousands of students are economically disadvantaged and thus more prone to inadequate access to remote learning, and thousands more are not attending class. Providing appropriate virtual learning to students in Fairfax County has now become the top priority for FCPS, as well as solving remote learning-related challenges. This is the motivation for my report.

Background

For years, researchers have tried to understand the effects of education on student outcomes. Because of the subjective design of "success", proper school programs that are actually proven to benefit students are hard to come by. FCPS is currently redesigning how they measure academic return-on-investment. With the emergence of COVID-19, this task becomes more challenging because of the aforementioned unequal burden of remote learning placed on specific student demographics. This creates ambiguity in how students and programs are evaluated, making the task of improving remote learning outcomes even more challenging.

FCPS is one of the largest school systems in the United States. It teaches nearly 200,000 students across 200 schools. Some important features of the student body are:

- 29% of students are economically disadvantaged.
- 15% are students with disabilities.
- 27% are English Learner students
- 37.8% are White
- 26.8% are Hispanic
- 9.8% are Black

Current Status in FCPS

Across the board, FCPS noticed a significant increase in double-failure rates among students between the 2019-2020 school year and the 2020-2021 school year. On average, the failure rate nearly doubled to 11% of all students receiving at least two "F" grades. This is one in nine students (ORSI, 2020).

On average, there was an 83 percentage point increase in two or more F grades in economically disadvantaged students between the 2019-2020 school year and 2020-2021 school year, compared to less than 50 percentage point increase in non-economically disadvantaged students (ORSI, 2020).

A significant contribution to the problem is the varied set of technology barriers facing students. Some students lack Wi-Fi access, some students are unable to use a computer, and others still are unable to access the internet because of high bandwidth usage when parents are working from home. This creates a myriad of problems with related but decentralized solutions, making it challenging for FCPS to be the primary operator in determining a solution (Tagami, 2020).

Figure 1: Percentages of FCPS Students with 2 or More "F" Grades (FCPS ORSI)

Student Group	Q1 2019-20 Percent and Count	Q1 2020-21 Percent and Count
All Middle and High School Students	6% n=5359	11% n= 9698
Male Students	7% n=3414	14% n=6183
Female Students	4% n=1891	8% n=3461
Asian Students	2% n=420	4% n=719
Black Students	8% n=768	13% n=1147
Hispanic Students	13% n=3028	25% n=5939
White Students	3% n=914	5% n=1495
Students with Disabilities	9% n=1174	19% n=2321
English learner students	17% n=1999	35% n=3777
Economically disadvantaged students	12% n=3060	22% n=5039

From this FCPS data in Figure 1, there is an evident cause for alarm regarding the performance of all students, not just minority and low-income. Looking at Black, Hispanic, English learners, and disability students, we see significant increases in the percentage of students with two or more F grades. Results have shown that this widening achievement gap due to COVID-19 is real and increasing. The data show that students who previously not performing well, performed much worse during COVID-19. The increasing percentage of failures was noted in high schools as well as middle schools, across all student groups, but the largest concern is for disadvantaged students, especially English learner students and students with disabilities. Between Black students and White students, there is a nearly tripled failure rate. With Hispanic students, that gap has ballooned to five times the failure rate. In Q1 of 2020-2021, one in four Hispanic students are receiving two or more F grades. This is direct proof of the expanding disproportionate impact on minority and low-income students (ORSI, 2020).

Across the Nation

Historically, it has been shown that education inequities result in unequal opportunities for minority and disadvantaged groups (U.S. Department of Health and Human Services, 2020). There is data that minority students, on average, fall behind White counterparts by multiple grade levels (Johnson, 2003). These challenges facing minority students show an intersectional and systemic failure to provide equitable education access and resources for those in need. Fairfax County is an increasingly diverse county with a greatly increasing student population (U.S. Department of Education, 2000). Like many school districts, FCPS has struggled to manage appropriate technological infrastructure in classrooms and remotely. Antiquated equipment and a lack of

remote learning resources means that the worsening educational experience faced because of COVID-19 will likely continue.

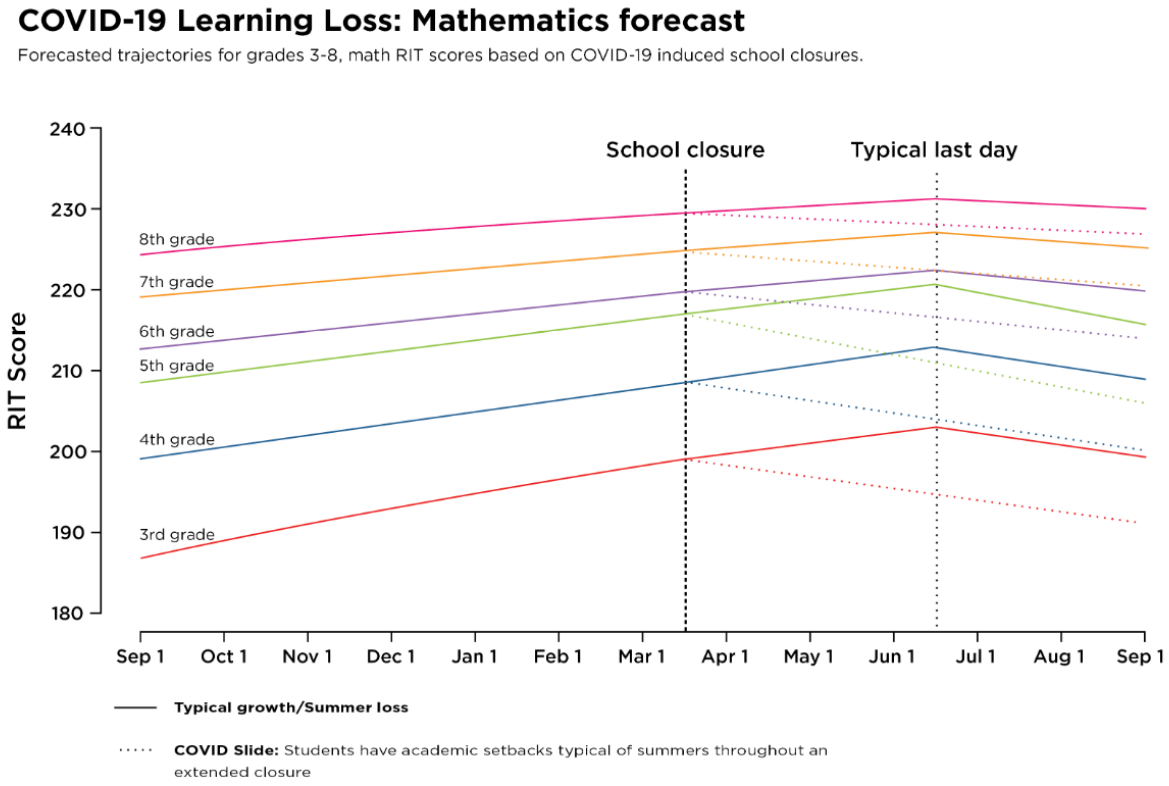
Race and education frequent the news, but it is tough to generate sticky solutions because of the decentralized educational architecture in America. Nationwide, school systems have historically been underfunded (Cook, 2015). With COVID-19 looming large in America, many states are preparing to slash school budgets even further (Eggert, 2020). This lack of funding puts extraordinary burden on school districts and prevents them from properly investing in programs addressing underrepresented and disadvantaged students. FCPS, despite being a very large, high-income, and relatively successful school district, still suffers from poor funds usage (Fairfax County Public Schools, 2020). Therefore, despite media attention and politicians frequently promising to save our schools, FCPS will continue to struggle with providing equitable education to all of its students.

Part of the problem is that COVID-19 extends negative effects of summer vacation on education retention: being out of school results in learning loss. Summer breaks serve as miniature examples of gaps in learning time, as academic test scores and achievement gaps are highlighted during the summer months when students are away from school. Research has shown that academic outcomes, such as test scores and graduation rates, depend on access to extracurricular education resources, such as tutoring, internet access, and personalized instruction. There are many circumstances that affect a student's ability to learn, but on average, students with less access to these resources lose academic gains over the summer (Cook, 2015).

Just like summer vacations, COVID-19 acts to expand these achievement gaps by increasing the duration of time away from institutional resources, forcing families to rely on their own means to provide education. Factors involved in this expanding achievement gap include housing access, financial wellbeing, proper nutrition, and health and wellness of the students (Dorn et al., 2020). These factors are well-known and thoroughly researched that can put greater relative pressure on lower-income students compared to wealthier students. The digital learning environment adds additional financial pressure, as students are now required to have access to technology in order to receive basic education. This access costs money and expands the relative difference in ease of access between socioeconomic groups. Learning losses increase disproportionately as a result (Dorn et al., 2020).

One caveat to projections in learning loss is the lack of clear and certain outcomes. Projecting learning losses as a result of COVID-19 is done with historical information and certain statistical assumptions. The main assumption is that students essentially went on summer vacation as soon as schools closed early in the Spring semester. This is because the vast majority of school districts did not have a solid emergency plan for remote learning before the Fall semester (Barnum, 2020). Research showed that schoolwork engagement was extremely low during the Spring, and Black and Hispanic students suffered the most, likely because of disparate technology access. However, research models assume that remote learning provided no benefit during the Spring, which might not necessarily be true.

Figure 2: Learning Loss Estimates (Brookings)



The actual data is still in the formative phase, but initial surveys to parents and teachers found that 72% of those surveyed ranked their school's online Spring programs as "good or excellent". However, over 75% of parents also expressed concern about their students missing out on learning (Barnum, 2020). Whether Spring education was effective, if more students than usual will drop out, and if average test scores decrease has yet to be seen. FCPS will have to be vigilant in observing student trends in order to proactively identify the costs and consequences.

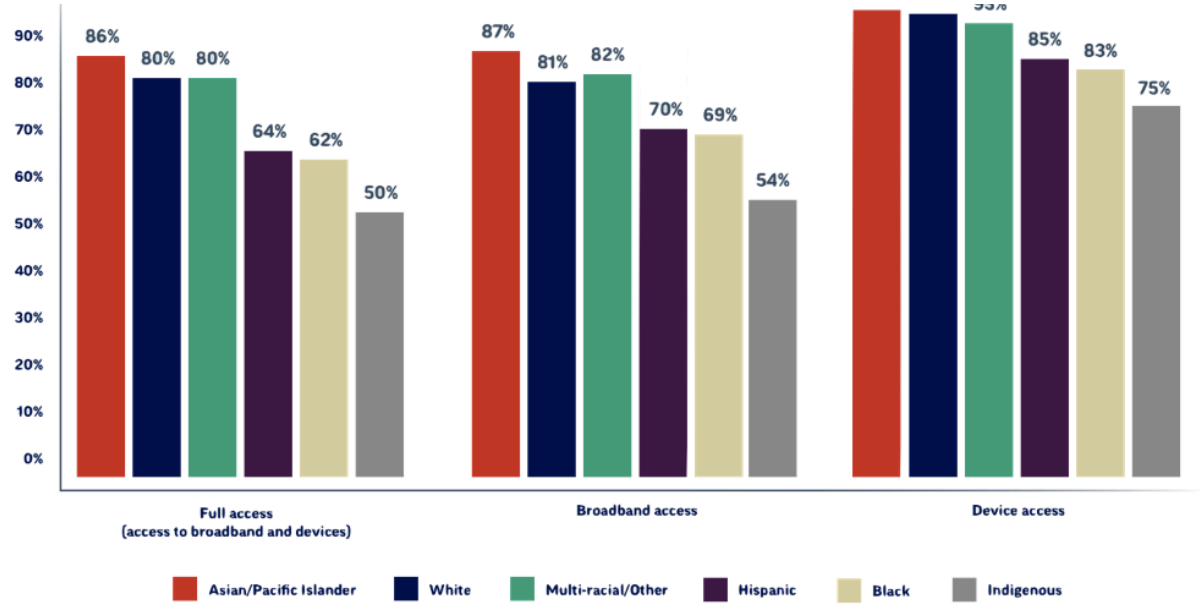
Impact and Consequences

In 2009, McKinsey & Co. found that achievement and income gaps between White students and minority students, nationwide, cost the U.S. economy between $300 billion and $500 billion. Achievement gap between high and low income students was between $400 billion and $700 billion. These achievement gaps have barely improved. In terms of measuring academic and achievement gaps, Black and Hispanic students are two school years behind White students. COVID-19 will likely increase these gaps because minority and low-income students will have less access to technology and less availability for learning in an online, remote environment (McKinsey & Co., 2020).

COVID-19 could also increase nationwide high school dropout rates. Vulnerable student groups are at greater risk because of reduced academic engagement and school services. Past studies have shown that students who miss school are more likely to drop out. If COVID-19 results in less attendance in engagement, it logically follows that more students will drop out, learn less, and earn less money in their lives. As a result of school closures and inadequate remote learning from COVID-19, McKinsey & Co. estimates that Black and Hispanic students would, on average, earn $2,000 less per year. White students, however, are estimated to only earn $1,300 less. These numbers come from the assessed economic impact of worse learning as a result of COVID-19 remote learning. Across the country, this aggregates to hundreds of billions of annual dollars not earned as a result of loss of learning (Brookings, 2020) (McKinsey & Co., 2020).

The U.S. Census Bureau also estimates significant economic costs as a result of academic performance disparity. With in-person instruction delays, a nationwide generalized remote

Figure 3: Remote Access to Internet Across Race (National Education Association)

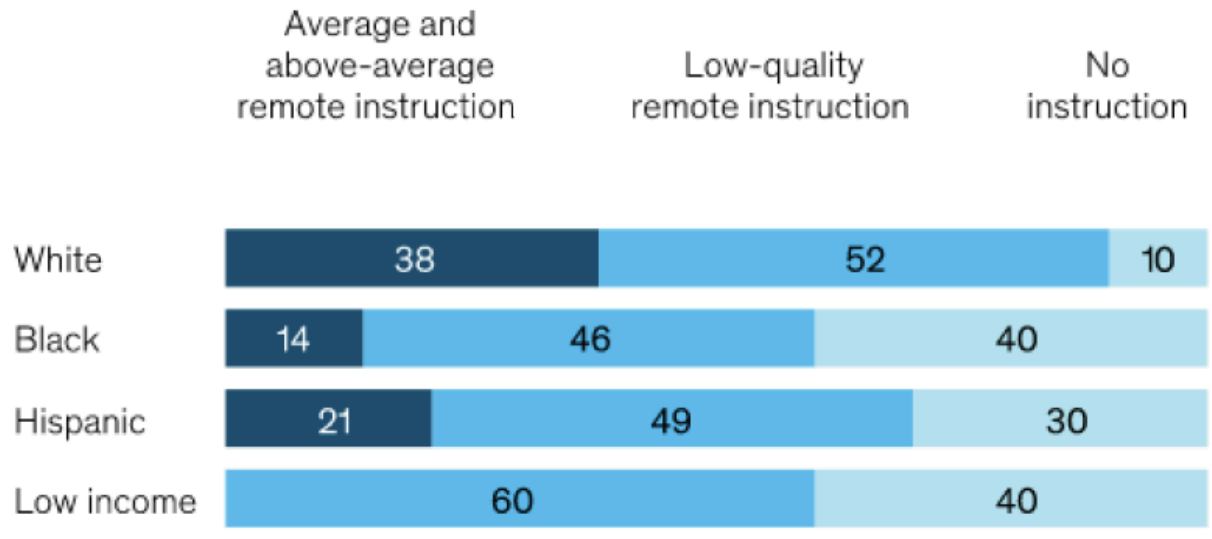


learning disruption could have the following effects: a loss of three to four months of learning with average remote instruction, seven to 11 months with low-quality instruction, and 12 to 14 months with no instruction during the fall semester (Dorn et al., 2020). Assuming in-class returns in January 2021, drop-out numbers are expected to be 648,000 additional high-school students, which would result in $96-124 billion annual earnings lost and a GDP loss by 2040 of $173-271 billion (U.S. Census Bureau, 2020). Fairfax County estimates that several thousand high school students would be at risk for dropping out, which could result in hundreds of millions of dollars of less income over the course of those students' lives.

Classroom participation and peer relationship building is another key consequence of poor remote learning access. Many students will lack proper connectivity to class (U.S. DOE, 2000). Because school is a very important element of a student's social life, lack of digital connection can result in a loss of relationships and feeling of connectedness with peers. This can exacerbate existing mental health concerns and cause students to feel disengaged and unmotivated to pursue further education (RWJF, 2016).

Racial and socioeconomic implications are ingrained in this problem. There are immense equity consequences of leaving this problem unaddressed both nationally and in FCPS. Expanding academic gaps will worsen racial and socioeconomic outcomes and create a less equitable society as a whole (Han et al., 2019). This outcome could increase if schools continue with unchanged online instruction through the academic school year.

Figure 3: Percent Quality of Remote Instruction, K-12 Students (McKinsey & Co.)



As seen in figures 3 and 4, we can see a readily apparent digital divide. Across the country, there is evidence of marginalized communities and inadequate funding. Many students either do not have technology devices or they do not have access to quality internet. In 2020, the National Education Association and McKinsey & Co. found statistically significant disparities in remote learning quality across racial demographics. For tens of thousands of students, virtual learning is either inhibited or blocked altogether by these factors (McKinsey & Co., 2020).

Disproportionate dropout rates and a lack of fundamental skills are likely to create negative externalities that are hard to quantify and compound racial issues across the country. Across the country, different school systems also face different challenges. During the spring semester, only 25% of school districts required live teaching instruction over video, with higher income schools' districts being twice as likely to have live teaching compared to low-income districts. Only 27% of rural school districts required any instruction during the semester closure (Dorn et al., 2020). The effects of these disparities will come to light in the coming years as academic effects become realized.

There are a multitude of negative externality costs affecting disadvantaged citizens. Nationally, disproportionate technology barriers are resulting in approximately 30-40% loss in attendance in schools with predominantly Black and Hispanic students (Dorn et al., 2020). Academic costs of academic differences are split by demographics. Black and Hispanic students are falling behind by around 10 months, low-income students by more than a year, and expanding existing achievement gaps by 15% nationwide (Goldstein, 2020).

Literature Review

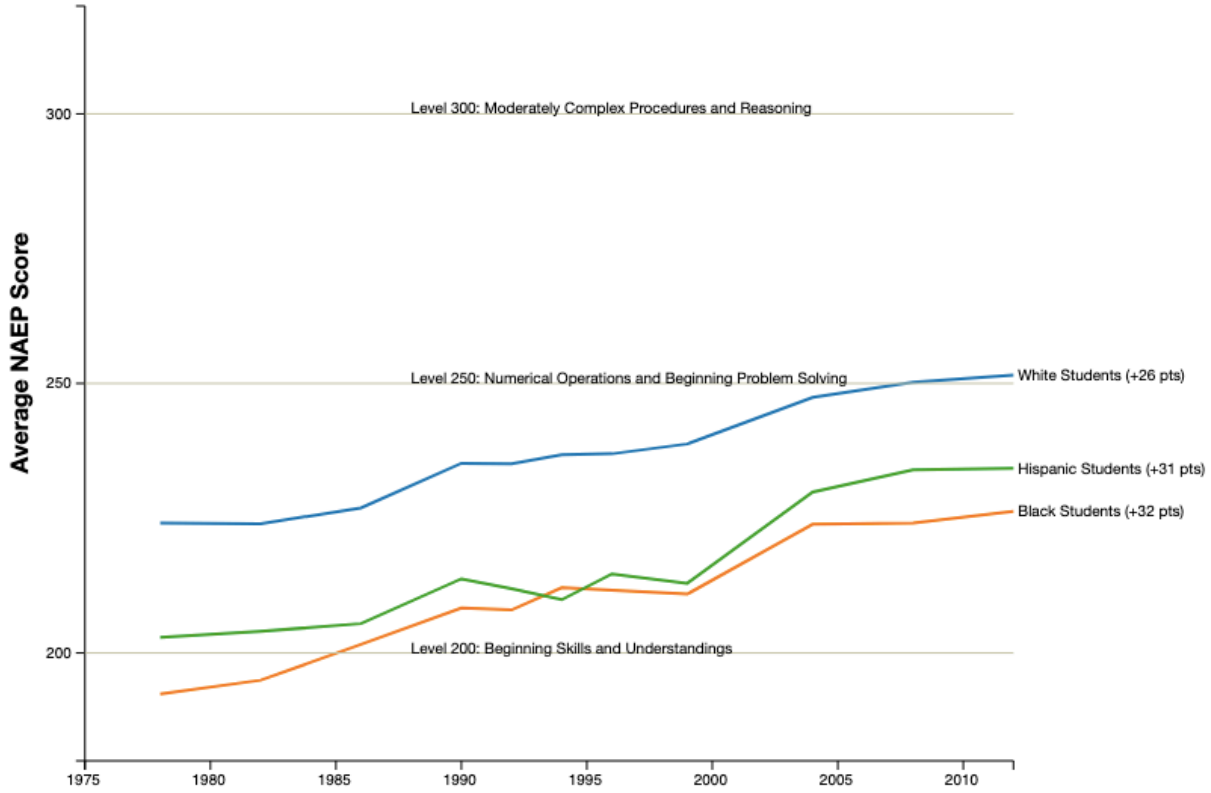
The COVID-19 pandemic is unique in the sense that it created a series of immediate and nationwide consequences, shutting down schools and forcing over 50 million students to learn at home. Research has shown that online learning is only effective with proper access to complete internet access and reliable technology, such as computers. In Fairfax County, nearly one in three students lack some component of access necessary to receive effective remote learning, such as access to a computer, adequate wireless connection, or knowing how to use learning software. Because of the unique nature of COVID-19 and because virtual learning is relatively new in the United States, there are no well-documented and rigorous studies or experiments that directly address the concerns of Fairfax County Public Schools, specifically concerning the improvement in quality of remote learning (ORSI, 2020).

Achievement Gaps across the Country

Pre-COVID-19 data on achievement gaps are readily available. Over the past 40 years, the NAEP has noted substantial improvements among Black and Hispanic students. The test scores over time are used to compare reading and math skills between generations and demographics. As seen in Figure 5, Black and Hispanic achievement gaps have narrowed because of a higher score improvement rate. This increase has been inconsistent and sporadic, however, with long plateaus and stagnations over time. Despite this decrease in achievement gap, there is still a statistically significant difference. Across subjects and ages, achievement gaps still exist by over 0.5 standard deviations (NCES, 2015).

Achievement gaps vary between states, as do average scores. There is no consistent nationwide trend; some states have higher achievement gaps because, on average, White students performed better than the national White average and Black students did not perform better than the national Black average. Some states have smaller achievement gaps because of higher-performing minority students and average-performing White students.

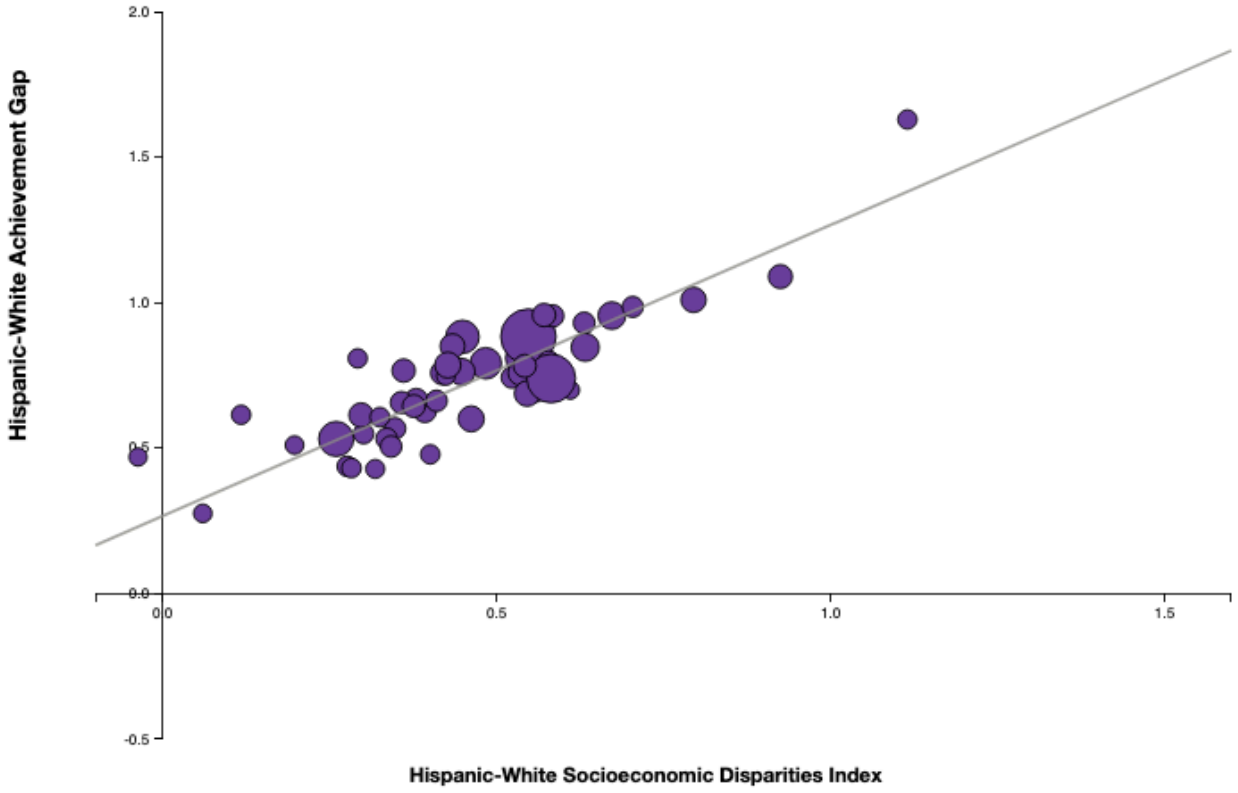
Figure 4: NAEP Test Scores Achievement Gaps (Stanford CEPA)



Achievement gaps have widened in some states and narrowed in other states. The majority of states have seen a moderate decrease in achievement gaps, with only a handful of states seeing increasing achievement gaps. In Virginia, the achievement gap has barely changed since 1995, from 1.1 standard deviations between Black and White students to 1.0 standard deviations (CEPA, 2013). Fairfax County achievement gaps have also barely moved, with no statistically significant change over time (Truong, 2019).

One explanatory variable for achievement gap differences is the average socioeconomic status disparities between demographics. Black and Hispanic families, on average, have lower income than White families. Because high income is correlated with greater educational opportunities and school quality, we would expect income disparities to correlate with achievement gap disparities.

Figure 5: Socioeconomic Disparities against Achievement Gaps between States (Stanford CEPA)



As seen in Figure 6, the expectation appears to hold true across the country for the vast majority of states. Achievement gaps are very strongly correlated with socioeconomic disparities. However, despite this correlation, states with no socioeconomic disparities still experience achievement gaps, which suggests that socioeconomic disparities are not the only causal link to achievement gaps. Other factors, like school quality, special education policies, and systemic housing, poverty, and city policies likely contribute or mitigate achievement gaps (CEPA, 2013).

COVID-19 becomes another correlated factor because it worsens the effects of poverty and housing and food instability. Because Black and Hispanic students have been seen to have socioeconomic disparities, which are correlated with poverty and housing and food instability, we can infer that COVID-19 will increase achievement gaps through these other variables.

Understanding Online Learning

Poirier and Feldman (2004) showed a greater positive effect in blended learning, a hybrid of online and in-person learning, compared to completely remote learning. Using tools such as an online discussion forum and multimedia sources of education led to a significant increase in online course learning in test scores. By providing resources such as online tutors, selection of method of

instruction (students select how they want to learn), and providing more flexibility on assignment due dates, test score averages were higher than in-person control groups (Campbell et al., 2008). Chung et al. (1999) found in a study of middle-schoolers that programs including student reflection, such as prompts for explanation, writing assignments designed to integrate material, and self-assessment tools at the end of class sessions resulted in a significantly higher number of concepts remembered as well as an increase in average test scores. Bixler (2008) conducted a similar study involving question prompts to require students to reflect on homework questions. Self-monitoring elements that involve reflection and investigation towards a solution in standard school homework resulted in improvement in students' online learning. Therefore, learning modules that incentivize or require self-reflection and problem solving have better information retention and improved online education outcomes.

Beile and Boote (2002) conducted a study comparing in-person instruction, blended learning combining in-person and remote learning, and a third group of completely online tutorials and instruction. The groups were tested on specific scholastic library skills and the study found no significant differences between the groups. In an undergraduate college-level study, Caldwell (2006) compared two groups of students, one with blended learning, including in-person laboratory environments, and one with entirely online learning, and found no significant difference in test scores between groups. These studies show that not all types of education benefit from remote learning, as no discernable learning was measured. This is an indication that education and effective learning is complicated and intersectional, such that there are different ways to approach different kinds of learning.

One large educational detraction resulting from COVID-19 is the reduced peer-to-peer communication between students on scholastic topics. The research has mixed results on the academic impact of reduced peer-to-peer contact, however. Ryan (2007) studied collaboration and group work and effects on student performance. Using middle-schoolers, he studied two groups: one with an online collaborative interaction with peers, and a control group that did not receive peer collaboration tools. No statistically significant loss of knowledge was found between groups. Zhang (2004) determined that a peer-moderated group was able to retain less statistical knowledge and skills than an instructor-moderated group. These studies show that group interactions are important but require instruction and proper management.

In a meta-analysis of academic literature between 1985 and 2002, Bernard et al. (2004) showed that students in online learning conditions learned better than in traditional classrooms, but the effect was only seen in a specific set of students that had a high degree of technology access, wealth, and increased time spent on education rather than working or caring for family members. This evidence, however, does not necessarily show causation. A generalization of findings would only be appropriate if the application of remote learning applied to those with the treatment

conditions that support remote learning, such as stable income, additional time to spend on education, and access to high-quality internet connection.

Online education programs are included in this analysis. Nguyen (2007) used experimentation with individualized instruction in online learning, using two studies of "online dynamic learning" where an education program responded automatically to the student's performance, addressing correct and incorrect information in order to provide context for the learning. This was compared to static information tutorials that did not involve input from students, such as a slideshow presentation or lecture. These studies were done with adult students studying tax tutorials. Both studies found positive effects on learning and information retention in the dynamic learning model.

Key Takeaway: providing feedback to students in real time allows for greater engagement with material, prevents loss of interest, and promotes information retention.

Davis et al. (1999) provided college students, in an education class, with a "blended learning" model, involving online instruction paired with traditional in-person lectures. Students were randomly assigned to groups with and without the online component. Researchers found no significant differences in test scores between the two groups. Ruchti and Odell (2002) evaluated scores from between two groups of college students studying elementary science teaching methods. One group had standard in-person instruction, the other had an online education application. Their findings share the results of Davis et al. and Beile and Boote, that there was no difference in test scores in college students between the two types of learning. This is an important finding, because it indicates that online learning can be just as effective, if not more effective, than standard in-person instruction. A caveat to these findings is the generalizability (college students were studied here, so the results may be different for K-12 students) of the studies.

Together, studies on the quality of remote learning show mixed results in the usefulness of new academic methods in online learning. Further, the studies do not provide a clear answer for the proper means of improving remote learning. The studies indicate that method or condition variables play a critical role in the success or failure of remote learning. Method variables, the controlling elements of a study, such as instructor type, assignment to conditions, and type of knowledge assessment, are likely to affect the outcome of studies. This is understandable because some things are easier to learn in an offline environment, such as hands-on skills. Other subjects, such as computer science or technology-related fields, might be easier to complete online. Another

confounding point is the controlling of class duration. I could not find consistent information regarding how the material was covered.

For example, the previous Poirier and Feldman study had students in two online classes a week, who may have received more or less instruction time compared to the face-to-face students depending on class size and level of engagement by the professor. Prior educational research has shown that smaller class sizes and more attention from professors and teachers results in better scores, and most researchers did not control for variables like class size. This could indicate that test score improvement may be from a variable other than online vs. in-person, but it is more likely that the score changes are due to method variables, such as the class subject.

The evidence presented here shows relatively consistent results that online instruction either matches or surpasses test scores from in-person instruction. There are still uncertainties, like the true causality or generalizability of some of the studies. Altogether, the research suggests that online instruction will still be useful to Fairfax County Public Schools. Greater confidence could be gained through a specific FCPS study to evaluate the efficacy of online learning of their students, however. Further, there is research that has developed rigorous findings regarding online instruction and ways to improve remote learning. Much of the learning differences occur in related variables, such as socioeconomic status, access to technology, and type of education received. The studies provide inconclusive results but provide a clearer picture of what makes online learning easier and more difficult, as well as what type of student is more set for success. Therefore, it is important for Fairfax County Public Schools to understand what can be controlled: the means of instruction and online curricula. The research suggests that personalizing instruction, granting students more time to complete assignments, and developing real-time instruction programs will increase student engagement and limit a loss of previous learning.

Evaluative Criteria

In addressing this project, FCPS has several important values and goals. First, and most important, FCPS wants to decrease or otherwise prevent the increase of the achievement gap between economically disadvantaged and minority students. FCPS has a stated goal in their 2019 strategic plan to close the achievement gap. Alternatives were thus measured with this as the greatest consideration. FCPS has also explicitly defined resource stewardship as one of their four strategic plan goals, so the alternatives will be weighed by their efficiency of public investment and administrative feasibility.

Effectiveness

Conceptually, this criterion is invaluable because it will inform FCPS of the alternative's ability to make progress at addressing the stated goal of reducing the achievement gap and promoting student success. Alternatives will be measured for effectiveness by using standardized testing and mapping changes in grades as usual. Trends over time will inform FCPS on rates of change and the benefit provided by each alternative. Student data from each school quarter would determine aggregate changes in scores and grades for students and determine if the alternatives increase grades and test scores.

I estimated effectiveness by comparing FCPS data of differences in student performance by location. There are limitations to existing data about the full extent of COVID-19 projections, however, so quantitative measurements are limited. I evaluated the effectiveness of my alternatives on a scale of 1 to 5.

Cost Efficiency

The financial impact and efficiency of alternatives is important to measure because FCPS must be prudential in its use of public resources. For example, an alternative would not be cost effective if it required billions of dollars but only increased a handful of students' grades by a non-significant margin. Costs will be measured by the prices of equipment, labor, and leasing. Positive externalities will not be measured but will likely exist (bringing a student in-person might inspire them to learn, loaning a laptop might facilitate technological literacy, etc.). This criterion is especially important to consider because FCPS has a strict budget process, so some potential alternatives could be unachievable despite high estimated effectiveness.

I measured the costs of each alternative in 2020 USD. Without knowing contract details, costs were estimated based on existing programs within FCPS, such as their current wireless connection

contract with Cox Wireless, and average laptop costs in the county. Because two of three alternatives carry incalculable financial burdens, I evaluated alternatives on a scale of 1 to 5.

Administrative feasibility

This criterion estimates the potential flexibility of implementation for alternatives, with consideration to time constraints, staffing, legality, and stakeholder relationships. FCPS has reported a massive increase in worker strain on teachers and administrative staff as a result of the COVID-19 pandemic. They have temporarily suspended non-COVID-19-related research and programs that drain manpower so employees can focus on social work and organization pivoting to remote learning. Alternatives must therefore be evaluated on the feasibility of implementation, both in terms of likelihood of acceptance by senior administrators and effective application. Contracts may need to be renegotiated with business partners, there may not be enough employees with enough time to actually implement the solutions, or school board officials may find them unnecessary, too radical, or not radical enough.

I evaluated each alternative as they relate to regulations, potential administrative changes, and the staffing requirements for implementation. I evaluated each alternative on a scale of 1 to 5.

Equity

This criterion is very important for FCPS to consider because it evaluates the degree to which the alternatives appropriately implement equitable benefits to students who are disproportionately affected by COVID-19 learning losses. FCPS is a current partner in the One Fairfax policy, in which it promotes equitable opportunities for all students by evaluating policies and providing opportunities to those in need.

I measure alternatives on their ability to address underlying factors or improve the conditions of those who struggle most in our society. I evaluated each alternative on a scale of 1 to 5 for their ability to target fair allocation of resources and benefits.

Alternatives

In Fairfax County Public Schools (FCPS), there are disproportionate rates of academic success based on race and socioeconomic status. Due to COVID-19, remote online learning is poised to put these disadvantaged groups at even greater disadvantage compared to their White or wealthy peers. If unaddressed, this problem will have long-term effects on both the wellbeing and life outcomes of affected students. A true and certain causal link to achievement gaps has yet to be determined, but research shows that there exists an intersectional network of variables that contribute to school performance, such as health, family income, parents' education level, teacher-student ratio, and attendance. In this memo, I will provide several alternatives to address this problem and evaluate them according to relevant criteria. I will provide an outcomes matrix to appropriately recommend a preferred alternative. The evaluative criteria are program effectiveness, cost efficiency, administrative feasibility, and equity. Before COVID-19, there was a wide achievement gap, so equity is very important, however, minimizing the expansion of an achievement gap due to COVID-19 is the top priority of these alternatives, making total effectiveness the most important criteria.

Allow in-person instruction for students with two or more "F" grades

This alternative allows for students who meet a specific threshold of two or more "F" grades in the past quarter to be eligible for in-person instruction at their school. This involves teachers supporting a hybrid classroom model, such that non-failing students can still learn synchronously. The origin for this alternative comes from the knowledge that disadvantaged student groups also have a systemic lack of technology resources, and that a greater proportion of non-White and low-income students are in this failing category than their White or wealthy peers. This has manifested in attendance lapses and faulty connections and assignment submissions. By allowing struggling students to learn in person, FCPS could alleviate technological inhibitions.

In terms of cost efficiency, this alternative is very inexpensive because infrastructure and teacher salaries are already factored into school budgets, so no new personnel would need to be hired or technology resources to be acquired. All financial costs would be related to resuming school operations. Therefore, the cost of this alternative ranks **high**.

In terms of effectiveness, this alternative would be **medium-high**, as it would help mitigate academic loss due to remote learning but not addressing existing inequity that plagues the lower average performance of low-income and minority students. By directly addressing the primary environment change, FCPS can reverse trends and start using new COVID-19 protocols to let disadvantaged students return to school and learn as they did before the pandemic.

In terms of administrative feasibility, this alternative receives a rating of **medium**. FCPS is under heightened scrutiny by the public over poor performance in remote learning. In the Spring, FCPS faced significant technical difficulties, and online platforms regularly went offline. Programs that bring students back in person are facing rejection over increasing infection rates in the county. One possible problem is a COVID-19 outbreak within the school district. FCPS has many schools and students, and the likelihood of 100% compliance with COVID-19 policies is low. Mixing members of households at school that then return to their own homes is inherently risky, and FCPS would likely receive harsh criticism from parents and press if COVID-19-rate-increases were linked to in-person student instruction. Because FCPS has been involved in high-profile lawsuits and significant recent media coverage, any outbreak is likely to receive negative attention.

Consequently, this alternative does not address existing equity problems in the county, it only attempts to reverse trends caused by the problem. It therefore receives an equity rating of **medium-low**. The greater focus on lower-performing students will lead to a disproportionate benefit for low-income and minority students because a greater percentage are in the "2 or more 'F' grade" category. This therefore provides greater benefit to disadvantaged groups, which might decrease but not eliminate the achievement gap.

Program to solve student-specific technology needs

This alternative involves increasing the expenditure of existing Cox Communications in order to provide students with internet connection services, laptops, IT support, or other technological needs. FCPS and Cox Communications would jointly contact every household in the county and identify a specific individual or set of needs that fall into buckets of solutions (e.g. if a family does not have a laptop, FCPS would provide a laptop; if a family does not have stable internet, Cox would provide a low-cost internet service). This alternative is very expensive compared to others, but is targeted at addressing needs and has the added benefit of helping disadvantaged students in a specific and customizable area of need.

In terms of cost efficiency, this program is very inefficient because it requires an increase in spending of tens of millions of dollars. FCPS reports a per-student cost of $16,000. Per capita alternatives will be evaluated on how much they increase the cost, acknowledging the capacity for 50,000 affected students that are considered economically disadvantaged. Assuming an average yearly cost of $1,000 per household assumed by FCPS, with half of the 50,000 disadvantaged students using the program, this alternative would still cost over $20 million. Given these estimates, this alternative ranks **medium-low** in terms of cost.

In terms of program effect, this alternative is ranked **medium**, as it would properly address specific problems that contribute to poor remote learning, but does not address other hidden variables that

may be hindering student success. Low-income and non-White students already struggled with school performance before the COVID-19 pandemic.

This has immediate negative impacts on its administrative feasibility, because FCPS is facing significant financial pressure from the school board to lower expenses. It is the highest-costing alternative provided. This alternative is also more logistically intensive and would require increased staff engagement to manage thousands of new cases. FCPS would also need to consider barriers to access. Efforts to increase education and awareness of such programs would cost both time and additional money. Based on these considerations, this alternative ranks **medium-low** on administrative feasibility.

Remote learning is expanding existing achievement gaps, and this alternative only serves as mitigation by addressing remote learning failures, not education system failures. However, it does alleviate some costs that would otherwise be assumed by the household (or lower the cost of services enough to incentivize purchase), which ultimately provides households with more wealth and access to technology. This includes positive externalities not estimated here, such as allowing the parents greater job-searching capabilities and informal learning through the internet. Therefore, its equity rating is **medium-high**.

Asynchronous learning

This alternative provides all students with the option of accessing classroom materials asynchronously through an existing FCPS software platform, such as Blackboard. This allows students to choose when to access material and submit assignments. It removes attendance grades and lets students submit assignments on a more flexible schedule. Teachers would be required to hold additional office hours and provide recorded lectures to students unable to access the material in a live setting.

In terms of cost efficiency, this alternative is very effective because the electronic infrastructure is already in place to support video uploads, downloads, and internet access. It receives a rating of **high** because there are no associated and calculable financial costs.

In terms of program effectiveness, this alternative is ranked as **medium-low** because there is low confidence that providing students with this kind of concession would effectively target enough students to show statistically significant changes in fail rate, and also has the potential to backfire. If students are given complete leniency with regards to attendance, there may be some students who will then choose not to access the material at all. These factors, paired with lack of technological literacy, could worsen learning loss. It places the responsibility of actual learning on

the students. This may be useful to older students, like high-schoolers, but FCPS data has shown that middle school students perform worse in online environments.

There may be challenges with tens of thousands of students accessing recordings from the websites but this problem is likely to be minimal, given the existing requirement for everyone to be concurrently online in synchronous classes. In terms of administrative feasibility, it ranks **medium-low** because it places greater job pressure on the teachers. By requiring teachers to do extra work without extra pay, this alternative could draw criticism and face backlash.

For equity, this alternative provides universal benefit to all students, and the number of disadvantaged, low-income and/or minority students who would benefit from greater academic flexibility are not being aided by this outcome in any other manner. There are no systemic issues that are being addressed, and this alternative does not do enough to provide targeted aid to students most in need. Therefore, the asynchronous learning alternative is rated **low** on the equity criterion.

Outcomes Matrix

Table 1: Evaluating Alternatives

Criteria	Alternative 1: In-person instruction	Alternative 2: Expand Tech Programs	Alternative 3: Asynchronous Learning
Cost Efficiency	High (5)	Medium-Low (2)	High (5)
Effectiveness	Medium-High (4)	Medium (3)	Medium-Low (2)
Admin. Feasibility	Medium (3)	Medium-Low (2)	Medium-Low (2)
Equity	Medium-Low (2)	Medium-High (4)	Low (1)
Total Score	**14**	**11**	**10**

Scores scaled from 1 (low) to 5 (high).

Recommendation

I recommend the first alternative, customized in-person instruction for students with two or more "F" grades, because of its high cost efficiency and overall effectiveness. No one solution is going to fix a correlated system of variables that contribute to the achievement gap, but this alternative provides the best path forward to minimize learning loss. This alternative does not involve engaging low-income or minority students because of that status; it involves taking failing students and bringing them back to school.

FCPS has stated that there is a higher proportion of students in disadvantaged groups that fall into the "two or more" failure bucket, so attempting to improve performance of failing students would result in a higher proportion of improvement in the disadvantaged groups compared to their peers. This alternative is also efficient because there are few students who fall between the margins of eligibility for the program: if students are failing, they often have two or more failures. There are very few students that have poor performance without several failing grades. Therefore, addressing students with two or more failing grades covers the majority of students that suffer from poor academic performance.

There are significant tradeoffs between this alternative and the program to provide technology to struggling households. Option 1, in-person instruction, is a more reactive approach with the intent of avoiding a specific source of poor school performance: struggling remote access. This method is opposite of option 2, the technology program, which aims at fixing the remote access problem rather than avoiding it. Option 2 is much more expensive, but could have potentially greater positive externalities for students and their households. Option 2 has a higher chance of fixing long-term achievement gaps, but that assumes that the achievement gap was related to access to technology, when it is likely to be many more combined variables.

This alternative assumes that in-person instruction is more effective than remote learning. This effect is even greater for disadvantaged students, who face greater remote learning challenges than their peers. Providing in-person instruction would significantly mitigate the falling academic performance. Through the indirect assistance of failing students, this alternative provides a greater amount of aid to disadvantage student groups. However, this alternative does not account for variables that contributed to achievement gaps in the first place. Once COVID-19-related learning losses are addressed and fixed, the pre-COVID-19 achievement gap is likely to remain. Therefore, further action would be needed to address these issues, as the presented alternative is only going to be effective at mitigating COVID-19-related learning loss, which is the goal of this project.

Implementation

Fairfax County Public Schools will likely face challenges from parents with the proposed solution to bring students receiving two or more "F" grades back into in-person classrooms. According to Karin Williams, parents are mostly likely going to be the main source of opposition for two reasons: first, parents are concerned with COVID-19 outbreaks, and students attending in-person classes are at some amount of risk. Secondly, because of the reduced in-person attendance, parents may be frustrated that their children are not allowed back to school because they do not fit the proposed criteria, such that FCPS is not prioritizing some students. This memo will discuss ways to mitigate these challenges as well as steps to follow during the implementation phase.

Stakeholders

Parents serve as very important stakeholders in the discussion of proper implementation because they are in direct contact with their students, often have to arrange their schedules to accommodate their children's school schedules, and are vocal in advocating for the perceived needs of their students. They serve as the primary feedback system to FCPS on the reception and success of programs and initiatives. For this implementation, parents act as a mechanism to ensure FCPS is taking appropriate safety measures. FCPS must communicate clearly and frequently with parents to ensure they are kept in the loop with the progress of implementation.

FCPS leadership is another important stakeholder group in this plan because of their decision-making requirements. The Fairfax County School Board, FCPS Superintendent, and FCPS Director of Operations and Strategic Planning, all have external pressures from Fairfax County residents, local government officials, and parents. The strategic leaders of FCPS are therefore very invested in the success of the implementation of this recommendation.

Potential Problems

One possible problem is a COVID-19 outbreak within the school district. FCPS has many schools and students, and the likelihood of 100% compliance with COVID-19 policies is low. Mixing members of households at school that then return to their own homes is inherently risky, and FCPS would likely receive harsh criticism from parents and press if COVID-19-rate-increases were linked to in-person student instruction. Because FCPS has been involved in high-profile lawsuits and significant recent media coverage, any outbreak is likely to receive negative attention.

Another potential problem is the changing of leadership in FCPS. Because of the recent lawsuits over racial bias in admission to the Thomas Jefferson High School for Science and Technology, federal Department of Education investigations into potential lapses in education services provided

to students with disabilities, and online system crashes and data leaks, FCPS leadership is under fire (Jackson, 2021) (Hillerich, 2021) (Wilder, 2020). In controversial times, it is not uncommon for superintendents or school board officials to resign or change course to appease critics. There is a likely chance that a plan to sequentially increase the number of in-person students would cause significant uproar. A change in leadership or strategic planning could therefore jeopardize the implementation of this plan.

Next Steps

There are several important steps that need to be taken in order to properly execute the recommendation. First, schools need to ensure they are adequately prepared to accommodate students in hybrid learning settings, both in terms of COVID-19 safety and the ability to properly educate. Then FCPS will bring students with two-or-more "F" grades to in-person classes. FCPS will then assess infection rates and education performance through student, parent, and teacher feedback to consider expanding in-person instruction as CDC guidance changes and vaccines become more readily available. According to Dr. Anthony Fauci, pediatric vaccines for COVID-19 will likely be available in late 2021 (Chen, 2021). As conditions change and vaccines become more readily available, FCPS should look to slowly increase in-person learning over time.

FCPS will also need to align every school to consistent guidelines and protocols with regard to COVID-19. It is important that all 198 schools have the ability to engage in safe and effective in-person instruction, so FCPS will need to conduct an internal review to make sure that standards are being upheld.

FCPS must also ensure that proper communication is given to families of eligible students. Many double-failing eligible students are less likely to know how to engage in school resources or seek additional help from the school system. It should be the responsibility of FCPS, not the student, to ensure that all households are properly informed of the current status of in-person instruction. To achieve this, FCPS should engage its existing workforce, especially School Social Work Services. Empowering this department to actively reach out to every eligible student and household is critical to ensuring this alternative is adopted as strongly as possible and to ensure best results.

In order to track progress, FCPS schools should continue to monitor performance, especially of minority, low income, disability, and English learner students. Engaging with existing intervention measures as normal will help bring student outcomes back on track and resume progress towards closing the achievement gap. With its Strategic Plan, FCPS will be able to efficiently integrate my proposed solution with its back-to-school framework to ensure that priority is given to those students who are most in need.

References

Barnum, M. (2020). How much learning have students lost due to COVID-19? *Chalkbeat National.* Retrieved November 25, 2020, from https://www.chalkbeat.org/2020/10/6/21504195/COVID-19-schools-learning-loss-projections-nwea-credo

Barnum, M. (2020). America's great remote-learning experiment: What surveys of teachers and parents tell us about how it went. *Chalkbeat National.* Retrieved November 28, 2020, from https://www.chalkbeat.org/2020/6/26/21304405/surveys-remote-learning-coronavirus-success-failure-teachers-parents

Beile, P. M., and D. N. Boote. (2002). Library instruction and graduate professional development: Exploring the effect of learning environments on self-efficacy and learning outcomes. *Alberta Journal of Educational Research* 48 (4):364–67.

Bernard, R. M., P. C. Abrami, Y. Lou, E. Borokhovski, A. Wade, L. Wozney, P.A. Wallet, M. Fiset, and B. Huang. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research* 74 (3):379–439

Bolt, D. & Crawford, R. (2000). Digital divide: Computers and our children's future. *New York: TV Books.*

Caldwell, E. R. (2006). A comparative study of three instructional modalities in a computer programming course: Traditional instruction, Web-based instruction, and online instruction. *PhD diss., University of North Carolina at Greensboro.*

Campbell, M., W. Gibson, A. Hall, D. Richards, and P. Callery. (2008). Online vs. face-to-face discussion in a Web-based research methods course for postgraduate nursing students: A quasi-experimental study. *International Journal of Nursing Studies* 45 (5):750–59.

Cavanaugh, C. (2001). The effectiveness of interactive distance education technologies in K–12 learning: A meta-analysis. *International Journal of Educational Telecommunications* 7 (1):73–78.

Center for Education Policy Analysis (CEPA). (2013). Racial and Ethnic Achievement Gaps. *Stanford University.*

Chang, M. M. (2007). Enhancing Web-based language learning through self-monitoring. *Journal of Computer Assisted Learning* 23 (3):187–96.

Chen, C. (2021). Vaccines for kids as young as first graders could be authorized by September. *Pro Publica, Inc.*

Chung, S., M.-J. Chung, and C. Severance. (1999). Design of support tools and knowledge building in a virtual university course: Effect of reflection and self-explanation prompts. *Paper presented at the WebNet 99 World Conference on the WWW and Internet Proceedings, Honolulu, Hawaii.*

Cook, L. (2015, Jan 28). U.S. Education: Still Separate and Unequal. U.S. News. Retrieved 2020, Sep 9 from US Education: Still Separate and Unequal | Data Mine | US News.

Davis, J. D., M. Odell, J. Abbitt, and D. Amos. (1999). Developing online courses: A comparison of Web-based instruction with traditional instruction. *Paper presented at the Society for Information Technology & Teacher Education International Conference, Chesapeake, Va.*

Dede, C., ed. (2006). Online professional development for teachers: Emerging models and methods. *Cambridge, Mass.: Harvard Education Publishing Group.*

Dorn, N. (2020). COVID-19 and student learning in the United States: The hurt could last a lifetime. *McKinsey & Co.*

Eggert, D. (2020, May 13). Senator warns of potential 25% cut in Michigan school funds. *The Detroit Free Press.*

Fairfax County Public Schools. (2020, May 22). Fairfax County School Board Approves Revised FY 2021 Budget [Press Release].

Fox, S. (2011, Jan 21). Americans living with disability and their technology profile. *Pew Research Center.*

Goldstein, D. (2020, Jun 10). Research Shows Students Falling Months Behind During Virus Disruptions. *The New York Times*. Retrieved 2020, Sep 26 from https://nyti.ms/3cHuCQp.

Han, X, Khaja, F, Lamsal, M. (2019). Fairfax County Demographic Report 2019. *Report prepared by the Economic, Demographic and Statistical Research Department.*

Hillerich, A. (2021). Department of Education initiates directed investigation into FCPS. *LocalDMV.*

Jackson, H. (2021). Thomas Jefferson High School students and parents are fighting changes to admissions standards. *The Washington Post.*

Johnson, T. (2003). Race, Education and No Child Left Behind. *Applied Research Center.*

Kids Count Data Center (2018, May). A Snapshot of Children in the Northern Region. *Voices for Virginia's Children.*

K. Williams, personal communication, September 6, 2020.

National Center for Education Statistics (NCES). (2015). Key Findings from the School Composition and the Black-White Achievement Gap Report. *U.S. Department of Education.*

Nguyen, F. (2007). The effect of an electronic performance support system and training as performance interventions. *PhD diss., Arizona State University, Tempe.*

Note. Data for Demographics by Fairfax County Public Schools. Retrieved 2020, Sep 3 from Workbook: Demographics.

Office of Research and Strategic Improvement (ORSI). (2020). Study of Teaching and Learning During the COVID-19 19 Pandemic. *Fairfax County Public Schools.*

Poirier, C. R., and R. S. Feldman. (2004). Teaching in cyberspace: Online versus traditional instruction using a waiting-list experimental design. *Teaching of Psychology* 31 (1):59–62.

Price-Haygood EG, Burton J, Fort D, Seoane L. Hospitalization and Mortality among Black Patients and White Patients with COVID-19. *N Engl J Med 2020.*

Rice University. (2018, August 20). Natural disasters widen racial wealth gap: Study also finds FEMA aid increased inequality. *ScienceDaily*.

Ruchti, W. P., and M. R. Odell. (2002). Comparison and evaluation of online and classroom instruction in elementary science teaching methods courses. *Paper presented at the 1st Northwest NOVA Cyber-Conference, Newberg, Ore.*

Ryan, R. (2007). The effects of Web-based social networks on student achievement and perception of collaboration at the middle school level. *PhD diss., Touro University International, City, Calif.*

Sawchuk, S. (2020, Aug 19). Remote Learning Is Tough for Many Students. How 'Early-Warning' Data Can Help Schools Support Them. *Education Week*.

Solomon, G., Allen, N., & Resta, P. (2003). Toward digital equity: Bridging the divide in education. *Boston: Allyn and Bacon.*

Startz, D (Brookings) (2020). The achievement gap in education: Racial segregation versus segregation by poverty. The *Brookings Institution.*

Tagami, T. (2020, May 1). Requested budget cut could mean $1.6 billion less for Georgia schools. *The Atlanta Journal-Constitution.*

Truong, Debbie. (2019). Report: Racial disparities persist on test scores, hiring and discipline in Virginia's largest school system. *The Washington Post*. Retrieved 2021, Mar 1 from https://www.washingtonpost.com/local/education/report-racial-disparities-persist-on-test-scores-hiring-and-discipline-in-virginias-largest-school-system/2019/06/30/e3047d22-9827-11e9-830a-21b9b36b64ad_story.html.

USC Program for Environmental & Regional Equity (2012). Equitable Growth Profile of Fairfax County. *PolicyLink.*

US Department of Education, National Center for Education Statistics. (2000 August). *NAEP 1999 Trends in Academic Progress (p. 107) Washington, DC: US Department of Education.*

U.S. Department of Health and Human Services. (2020). *Social Determinants of Health* [online].

Wilder, D. (2020). Hackers Share Fairfax County Schools Employees' SSNs Online. *NBC4 Washington*.

York, Travis T.; Gibson, Charles; and Rankin, Susan (2015) "Defining and Measuring Academic Success," *Practical Assessment, Research, and Evaluation: Vol. 20 , Article 5.* DOI: https://doi.org/10.7275/hz5x-tx03.

Zhang, K. (2004). Effects of peer-controlled or externally structured and moderated online collaboration on group problem solving processes. *PhD diss., Pennsylvania State University, State College.*