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An Analysis of the Relationship Between COVID Policies and Student Growth in the Nine Largest Arkansas Public School Districts During the 2020-2021 Academic Year

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An Analysis of the Relationship Between COVID Policies and Student Growth in the Nine Largest Arkansas Public School Districts During the 2020-2021 Academic Year

An Honors Thesis submitted in partial fulfillment of the requirements of Honors Studies in Bachelors of Science in Political Science

By

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CHAPTER I: INTRODUCTION

My honors thesis is a comprehensive overview of the relationship between the COVID-19 response of Arkansas' nine largest school districts on high school students' Value-Added Growth Scores (VAS). I wrote my thesis on the intersection between districts' COVID-19 response and the academic success of their students because the COVID-19 pandemic caused a historically significant change in education. The effects of switching from in-person, mask-free learning to virtual, semi-virtual and socially distanced learning certainly affected students' ability to learn from the educational environment pre-COVID. I chose to utilize the VAS as the metric for student success because it measures how students increase their academic learning throughout a school year. The VAS uses a predictive linear model to track if students improved more or less than typical for other students across the state with similar prior test score histories. Academic Growth Scores are calculated every year and would not have been affected by COVID, making it possible to compare changes related to differences in district policy responses to COVID. I believe there is importance to understanding how COVID policies affect student achievement in public schools. Educational policy should be prescribed with the intent for advancing student achievement. When COVID began to cause serious shifts in the learning modality of education, I began to think about how certain policies would affect how students learn. My research is aimed to address the nature of the relationship between COVID policies and student achievement.

DEFINITION OF TERMS

For the purposes of understanding this thesis, the following terms are defined:

1. Value-added growth score (VAS) is a model utilized by the Arkansas Department of Education and Secondary Education (ADESE) to measure individual student growth. The model analyzes student achievement in English Language Arts (ELA) and mathematics through statewide assessments. The students' results are used to compare how a student is progressing relative to other students and identify areas for improvement. The ADESE collects VAS for students in grades 3-10.
2. COVID Policy Metric is defined as the number of ADESE recommended COVID policies followed by each individual school district. There were thirteen recommended COVID policies which results in districts receiving a metric out of thirteen. The metric is determined by the schools' reopening proposals graded against the ADESE recommended policies.

ADESE COVID POLICIES

The Arkansas Department of Education & Secondary Education (ADESE) released a guide for public schools reopening procedures on June 5, 2020. The ADESE directives were based off similar guidelines that the Center for Disease Control (CDC) had released a few weeks prior. Arkansas public school districts were given until July 27th to submit a plan that adhered to the guidelines established in the ADESE. The school districts were given the seven required directives to be adopted in each plan submitted for reopening. I listed the seven required directives for Arkansas school districts below.

Arkansas DESE Baseline Policy Requirements:

- Ensure the continuity of teaching and learning by providing a guaranteed and viable curriculum that includes blended learning (K-12) and diagnostic assessments (K-8);
- Identify how they will address unfinished learning from the prior year by using the *Arkansas Playbook: Addressing Unfinished Learning* or district developed resources;
- Utilize a Learning Management System;
- Schedule teacher training for how to use the LMS;
- Schedule teacher training for blended learning (delivery of instruction);
- Use effective technology for parents and students; and
- Provide a written communication plan for interacting with parents, students, and the community regarding day-to-day expectations.

The ADESE additionally released 13 more directives that were recommendations for school districts to adopt in their plan. I have listed those 13 directives below.

Arkansas DESE Recommended Guidelines

1. Review facilities to determine how modifications can be made to accommodate as much physical distancing as possible, including repurposing unused spaces or modifying existing spaces to allow for maximum distancing of students/staff.
2. Suspend assemblies and other large group gatherings until ADH guidance allows for these types of gatherings.
3. Schedule restroom breaks to avoid congregating. Create a schedule to ensure disinfecting of frequently touched areas such as light switches, faucet levers, paper towel dispensers, and flush levers.

4. Consider suspending the use of water fountains and plan for alternative hydration stations (e .g . bottled water, disposable water cups/cones, bottle filling stations) if feasible.
5. Establish drop-off and pickup to limit close contact between parents and staff members
6. Limit group activities and interaction between classes. Stagger class dismissals in middle and high schools.
7. Consider rotating teachers rather than students.
8. Determine how to prohibit congregation in hallways and cafeterias.
9. Post signage at entrances and throughout buildings with the latest health guidance.
10. Review teacher and student schedules.
11. Consider alternatives for holding areas for large groups of students before and after school.
12. Re-Entry Guidance document will be updated as information becomes available.
13. Ability to quickly move between different modes of instructional delivery.

During the 2020-2021 academic school year, Arkansas school districts were requested to implement virtual and in-person instruction for students. Six of the nine districts in my sample implemented a hybrid learning module as well. Cabot, Conway, and Little Rock did not offer a hybrid option. The learning modalities for all nine districts were to comply with the Arkansas Department of Education's requirements for a Learning Management System (LMS) for the three types of enrollments. The preferred platform of virtual learning was Google Classroom, with eight out of the nine districts utilizing the service. Little Rock SD used Schoology as the virtual platform. For access to virtual learning, eight of the school districts automatically provided technology for students to use during the year. Pulaski County Special SD provided students with technology on request but did not automatically give technology to students. For

in-person learning, students and teachers wore masks during instruction. Across the nine districts, in-person varied in terms of implementation procedure. Bentonville, Fayetteville and Springdale school districts staggered dismissal and lunch times to accommodate for social distancing. Bentonville and Fayetteville also repurposed previously unused classrooms to minimize class size. However, all school districts provided a directive for sanitation of classrooms. For the other six school districts, in-person learning was similar to previous years except for the mask requirement. All nine districts reopening proposals can be found here.

SELECTION OF SCHOOL DISTRICTS AND CHARACTERISTICS

My sample for this study was the nine largest public-school districts in Arkansas: Springdale, Little Rock, Bentonville, Rogers, Fort Smith, Pulaski County, Cabot, Fayetteville and Conway school districts. For each school district I constructed a profile of enrollment, student demographics, financing, and COVID-19 response. The COVID-19 response consists of the learning modality (in-person, virtual or hybrid) and school district policy regarding masking, quarantine and social distancing. I chose those metrics because they construct a useful overview of how the school districts vary from one another. I then took the VAS of students in grades 9 and 10 from the high schools in each district and. I will utilize the school district profiles and identify metrics that might indicate any variance in their students' VAS. I was motivated to conduct this evaluation because the educational measures enacted in COVID-19 are likely to alter how schools teach students in the future. By researching how these measures intersected with student learning in the first year of their implementation, I can provide insight into how different learning modalities and district policies relate to student success.

Table 1

Financial Details of Sample Districts, 2020-21

District Name	Enrollment	Number of High Schools	Per Pupil Expenditure	Net Operating Expenditure	Millage Rate
Bentonville	17,960	2	$10,346	$196,219,056	48.5
Cabot	10,081	1	$9,489	$104,168,063	36.0
Conway	9,738	1	$10,555	$116,477,245	38.1
Fayetteville	9,941	1	$11,821	$125,010,381	45.7
Fort Smith	13,640	2	$12,022	$174,841,829	42.1
Little Rock	20,363	2	$14,913	$290,897,799	46.4
Pulaski Co.	11,262	4	$13,581	$178,823,411	40.7
Rogers	15,378	3	$10,764	$152,703,854	41.9
Springdale	21,681	2	$10,775	$191,295,090	38.6

Source: https://myschoolinfo.arkansas.gov/Plus/RenderDistricts

The characteristics listed above are the characterize the school districts from a financial perspective. There has been extensive research on the effect of funding for schools to increase student success. Little Rock has the highest per pupil expenditure and net operating expenditure of the nine school districts. All nine school districts are above the standard millage rate of 28.5 which means that all school districts give a percentage of income to school districts below the 28.5 millage rate.

Table 2

Student Demographics of Sample Districts, 2020-21

District Name	% Asian	% Black/ African American	% Hispanic/ Latino	% White	% Other*	%Free/ Reduced Lunch
Bentonville	7.72	3.13	11.66	71.05	6.45	20.04
Cabot	1.40	2.64	6.60	82.80	6.56	43.41
Conway	1.68	29.31	11.11	53.00	4.90	54.46
Fayetteville	2.95	9.66	12.26	65.51	9.61	40.97
Fort Smith	5.33	10.87	33.98	39.48	10.34	73.48
Little Rock	3.33	60.53	15.65	19.23	1.25	77.86
Pulaski Co.	2.54	44.42	9.61	39.17	4.25	55.90
Rogers	1.89	1.52	47.75	43.00	5.84	59.97
Springdale	1.47	2.19	47.90	32.44	16.01	72.07

* includes Native American/ Hawaiian, Pacific Islander, and Two or more races

Source: https://myschoolinfo.arkansas.gov/Plus/RenderDistricts

Little Rock has the highest percentage of minority students and the highest percentage of students eligible for the free/reduced lunch program. Free/Reduced lunch eligibility is based on household income and is commonly used as a proxy for low socio-economic status Bentonville has the lowest percentage of free/reduced lunch and the second highest percentage of white students.

STATEMENT OF PURPOSE

The purpose of this research is to discover the relationship between COVID policies and academic growth in ninth and tenth grade students in ELA and math. COVID cases are still present in the United States and another wave is possible. The research of understanding the relationship between COVID policies and academic growth is substantial to understanding how to benefit student achievement in the future. The research into students as individuals using VAS can help the development of policies for the future. The effectiveness of specific policies measured against others would help school districts develop plans that best suit the specific needs of the school district.

CHAPTER II: REVIEW OF LITERATURE

IMPLEMENTATION AND RECEPTION OF COVID POLICIES IN PUBLIC SCHOOLS

The 2020-21 academic year forced schools to determine COVID mitigation policies and provide effective measures of communication. A study in Georgia examined a cross-section between the implementation of COVID policies and the perception of the communication from school officials. The cross-section featured 761 students combined from both high schools. The 761 students were approximately 19% of the total enrollment for both schools. The 54-question survey was broken up over the following categories: Coronavirus Knowledge, Pandemic Behaviors, and Demographics (Campbell, Weingart, Ashta, Cronin and Gazmararian 3). For the first section, 91% of students answered that they received Coronavirus news from traditional news outlets, social media or friends and family. Over half of these students listed social media as their primary source of information COVID-19 knowledge. From the questions related to the Coronavirus Knowledge, 95% agreed that elderly people were at high risk, while only 3% agreed that high school students were at risk (Campbell, Weingart, Ashta, Cronin and Gazmararian 4). Most of students (greater than 80%) agreed that the following behaviors were effective in preventing COVID-19 transmission: washing hands, social distancing and only staying in close contact with members from their household. For the behaviors section, 87% of students reported engaging in both “staying home as much as possible” and “washing hands with soap more frequently.” The largest observable trend was that screen-time for students had significantly increased (Campbell, Weingart, Ashta, Cronin and Gazmararian 5). 82% of students reported that their screen time outside of school had increased since the closure. Students also reported an increase in reduced physical activity and eating unhealthier foods at 41% and 39% respectively (Campbell, Weingart, Ashta, Cronin and Gazmararian 6).

The findings from the study concluded that students primarily gathered their information from social media and family against traditional news outlets. The students also expressed an increase in unhealthy habits such as increased screen time, less exercise and poorer diets. The largest concern raised from the study was that students did not perceive themselves as high risk to the Corona Virus (Campbell, Weingart, Ashta, Cronin and Gazmararian 7). The recommendations from the study suggested that schools should promote social media campaigns that educate students on finding accurate information vs. Misinformation, along with discussion groups to discuss information relevant to COVID-19. The recommendation to address the increase in unhealthy behavior were geared towards family-intervention to correct the suggest healthier behaviors. Although this survey was taken in the early months of COVID-19, the primary recommendation was to proactively address any health disparities that might arise between social class and minority students. The study suggested that proactively addressing the health disparities could take form in school-led resource expansion with food, after-school care and technological support for remote learning. This study was utilized in my thesis because of the results directly taken from students in response to COVID-19 measures and behavior. The student's knowledge and behavior assisted my research in how Arkansas students could potentially be affected academically by their knowledge of COVID-19 and their behavior.

As directed by the ADESE, schools were required to provide a platform for online learning. The specific variable used was using real-time internet search analysis for online learning resources. The study chose this variable to analyze how parents from different income areas reacted to the school closures and to potentially identify a factor for potential education disparity relative to family income. The variable of internet search frequency for online resources was also chosen to understand how the school closures affected student's ability to learn and

engage in the classroom. The study divided the search for online learning resources into the two categories, “school-centered resources” and “parent-centered resources” (Bacher-Hicks, Goodman and Mulhern 4) School-centered resources are online platforms used by education centers, such as Teams or Google Classroom. Parent-centered resources are mainly supplemental resources such as private tutors. The overall search analysis displayed that the online searching reflected the school year, peaking throughout the school semesters and drastically falling off during the summer. The study utilized the publicly available data from Google Trends, which measures search intensity for various keywords (Bacher-Hicks, Goodman and Mulhern 4). The study compiled a list of 45 keywords relevant to online learning resources, divided into two categories. The pre-COVID search was significantly lower and regular up to March 2020 when most schools across the United States closed. The search intensity research showed that searches for school-centered resources were significantly larger than parent-centered resources. However, the search intensity for online learning resources was higher for users in high income areas. The higher search frequency also directly correlated with students' math progress scores in the same higher income areas, which increased relative to lower income areas (Bacher-Hicks, Goodman and Mulhern 10). The increased search intensity for higher income areas reflects the greater access to the internet and income to afford supplemental resources. The disparity between the search intensity could reflect a potential increase in the gap in education between higher and lower income households. The recommendations from the study suggested that schools can utilize this data to better prepare for online education in lower income households, by providing more online learning resources (Bacher-Hicks, Goodman and Mulhern 15). Understanding how households respond to online education is an important factor for measuring the effect of COVID-19 in education. The concept of how virtual learning is perceived through families of

different incomes was important for my research because the school's districts differ in levels of income. The Arkansas school districts I studied varied in terms of income areas and online educational resources.

Arkansas public school faculty and staff were tasked with implementing and enforcing COVID policies to ensure a school climate that was still beneficial to positive student achievement. A survey was administered to 7467 American School Health Association (ASHA) members of the summer of 2020. However, only 375 of those emailed completed the survey (Pattison, Hoke, Schaefer, Alter and Sekhar 378). The largest area of concerns was proper social distancing being enforced, COVID resurgence and adequate health supply resources. All participants expressed concerns in those areas at above 88% (Pattison, Hoke, Schaefer, Alter and Sekhar 379). The survey included demographics and concerns with reopening. The study further broke down results by overall response and then responses by educators, nurses and others. The survey divided the questions into concerns of physical environment, school health and mental health (Pattison, Hoke, Schaefer, Alter and Sekhar 382). From the overall responses, there was a significant disparity between concerned and not concerned. The closest difference from the overall response section was for the item “Ability to re-establish trusting relationships/rapport with students and their families” with 54.8% expressing concern compared to 45.2% not being concerned. Between educators, nurse and other faculty, nurses expressed a higher level of concern in all items asked, with the “other” category expressing a larger overall level of concern than educators(Pattison, Hoke, Schaefer, Alter and Sekhar 382).

MEASURING STUDENT ACHIEVEMENT IN ARKANSAS

Arkansas uses value-added growth scores to measure student growth in public schools over grades 3-10. The VAS model is used to measure student achievement through the annual state assessment test, ACT Aspire. VAS is interpreted through English Language Arts (ELA) and mathematics (McKenzie, Barnes, Reid 7). The VAS model allows for a comparison between individual students as to how they are progressing compared to each other.

The individual improvement measured through value-added growth provides a valuable insight into how students are affected throughout their academic year. One study examined the value-added growth from students who transitioned from one school to a different school, compared to students who remained at the same school. Transition from one year to the next is an important aspect to understanding a baseline for value-added growth transition. The results of the study did not find a significant statistical relationship between student's transitioning schools and their VAS (McKenzie, Barnes, Reid 23).

The school climate is an important factor in the effect on student performance between school or grade transitions (Rice 373). School climate is defined as how students, faculty and staff perceive the academic environment. For the 2020-21 academic year, the school climate would be demonstrably different from previous years because of the new COVID policies. The total school enrollment is a factor that influences the school climate as well. Another factor proven to affect student performance is the perceived disruption within the academic environment (Rice 374). In Arkansas, the policies measures could have been perceived as disruptive to students' learning ability with policies such mask mandates and socially distanced classrooms.

Chapter Summary

In this chapter, the literature regarding COVID policy implementation, and the defining of VAS was discussed. COVID policy implementation was received best by students through the use of social media, and best received by parents through school-issued updates. Parents in higher income areas had relatively better access to supplemental virtual education, while parents in lower income areas did not. School faculty were not highly confident that appropriate measures were being taken in schools for COVID mitigation. VAS is used because of the process for measuring student growth over time as opposed to comparing student scores isolated from other factors. VAS is affected by how the school climate is perceived by students and faculty.

CHAPTER III: METHODOLOGY

VALUE-ADDED GROWTH SCORE

Value Added Growth Score (VAS) is a model to measure the change in student achievement over a certain period. VAS helps identify how a student's performance changed from year to year and is measured for English language arts (ELA) and math . The measurement of VAS is the difference between what the student was expected to achieve in the year, based on previous performance and what the student actually achieved during that school year. The measurement is useful to track academic achievement because each student is measured against a predicted model for success, the measured difference quantifies how well the student is on track to graduate or ready for college or a career. VAS is also useful because the measurement differentiates between non-school related factors such as poverty and focuses on student achievement to create a more accurate model for predicted achievement.

My research focused on student value added growth in math and ELA. The VAG for math and ELA is measured based on the students' scores throughout their academic career. The scores are classified as positive value-added growth scores, value-added growth student scores near zero and negative value-added student scores. Positive value-added growth scores indicate the student achieved a greater than expected growth based on previous years' performance. Value-added growth scores near zero indicate that the student achievement met expectations based on previous years' performance. Negative value-added growth scores indicate that the student achievement was lower than the expectation based on previous years' performance.

The VAS for math and ELA are considered "Content VAS" and are NOT combined with the English Learner Proficiency Value Added Growth Score (ELP VAS) to define the VAS for a specific school. ADESE utilizes VAS to track a school's performance.

Table 3

Value-Added Growth Scores for Sample Districts and by grade 2017-2021.

Value Added Growth (VAS)						
Subject	Grade	District	2017-18	2018-19	2020-21	Difference 2019-21
ELA	Grade 9	Bentonville	79.39	79.86	79.75	-0.11
		Cabot	81.08	79.89	79.39	-0.50
		Conway	79.14	81.23	81.04	-0.19
		Fayetteville	78.86	76.22	78.51	2.29
		Fort Smith	83.04	80.90	80.41	-0.49
		Little Rock	76.63	77.14	77.84	0.70
		Pulaski County	80.94	81.83	79.17	-2.66
		Rogers	78.22	79.12	79.54	0.42
		Springdale	80.13	79.75	80.35	0.60
	Grade 10	Bentonville	79.58	78.99	79.05	0.06
		Cabot	81.31	80.85	79.18	-1.67
		Conway	79.89	81.02	79.82	-1.20
		Fayetteville	78.43	76.05	78.38	2.33
		Fort Smith	79.64	79.40	76.91	-2.49
		Little Rock	75.43	77.24	76.66	-0.58
		Pulaski County	79.84	79.49	80.63	1.14
		Rogers	77.25	78.83	78.85	0.02
		Springdale	79.65	80.13	79.84	-0.29

Source: https://myschoolinfo.arkansas.gov/Plus/RenderDistricts

Table 4

Value-Added Growth Scores for Sample Districts, by grade and content area, 2017-2021.

Value Added Growth Score Math (VAS)						
Subject	Grade	District	2017-18	2018-19	2020-21	Difference 2019-2021
Math	9th	Bentonville	82.03	81.38	84.01	*2.63*
		Cabot	79.64	80.01	77.74	*-2.27*
		Conway	81.65	84.82	81.00	*-3.82*
		Fayetteville	79.76	79.17	79.80	*0.63*
		Fort Smith	82.95	81.53	80.03	*-1.50*
		Little Rock	78.68	77.94	78.24	*0.30*
		Pulaski Co.	79.70	79.59	78.82	*-0.77*
		Rogers	78.91	80.88	81.13	*0.25*
		Springdale	81.93	80.24	80.91	*0.67*
	10th	Bentonville	81.17	80.47	82.23	*1.76*
		Cabot	82.23	80.85	75.77	*-5.08*
		Conway	80.69	82.10	79.94	*-2.16*
		Fayetteville	78.66	77.53	79.55	*2.02*
		Fort Smith	80.20	79.39	79.36	*-0.03*
		Little Rock	76.79	77.48	77.87	*0.39*
		Pulaski Co	79.13	79.06	80.42	*1.36*
		Rogers	79.04	80.37	79.77	*-0.60*
		Springdale	81.07	80.63	79.77	*-0.86*

Source: https://myschoolinfo.arkansas.gov/Plus/RenderDistricts

The tables above show the 9th and 10th grade VAS in math and ELA for the nine school districts included in my study. The VAS scores are collected from three academic years,: 2017-18, 2018-19 and 2020-21. The VAS for the 2019-20 school year is not available due to lack of testing during the COVID-19 pandemic. The final column displays the difference in VAS between the 2018-19 school year and the VAS of the 2020-21 school year. For ELA, only Fayetteville and Rogers school districts demonstrated a positive VAS in both grades 9 and 10. For math, only Fayetteville, Bentonville and Little Rock school districts showed a positive VAS in both grades 9 and 10.

IN-PERSON LEARNING MODALITY PERCENTAGE

The ADESE mandated that all school districts offer in person learning, as well as a virtual learning model. Each district had to submit a bi-weekly report for the number of students enrolled in either an in-person, hybrid or virtual learning model. I filtered the bi-weekly reports by high schools in the nine school districts in a separate spreadsheet and then combined the total enrollment for each learning model to define a total enrollment for each bi-weekly period. I then divided the number of students for each learning model against the bi-weekly total enrollment to define a percentage of enrollment for that bi-weekly period. I found the average annual percentage of learning model enrollment by adding the bi-weekly enrollments for each learning model and dividing that sum by the total enrollment of all the bi-weekly period reports.

Table 5

Average student participation by learning modality, 2020-21

District Name	% In-Person	% Hybrid	% Virtual
Bentonville	72.0	24.3	28.2
Cabot	81.0	0.0	18.9
Conway	56.0	0.0	43.9
Fayetteville	51.0	21.8	26.9
Fort Smith	38.0	49.1	13.6
Little Rock	37.0	0.0	62.8
Pulaski Co.	37.5	26.7	35.7
Rogers	84.0	61.3	9.5
Springdale	73.0	22.3	4.2

Source: https://myschoolinfo.arkansas.gov/Plus/RenderDistricts

Table 5 above includes the average percentage of student participation in the learning modalities. enrollment type among the school districts. For the data, hybrid students were included under in-person enrollment for Bentonville, Fort Smith and Rogers which is why those percentages add up to greater than 100%. Cabot, Conway and Little Rock did not offer a hybrid learning model for the school year. Cabot had the highest percentage of true in-person instruction while Little Rock had the highest percentage of students attending school virtually.

COVID POLICY EVALUATION:

For my policy analysis of the school districts' responses to COVID-19, I utilized the discrepancies from the number of recommended directives that each school district followed or chose not to follow. I focused on the recommended directives because, while every school district had to follow the seven required districts, not every school district implemented the additional 13 recommended guidelines. The varied implementation of the recommended guidelines could have affected how students from different school districts performed

academically because of the differing educational environment. For each of the 9 school districts, I scored the districts out of thirteen. If a district implemented 9 out of the 13 recommended directives, the school district was assigned a 9/13. The numbers listed below each school district correspond to the specified number on the list of recommended directives above. If the school district implemented a recommended directive, I included the specific guidelines used for that directive. If the school district did not implement a recommended directive, I documented the absence of that specific recommendation.

Table 6

COVID Policy Analysis of Sample Districts

District	Policy Number													
	1	2	3	4	5	6	7	8	9	10	11	12	13	Score
Benton-ville	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	11
Cabot	N	N	N	N	N	N	N	N	N	N	N	Y	Y	2
Conway	N	N	N	N	N	N	N	Y	N	N	N	Y	Y	3
Fayette-ville	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	12
Fort Smith	Y	N	N	N	N	N	N	N	Y	N	N	Y	Y	4
Little Rock	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	3
Pulaski Co.	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	3
Rogers	Y	N	N	N	N	N	N	N	Y	N	N	Y	Y	4
Spring-dale	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	Y	6

A folder with each schools' policy proposal can be found here.

Table 6 illustrates that every school district followed the recommended policies 12 and 13. Recommended Policy 12 was that every school district should update a document re-entry guidance as information becomes available. Recommended Policy 13 directed that school districts should provide for the ability switch between in-person and virtual learning quickly. None of the school districts followed Recommended Policy 7 which suggested that school districts rotate teachers instead of students. Fayetteville School District followed the most recommended guidelines with a policy metric of 12/13. Cabot School District followed the least recommended guidelines with a policy metric of 2/13.

ANALYSIS

I used ordinal least squares multivariate regression (OLS) to analyze the relationship between the VAS and policy metric for each school district. OLS is used to define the linear relationship between variables by measuring the variation between the data points of the independent variable against the predicted measurement of the dependent variable.

For my research I used an initial OLS to quantify the relationship between school district COVID policy score and 9^{th} and 10^{th} grade VAS as the dependent or outcome variable. In a secondary regression, I added school district characteristics (per pupil expenditure, free and reduced lunch percentage and average annual in-person learning percentage) to the model. The regression plotted all the values of the policy metric and the VAS and constructed a linear representation of this relationship. From there, the regression measured the differences between the actual values and the linear representation by adding the area of the squares to quantify the error. The error indicates how well the policy metric as a variable can predict the growth of VAS. The secondary regression was calculated through the same process, but instead added the

district characteristics as independent variables to measure the predictive growth of the VAS. I utilized the Stata statistical software to run the regressions.

Chapter Summary

In this chapter, the model of VAS, learning modality by district and district policy metric were discussed. I discussed how VAS was utilized in my district research and compared the learning modalities of each district. I also discussed the explanation for my policy Evalution and how I derived each district policy metric. The explanation of analyzing the data using an ordinal least squares multivariate regression was also discussed.

CHAPTER IV: RESULTS

REGRESSION FIGURES

Figure 1

Regression Output, initial model, Grade 9 math VAS

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.
. reg gr9math_2021 gr9math_1819 policygrade
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Source	SS	df	MS	Number of obs	=	9
				F(2, 6)	=	6.21
Model	19.2260299	2	9.61301493	Prob > F	=	0.0345
Residual	9.28400422	6	1.54733404	R-squared	=	0.6744
				Adj R-squared	=	0.5658
Total	28.5100341	8	3.56375426	Root MSE	=	1.2439

gr9math_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr9math_1819	.5646363	.2285984	2.47	0.048	.0052763	1.123996
policygrade	4.340279	1.565629	2.77	0.032	.5093236	8.171234
_cons	32.88631	18.51568	1.78	0.126	-12.41992	78.19255

The initial regression displays 9th grade math VAS in mathematics based on the prior year VAS and the policy metric score. The results are significant at the 95% level between for the relationship of the prior year's VAS and 2021 VAS. The results are also statistically significant at the 95% level overall for the relationship between Grade 9 Math VAG and policy metric score.

Figure 2

Regression Output, initial model, Grade 9 ELA VAS

```
. reg gr9ela_2021 gr9ela_1819 policygrade
```

Source	SS	df	MS	Number of obs	=	9
				F(2, 6)	=	4.07
Model	4.49787802	2	2.24893901	Prob > F	=	0.0765
Residual	3.31736044	6	.552893406	R-squared	=	0.5755
				Adj R-squared	=	0.4340
Total	7.81523846	8	.976904807	Root MSE	=	.74357

gr9ela_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr9ela_1819	.4556033	.1631213	2.79	0.031	.0564598	.8547468
policygrade	.9039402	1.063758	0.85	0.428	-1.698982	3.506863
_cons	42.94197	13.19572	3.25	0.017	10.65321	75.23073

The results of the initial regression results for 9th grade ELA VAS are presented in Figure 2. The results are significant at the 95% level between for the relationship of the prior year's VAS and 2021 VAS. The results are not statistically significant, however, between the VAS policy metric score.

Figure 3

Regression Output, initial model, Grade 10 math VAS

```
. reg gr10math_2021 gr10math_1819 policygrade
```

Source	SS	df	MS	Number of obs	=	9
				F(2, 6)	=	1.84
Model	9.57824896	2	4.78912448	Prob > F	=	0.2375
Residual	15.5776697	6	2.59627828	R-squared	=	0.3808
				Adj R-squared	=	0.1743
Total	25.1559187	8	3.14448983	Root MSE	=	1.6113

gr10math_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr10math_1819	.3250568	.384123	0.85	0.430	-.6148583	1.264972
policygrade	3.973303	2.099713	1.89	0.107	-1.16451	9.111117
_cons	51.85084	30.89645	1.68	0.144	-23.75004	127.4517

Figure 3 presents the regression results for 10th grade math VAS. The relationship between the 2021 VAS was not statistically significant for either prior year VAS or the policy metric score.

Figure 4

Regression Output, initial model, Grade 10 ELA VAS

```
. reg gr10ela_2021 gr10ela_1819 policygrade
```

Source	SS	df	MS	Number of obs	=	9
				F(2, 6)	=	1.93
Model	5.48423131	2	2.74211566	Prob > F	=	0.2253
Residual	8.5225248	6	1.4204208	R-squared	=	0.3915
				Adj R-squared	=	0.1887
Total	14.0067561	8	1.75084451	Root MSE	=	1.1918

gr10ela_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr10ela_1819	.6240409	.317949	1.96	0.097	-.1539524	1.402034
policygrade	1.903038	1.818195	1.05	0.336	-2.545925	6.352001
_cons	28.66403	25.59067	1.12	0.305	-33.95407	91.28213

The initial regression model predicts Grade 10 English Language Arts 2021(Gr10ELA2021) VAS based on prior year's Grade 10 English Language Arts VAS and policy metric. The results are not statistically significant between Grade 10 English Language Arts 2021 VAS and prior years VAS along with the policy metric.

Figure 5

Regression Output, secondary model, Grade 9 math VAS

```
.
. reg gr9grwth_math_2021 gr9grwth_math_1819 policygrade perpupilexpenditure freeandreducedlunch avgannualpctinperson
```

Source	SS	df	MS	Number of obs	=	9
				F(5, 3)	=	3.26
Model	24.0801043	5	4.81602087	Prob > F	=	0.1797
Residual	4.42992973	3	1.47664324	R-squared	=	0.8446
				Adj R-squared	=	0.5856
Total	28.5100341	8	3.56375426	Root MSE	=	1.2152

gr9grwth_math_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr9grwth_math_1819	.942548	.3459263	2.72	0.072	-.1583438	2.04344
policygrade	5.188055	2.022829	2.56	0.083	-1.249491	11.6256
perpupilexpenditure	.0010882	.0007086	1.54	0.222	-.0011668	.0033432
freeandreducedlunch	.2501649	3.452731	0.07	0.947	-10.73796	11.23829
avgannualpctinperson	9.102448	5.037801	1.81	0.169	-6.930083	25.13498
_cons	-16.0289	36.60263	-0.44	0.691	-132.5148	100.457

The secondary regression model predicts Grade 9 Math 2021 VAS based on prior year's VAS, policy metric and district characteristics (including per pupil expenditure and avg. annual pct in person). The results are not significant overall, but Grade 9 Math 2021 VAS and policy metric still reflected a marginally significant model.

Figure 6

Regression Output, secondary model, Grade 9 ELA VAS

```
. reg gr9grwth_ela_2021 gr9grwth_ela_1819 policygrade perpupilexpenditure freeandreducedlunch avgannualpctinperson
```

Source	SS	df	MS		
Model	7.25627007	5	1.45125401	Prob > F	0.0608
Residual	.558968383	3	.186322794	R-squared	0.9285
				Adj R-squared	0.8093
Total	7.81523846	8	.976904807	Root MSE	.43165

gr9grwth_ela_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr9grwth_ela_1819	.3573736	.1220463	2.93	0.061	-.0310323	.7457795
policygrade	1.39859	.8955511	1.56	0.216	-1.451453	4.248633
perpupilexpenditure	-.0005639	.0002014	-2.80	0.068	-.001205	.0000772
freeandreducedlunch	3.193387	1.271065	2.51	0.087	-.8517082	7.238483
avgannualpctinperson	-1.758078	1.647101	-1.07	0.364	-6.999887	3.483731
_cons	56.35234	12.12114	4.65	0.019	17.77745	94.92722

The secondary regression model predicts Grade 9 English Language Arts 2021 VAS based on prior year's VAS, policy metric and district characteristics (including per pupil expenditure and avg. annual pct in person). The results are marginally significant overall, but policy grade is not significant. Policy grade does not seem to be associated with student value added growth scores in ELA.

Figure 7

Regression Output, secondary model, Grade 10 math VAS

```
.
. reg gr10grwth_math_2021 gr10grwth_math_1819 policygrade perpupilexpenditure freeandreducedlunch avgannualpctinperson
```

Source	SS	df	MS	Number of obs	=	9
				F(5, 3)	=	2.67
Model	20.5376917	5	4.10753835	Prob > F	=	0.2244
Residual	4.61822692	3	1.53940897	R-squared	=	0.8164
				Adj R-squared	=	0.5104
Total	25.1559187	8	3.14448983	Root MSE	=	1.2407

gr10grwth_math_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr10grwth_math_1819	1.720814	.6080856	2.83	0.066	-.2143858	3.656014
policygrade	7.612977	2.506003	3.04	0.056	-.3622447	15.5882
perpupilexpenditure	.0014386	.0007137	2.02	0.137	-.0008327	.0037099
freeandreducedlunch	.1530313	3.53543	0.04	0.968	-11.09829	11.40435
avgannualpctinperson	.4568227	4.16438	0.11	0.920	-12.79609	13.70974
_cons	-77.99449	56.19133	-1.39	0.259	-256.8204	100.8314

The secondary regression model predicts Grade 10 Math 2021 VAG based on prior year's VAG policy metric and district characteristics (including per pupil expenditure and avg. annual pct in person). The results are not significant overall, but policy grade and prior year's VAG are marginally significant at the 90% level.

Figure 8

Regression Output, secondary model, Grade 10 ELA VAS

```
. reg gr10grwth_ela_2021 gr10grwth_ela_1819 policygrade perpupilexpenditure freeandreducedlunch avgannualpctinperson
```

Source	SS	df	MS	Number of obs	=	9
				F(5, 3)	=	0.69
Model	7.51683164	5	1.50336633	Prob > F	=	0.6639
Residual	6.48992447	3	2.16330816	R-squared	=	0.5367
				Adj R-squared	=	-0.2356
Total	14.0067561	8	1.75084451	Root MSE	=	1.4708

gr10grwth_ela_2021	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gr10grwth_ela_1819	.9283602	.7138054	1.30	0.284	-1.343287	3.200007
policygrade	2.359249	3.849545	0.61	0.583	-9.89172	14.61022
perpupilexpenditure	.0007002	.0008513	0.82	0.471	-.0020092	.0034095
freeandreducedlunch	-2.543522	4.216423	-0.60	0.589	-15.96206	10.87502
avgannualpctinperson	3.573366	5.324543	0.67	0.550	-13.37171	20.51844
_cons	-4.404026	67.07803	-0.07	0.952	-217.8762	209.0682

The secondary regression model predicts Grade 10 English Language Arts 2021 VAG based on prior year's VAG, policy metric and district characteristics (including per pupil expenditure and avg. annual pct in person). The results are not significant overall between any of the variables.

CHAPTER V: DISCUSSION

In March of 2020 the COVID-19 pandemic prompted a sudden shift in learning models across the world. Schools had to implement virtual learning overnight and adapt as the pandemic developed. The pandemic was still present while school districts across the country had to plan for the 2020-2021 academic year. This research was intended to understand how the different COVID response policies were related to student achievement during a school year where the models of learning had shifted. This descriptive study found a significant relationship between t following more recommended guidelines and grade 9 math VAS. However, the data also suggests that there is a marginally significant relationship between the number of recommended guidelines followed and grade 10 math VAS. There is no significant relationship between policy metric and ELA for grades 9 and 10 at all. In addition, the district characteristics of per pupil expenditure, percentage of students eligible for free and reduced lunch, and the average annual percentage of in-person enrollment, did not have a significant relationship to VAS in either subject or grade.

While there was variation in the number of recommended policies that the school districts followed, overall, the variation did not influence students' VAS. For most school districts, VAS decreased between the academic years 2018-19 and 2020-21. However, the data suggests the interesting implication that the policies only significantly affected student achievement in math, but not ELA.

CONCLUSION

All of the school districts varied in terms of enrollment, financial ability, student diversity and the number of recommended policies implicated. This research focused on the relationship between the recommended policy metric and suggests that there is a significant effect on student

math growth, but not ELA. The research did not identify the cause of the discrepancy between the effect on math instead of ELA. The differences between the ways that students are taught math and ELA in the nine school districts could have caused the difference in the relationship. Some factors that would influence this are the quality of teachers and curriculum, along with differences in financial support dedicated to each subject. The discrepancy between the significant relationship in math could be attributed to the variety of math classes available for 9th and 10th grade students to choose from. Student's ability to choose classes has been associated with lower academic performance (Rice 374).

Further research should explore the delivery of learning for math as compared to ELA. This research could help explain why variations of learning environment would affect math differently than ELA. Another concept to further research would be how students learn math and the degree of difficulty for achievement. Math might be more rational for students to learn, as opposed to ELA potentially being more analytical-based learning.

LIMITATIONS

It is important to consider that this research only covered nine school districts in Arkansas, as opposed to a complete representation of the entire state. The school districts were also the largest and are not representative of all school districts in Arkansas.

Another factor to consider is that the school districts might not have fully followed the recommended policies. The directives issued by the school districts only contained the protocols for following the policies but no indication of the success of the implementation of the policies. Students also might not have followed policies while they were implemented.

A third factor to consider is that COVID affected the areas of the nine school districts differently throughout the year. This means that policies could have been followed less strictly while one school district was experiencing less COVID cases, while another school district could have enforced policies more strictly because of an increase in COVID cases. On a specific level, certain teachers in one district could have been sick with COVID which would have altered how math and ELA were taught.

IMPLICATIONS

This research suggests that the protections against COVID potentially do not have to be as strict to ensure higher student achievement. However, COVID still does influence the classroom environment and the educational experience. For school districts, evaluating response policies for COVID while considering student achievement should be conducted with more independent authority as opposed to statewide directives.

CHAPTER SUMMARY

In this chapter, the regression results, conclusions, limitations and implications were discussed. The regression results suggested a significant relationship between COVID policies in Grade 9 math, but no other grade levels or subjects. This result is surprising because of the isolated relevance of the single grade and subject compared to the other measures. The significance could be explained through the transition between middle and high school, as well as the relative freedom for students to choose different math courses. My research was limited because the school districts might not have enforced the policies as strictly as presented. Further

research should explore the different methods that mathematics is taught in schools compared to ELA and if there are factors other than COVID policies that could affect student growth.

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