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Gerrymandering in a Selection of Central Alabama School Districts

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Departmental Honors Thesis

The University of Tennessee at Chattanooga

Education Department

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Abstract

School district gerrymandering, the process of drawing district lines that intentionally steep the demographics to create a more homogeneous student population, has been a significant factor in cementing Alabama's reputation as being academically underperforming. This is especially true in central Alabama's Jefferson County, where forced integration and shifting area demographics have resulted in a significant number of unusual school district secessions. In this paper, I argue that school districts within Jefferson County, Alabama, have created boundaries that put certain students at an educational disadvantage, which has had significant impacts on third grade reading achievement in struggling districts. I perform a statistical analysis to research the following question: To what extent is third-grade student achievement correlated with the percentage of low-income students attending either the local school or local educational agency? Using the Pearson Correlation Coefficient, r , to establish a relationship, I find that there is a highly significant relationship between a school's third grade reading achievement and the percentage of students enrolled in free and reduced lunch ($r=-0.94$). I reject the null hypothesis, which states there is no statistical correlation between student socio-economic class and third grade reading achievement. Rather, I accept the alternative hypothesis, stating that there is a statistical correlation between student socio-economic class and third grade reading achievement. I then discuss factors contributing to the observed achievement gap through analyzing extreme variation in defining characteristics, including racial demographic, median household income, per-pupil spending, per-pupil expenditures, teacher credentials, and teacher-to-student ratio. This data is presented alongside a legal discussion of how these districts have been able to uphold segregative school district secessions.

Background—The Present State of Education in Alabama

Alabama is a unique state regarding its educational history and consistent patterns of poor student achievement state-wide, when compared to other states in the country. Over the past few decades, Alabama has nationally secured its reputation as being low performing across all areas of education achievement. Over the past few decades in particular, Alabama has scored at or near the bottom of national education rankings when compared to other states in the country, a clear demonstration that Alabama is not as well-prepared nor able to educate its children to the same degree as other states. In 2019, the U.S. News and World Report ranked Alabama No. 50 for K-12 Education. As of 2023, this ranking has improved slightly—now at No. 44—but still is a rightful cause for concern (U.S. News, 2023). These consistencies are no secret either, with Alabama Governor Kay Ivey announcing the “Take the Lead, Alabama” initiative at a public press conference in June of 2019, the same year Alabama ranked last in the nation, which stood as an effort to, “improve educational outcomes for students across the state.” This aim, largely supported by Education professionals in the state, would be achieved through fundamentally changing the leadership structure for Alabama schools by adopting a Governor-appointed school board, the structure adopted by 44 other states in the United States, including all the top-performing states in the nation (Office of the Governor of Alabama, 2019). The state of Alabama voted not to approve the initiative in 2020—a clear indication of the state’s failing education system.

Possible explanations for Alabama’s history of low educational performance are expansive, as it is a state plagued by issues such as wide-spread poverty, historical racial tensions, teacher shortages, student attendance crises, and lacking resources, just to name a few. However, one thing that is very clear is that the host of issues associated with the Alabama

educational system disproportionately impact students in under-served communities. Notably, inequitable funding has been a noticeable trend in Alabama's educational history, resulting in high-poverty districts receiving significantly less funding for their students than neighboring low to no-poverty districts.

Trends of educational disenfranchisement in the state's history are particularly noticeable in the funding of students of color. The N.Y.U. Review of Law & Social Change reports that prior to *Brown v. The Board of Education*, Alabama spent less than \$1.5 million to educate black children in 1924, compared to \$13 million for white children, even though over 40% of the state's population was black. These trends continued into the 1930s, when some counties in the state "averaged less than \$5 a child for black education, compared to \$96 for whites" (Anderson, 2017). As of present time, the inequities between social classes remain staggering— a student attending a 0% poverty school in Alabama can expect to receive, on average, \$1000 more in funding per year than a student at a school with a 30% poverty rate (Anderson, 2017). Even as state-wide progress is made in improving standardized testing scores and academic proficiency, seven schools in Alabama demonstrated 0% proficiency in math in 2022. Each of these are Title I schools, with poverty levels ranging from 59% to 75% (Crain, 2022). When faced with data as extreme as this, we are forced to ask ourselves— where do these inequalities truly lie, and how can we make systematic strides towards reducing them?

Introduction to Jefferson County, Alabama

In beginning to understand the state of education in Alabama, we must first turn to Jefferson County, Alabama, a county located in the center of the state that has especially been impacted by historic and systematic educational inequities. Issues in Jefferson County impact a large portion of Alabamians, as it is the largest county by population in the state. In the 2020

census, Jefferson County was home to 674,721 Alabamians, with 22.5% of those being under the age of 18, and thus will potentially be subjected to K-12 education, whether it be public or private (U.S. Census Bureau, 2020, QuickFacts Jefferson County, Alabama). At the center of Jefferson County lies the city of Birmingham, Alabama, home to 200,773 residents, close to 30% of the county's total population (U.S. Census Bureau, 2020, QuickFacts Birmingham city, Alabama).

The county has historically been criticized on a national level for its repeated attempts to deny students access to an equal education. Birmingham, Alabama, was a city extremely resistant to school desegregation efforts, while also serving as a key city during the Civil Rights Movement. The general trend of resisting integration observed in Birmingham, Alabama, is aligned with the state's desegregation efforts, or rather, the apparent lack of. For example, nine years after the ruling of *Brown v. Board*, Alabama public schools remained entirely segregated— not a single black student is recorded to have sat in a classroom alongside white students. After Birmingham City School District was sued for resisting integration efforts in 1963, multiple affluent urban school districts, notably Homewood City and Vestavia Hills, seceded from the district at large (Parker, 2017). These districts, formed in efforts to resist integration and maintain the status quo of the South in the 1960s, have grown to become central districts to the Birmingham Metro Area today—a prominent reminder of the city's dark historical foundations.

School district boundaries are incredibly powerful tools, determining much more than just who votes or serves on local school boards. They manage nearly all school-related public funding, especially in the state of Alabama, where local property taxes are the main source of educational revenue. Educators working at the district level are generally paid quite high, and depending on the district, private donors or philanthropic organizations can potentially pour

millions of dollars into improving district-specific performance. In previous studies, achievement variation between school districts in North Carolina and Florida have been extreme, with differences large enough at the extremes to represent more than a half-year difference in schooling (Whitehurst et. Al., 2013). School districts have the power to completely transform what teaching looks like at the local school level, deciding critical components like which curriculum to adopt, teacher salary scales, guidelines for instruction, and teacher evaluation methods (Underwood, 2019). Though the State Department of Education determines specifically what standards and core disciplines public schools must teach, local school districts determine through what means those standards are taught. This means that resources essential to a successful education—technological access, high-quality curriculum, manipulatives, and instructional materials—may differ greatly depending on the school district a student attends, and the subsequent financial ability of that district to educate its students.

More recently, school districts in Jefferson County have continued to receive national attention for controversy over race and class. In 2013, Hoover City Schools, a suburb located south of Birmingham, announced they would be eliminating their school bus system in the 2014-15 school year. The plan, supported by the Superintendent at the time, was publicized as being an effort to save upwards of \$2.5 million a year. However, when looking at the opinions of the local school board and changing demographics of Hoover, the plan's true intentions become a bit more complex than just finances. The decision would potentially impact the district's 13,000 students, half of which regularly utilized the bus system. Bus transportation sets Hoover apart from other nearby, affluent, white school districts in Birmingham. The neighboring districts of Mountain Brook, Homewood, and Vestavia Hills have never provided busing services to students. At the time, Hoover was seeing significant numbers of working and low-income

families moving into the district, many of which were motivated by a quality public education and free transportation to school. Nearly 25% of the district was enrolled in free or reduced lunch, which are the students most likely to be dependent on the bus system to physically get to school. Many members of the board publicly expressed their concerns about these demographic changes, blaming achievement drops in some local schools on students moving in after they had missed out on a “Hoover early education” (Carsen, 2013). In saying this, the school board members are referring to the high-quality education offered by Hoover, when compared to other neighboring school districts. In 2017, the first year the Alabama Department of Education used letter grades for school and district report cards, Hoover City Schools was awarded an A score of 92. Hoover City was one of only 15 districts of the state to do so (Alabama State Department of Education, 2017). Though the school board eventually rescinded their decision to end the bus service, their intentions were clear—Hoover, like its neighbors, was not interested in educating underprivileged students.

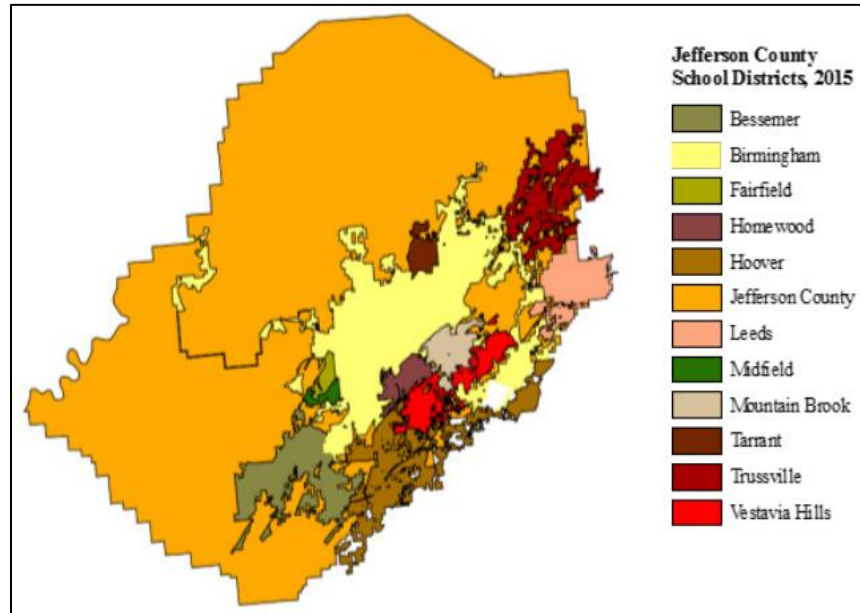
When looking at the issues evident in central Alabama schools, there is one very important overlapping factor at the area’s core— the intentional building of school districts and the host of issues associated with school district gerrymandering. The term “gerrymandering” is typically used when discussing politics and congressional districts, referring to the process of governing parties drawing legislative districts that steeply tilt the map’s congressional seats in favor of one party. However, a similar process occurs in education when school districts draw lines that intentionally steep the district’s demographics to create a more homogeneous student population, giving one group an educational advantage over another (Richards, 2018). In central Jefferson County, Alabama, this process perpetuates segregation by keeping low-income

students out of affluent school districts that are comparatively over-saturated with resources and funding.

Since forced integration in the 1960s, Jefferson County, Alabama, has seen a significant number of school district secessions as families and the community responded to new school environments. For the purposes of this paper, a school district secession is defined as the formal process of smaller, newer school systems breaking apart from a larger Local Education Agency (including, but not limited to, school districts and county or city offices of education). Secession is neither positive nor negative—rather, it is a course of action that can potentially have positive or negative impacts on the students and communities involved. The state of Alabama has one of the highest rates of city-school secession in the United States. Birmingham City Schools, a downtown urban district located in central Jefferson County, currently has twice as many immediate surrounding districts as the national average— twelve independently operated school districts share its immediate borders, compared to a national average of six. Of these twelve, six districts were individually featured in EdBuild’s “50 Most Segregating Borders in the Country” list, as part of the Fault Lines project (EdBuild, 2020). Upon visual inspection, the districts located in the urban and suburban areas in Birmingham are designed with irregularly shaped borders (see Figure 1 below). Individual neighborhoods have been carved out of the boundaries, resulting in extremely unusual shaping.

Figure 1

Map of Jefferson County, Alabama, School Districts in 2017¹



Note. Figure is reprinted from Frankenberg and Taylor (2017).

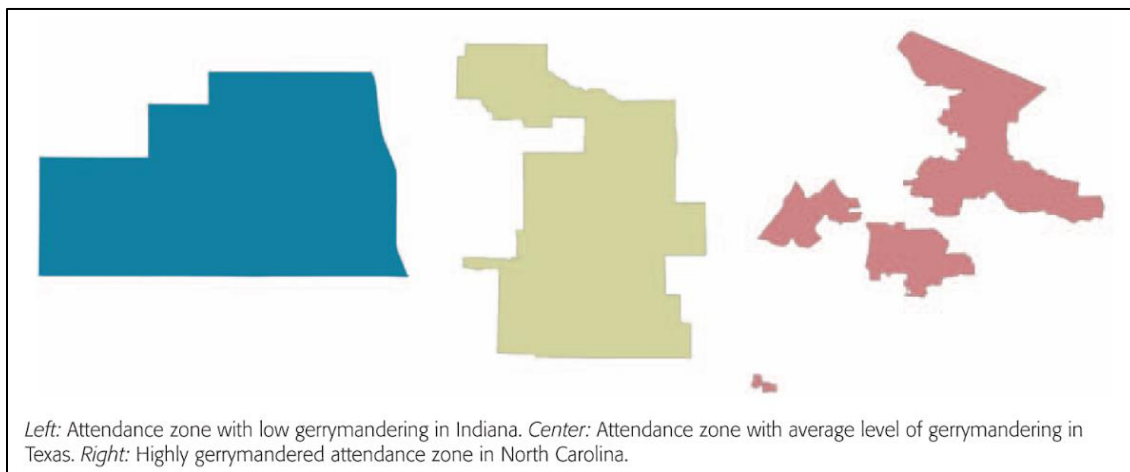
When comparing the map (Figure 1) of Jefferson County school districts to other area-wide districts across the country, the scale of irregularities in school zoning observed within Jefferson County is severe and abnormal. While there are a variety of factors that contribute to the severity of a district's gerrymandering, commonly used research measures compare the perimeter of a district to its area. Generally, districts with many cavities and protrusions, as seen in the map of Jefferson County, have longer perimeters and are classified as highly gerrymandered when compared to districts with smooth boundaries and shorter perimeter to area ratios. Figure 2, shown below, demonstrates a three-tiered scale of low to high gerrymandered

¹ Geographically, this map covers a relatively small distance, which may be misleading at first glance. The northernmost seceded district, Trussville City Schools, is only a 30 to 40-minute driving distance from the southernmost district, Bessemer City Schools (Google, n.d.).

school attendance zones. Using this scale as a frame of reference, the gerrymandering demonstrated in Figure 1 with central Alabama school districts clearly surpasses even the “high” example provided.

Figure 2

Examples of Low to High School District Gerrymandering



Note. Figure is reprinted from Richards (2018).

After visually analyzing the graphics provided in Figure 1 and Figure 2, the general conclusion can be made that something abnormal is happening with the education systems in central Jefferson County, Alabama. Extreme numbers of school district secessions have resulted in a myriad of issues for the larger districts left behind. In this paper, I argue that school districts within Jefferson County, Alabama, have created boundaries that put certain students at an educational disadvantage, which has had significant impacts on third grade reading achievement in struggling districts.

Statistical Analysis of Jefferson County, Alabama, School Districts

Methodology

Research demonstrates there are strong correlations between a student's third grade reading achievement and future academic performance. Most notably, third grade reading level is strongly correlated to eighth grade reading scores, with 40% of students below grade level in third grade also being below grade level in eighth grade. Longer term, students who are above grade level for reading in third grade enroll in college at higher rates than their below grade level peers (Lesnick et. al, 2010). Taking into consideration these research findings, I have chosen to analyze third grade reading achievement in a selection of the twelve school districts located in Jefferson County, Alabama: Bessemer City, Birmingham City, Fairfield City, Homewood City, Hoover City, Jefferson County, Leeds City, Midfield City, Mountain Brook City, Tarrant City, Trussville City, and Vestavia Hills City. Each of these districts share a border with the Birmingham City School district and are considered well-within the Birmingham Metropolitan Area. To represent a district's low-income student population, I used data representing the percentage of students enrolled in free and reduced lunch programs, an indicator of general socio-economic status. Both achievement and free-reduced lunch data were gathered from the Public Affairs Research Council of Alabama, sourced from the Alabama State Department of Education. The data was processed by Scranton, which replaced ACT Aspire as the primary state assessment in 2018 (Dailey, 2020).

Additionally, I chose to select data from the 2019-2020 school year because of the devastating impact of the Covid-19 pandemic on educational achievement. Test scores reported in 2021-2022 demonstrated that third-grade students across the country scored significantly lower than years past, with both reading and math scores falling by the largest margin in more

than 30 years, since the National Assessment of Educational Progress even began assessing student progress in the 1970s. These declines disproportionately impacted students already in the bottom 10th percentile, who on average experienced four times the impact of students in the top 90th percentile (Mervosh, 2022). For the purposes of this study, it was important for the data to represent the sample student population absent an educational interruption as major as a pandemic and year-long school closures. The educational impacts of the Covid-19 pandemic on student performance in Jefferson County, Alabama, is a recommendation for future study.

Research Question and Hypotheses

The following research question guided my statistical analysis and process of data collection in this study: To what extent is third-grade student achievement correlated with the percentage of low-income students attending either the local school or local educational agency? As such, the independent variable of this study is the percentage of students proficient in reading at the third-grade level. The dependent variable studied is the percentage of students enrolled in free and reduced lunch programs. I propose the following hypotheses for consideration:

H_0 = There is no statistical correlation between student socio-economic class and third grade reading achievement.

H_a = There is a statistical correlation between student socio-economic class and third grade reading achievement.

Using the Pearson correlation (r) value to establish any potential relationship, with a correlation of -1 showing a perfect negative correlation and a correlation of +1 showing a perfect positive correlation, I will reject the null hypothesis (H_0) given that $r \leq -0.70$ to -1.00 (negative correlation) or $r \geq 0.70$ to 1.00 (positive correlation). These values of ± 0.70 to 1.00 were chosen

due to these being the general accepted values to establish a high correlation in the field of statistics (Jaadi, 2019).

Results

Prior to running data analysis, the first task was to collect data from both the selection of twelve school districts and each of the local schools within the district serving third grade students. Using data from each local school (see Table 1²), I calculated the average of each district, displayed in Table 2 below:

Table 2

Jefferson County, Alabama, School Districts Percent Free and Reduced Lunch and Percent Proficient in Third Grade Reading (2018-2019 Academic Year)

School District	Percent Enrolled in Free/Reduced Lunch	Percent Proficient in Third Grade Reading Achievement
Jefferson County	55.9	39
Birmingham City	67.1	24.8
Bessemer City	70.2	26.2
Hoover City	23.8	63.9
Homewood City	20.3	65
Mountain Brook City	0	82
Vestavia Hills City	4.5	80
Trussville City	7.3	79.8
Leeds City	45	47.4
Fairfield City	64.3	14.8
Midfield City	70	14.7
Tarrant City	64	22.6

Note. Data is sourced from Dailey (2020), which was obtained from the Alabama State Department of Education.

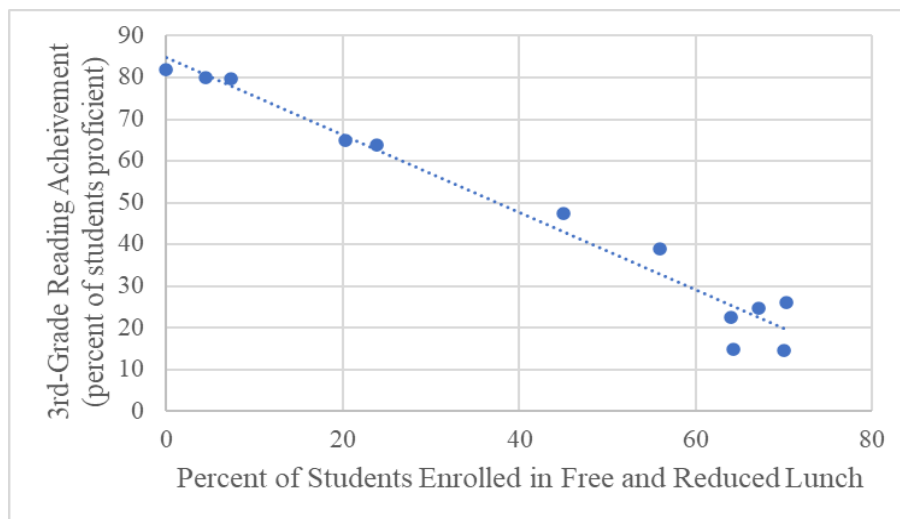
² Table 1 is located at the end of the paper.

As shown in Table 2, there is a wide variety in both third grade reading achievement and socioeconomic status across Jefferson County. Reading achievement carries a wide range, with Midfield City at 14.7% proficient compared to Mountain Brook City at 82%. Similar trends can be observed with the number of students enrolled in free and reduced lunch programs, with Mountain Brook City standing at the lowest, with 0% of its students enrolled. This is compared with Bessemer City, with 70.2% of students enrolled in free and reduced lunch programs.

While the data range itself suggests evidence of a significant achievement gap between school districts in Jefferson County, Alabama, the story becomes more compelling when each district is observed as a pairing of data, rather than looking at each data set independently. In the following graph, Figure 3, the data points lie closely to the trendline, forming an observable downward trend.

Figure 3

Academic Performance of Twelve Districts in Jefferson County, Alabama (2018-2019 Academic Year)



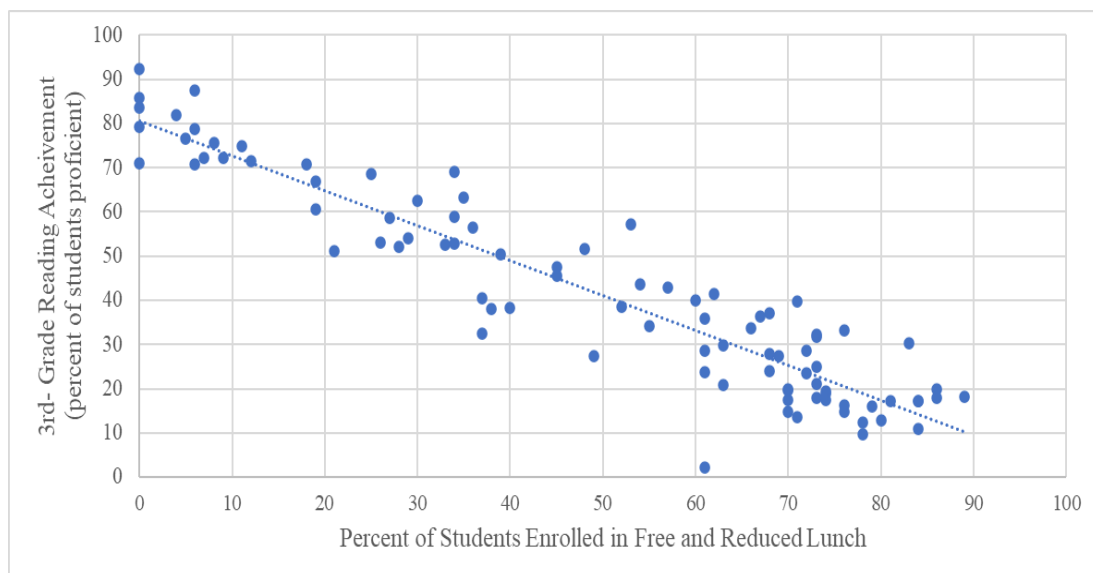
Note. Data is sourced from Dailey (2020), which was obtained from the Alabama State Department of Education.

With a calculated r value of -0.98 , a very significant negative correlation can be made between the number of students proficient in third grade reading in a district and the number of low-income students enrolled in free and reduced lunch programs.

In other words, students attending school districts with higher numbers of low-income students are less likely to be proficient in third-grade reading. These trends are consistent with trends observed when expanding the data set to include each local school within the district, analyzing the issue on a larger scale. As demonstrated by Figure 4 below, a similar downward trendline is evident when analyzing third grade reading achievement alongside the percent of students enrolled in free and reduced lunch at the local school level.

Figure 4

Academic Performance of Individual Schools in Jefferson County, Alabama (2018-2019 Academic Year)



Note. Data is sourced from Dailey (2020), which was obtained from the Alabama State Department of Education.

There is only one true outlier that veers largely off the trendline, Glen Oaks Elementary, with 61% of its students enrolled in free and reduced lunch programs and only 2.1% of third graders proficient in reading. The r value for this data set, at -0.94 , again suggests that a very significant negative correlation can be made between the number of students proficient in third grade reading in a district and the number of low-income students enrolled in free and reduced lunch programs.

Given that $r \leq -.70$ to -1.00 for both data sets, I reject the null hypothesis, which states there is no statistical correlation between student socio-economic class and third grade reading achievement. Rather, this data suggests that there is a very strong statistical correlation between student socio-economic class and third grade reading achievement, so I accept the alternative hypothesis. These results are consistent with previous studies, as a significant amount of research suggests that school redistricting processes can be used to exacerbate existing socioeconomic and racial inequalities (Siegel-Hawley, 2013).

It is important to note that even within certain districts, there is large variation in student achievement depending on which local elementary school the student attends. Data in Table 1 demonstrates that gerrymandering and wide achievement gaps are evident both within a larger district and in neighboring local schools within a district. For example, the two largest districts by population, Jefferson County and Birmingham City, also have the widest error bars in both achievement and percentage of students enrolled in free and reduced lunch. This is an interesting recommendation for future study, exploring gerrymandering and educational opportunity at the local school zone level rather than at the larger district level.

With a correlation established, we may now discuss and evaluate specific factors in Jefferson County, Alabama, that contribute to such a significant high gap in achievement. As

previously discussed, third-grade reading is a significant predictor of academic achievement later in life, including eighth-grade performance and college enrollment (see *Methodology* section). However, it is important to note here that a myriad of factors contribute to student achievement. While data tied objectively to student achievement can give a broad picture of who is on grade level and who is not, it fails at demonstrating the complex issues leading up to the data itself. Several previous studies of educational inequity have established that educational achievement is not about ability so much as it is related to opportunity and being given the proper resources to succeed (Owens, 2019). Later in the paper (see *Discussion* section), we discuss these issues in-depth and attempt to understand more deeply how the state of Alabama is failing to support all its students.

Discussion—Exploring Defining Characteristics of Each District and Contributing Factors

The major limitation of this study is the difficulty to directly and quantifiably “prove” evidence of gerrymandering. Previous studies in political science have quantified the gerrymandering of congressional districts using geospatial analysis, making it possible to assign a “gerrymandering index score” using either relative compactness or statistics on political factors, such as voting margins and unrepresentative discrepancies in the number of congressional seats (Cicero, 2006; Princeton, n.d.). However, these research methods are relatively new, and I was not able to identify previous studies in educational gerrymandering using similar methods to directly quantify gerrymandering nor create these methods myself due to the difficulty of geospatial analysis, requiring extensive amounts of geographic data in specific map programming tools that is time-consuming to aggregate and analyze. These methods are outside of the scope of this current study; however, future studies to address this gap in literature

and directly quantify gerrymandering in education using similar methods to those used in political science are critical to pushing forward solutions for this issue.

In this section of the paper, I will discuss four major contributing factors that have led to the achievement gap severity presented in the *Results* section—racial and socioeconomic segregation, revenue, instructional expenditures, and teacher credentials/class size. Previous studies of this topic tend to take an objective statistical view on student achievement, mostly looking at the varying ways that low-income students are falling behind academically. Rather, in this study, I aim to explore the varying institutional problems behind this achievement gap to establish that gerrymandering is the major process by which the gap in Jefferson County, Alabama, has become so severe. However, it is important to note that there are a wide number of explanations for the results of this study, and gerrymandering should not be used as a “catch-all” phrase to place blame. Rather, this study discusses just one of the varying larger explanations behind the complex issue of educational achievement gaps.

Racial and Socioeconomic Segregation

Nonetheless, the data of this study demonstrates that the school district you live in can be a potential predictor of your academic success, as districts with a higher population of low-income students are significantly more likely to perform lower on third grade reading assessments. This relationship is strong evidence of gerrymandering in its most definitional terms—altering a district’s demographics to create a more homogeneous student population, giving one group an educational advantage over another (Richards, 2018). These results are significant because they demonstrate the long-term impacts of foundational issues in Jefferson County’s educational and other institutional systems as gerrymandering has occurred over the course of many decades. Of the districts shown in Table 2, the top three highest and lowest

performing have startling similarities in their school-community demographics, especially when cross-compared. Table 3 below portrays a Jefferson County, Alabama, that is divided on both socioeconomic and racial lines:

Table 3

Demographic Information of the Top Three Lowest and Highest Performing Districts in Jefferson County, Alabama (2019-2020 Academic Year)

School District	Percent of the Community that is Non-White	Median Household Income of Children in Public School (USD)
Mountain Brook City	2	247,063
Vestavia City	16	163,648
Trussville City	13	137,188
Birmingham City	77	33,345
Bessemer City	81	26,867
Midfield City	90	68,026 ³

Note: Data is sourced from the United States Department of Education National Center for Education Statistics, *District Demographic Dashboard 2017–21* (2020).

If segregation, for the purposes of this study, is defined as physically separating groups of people in both everyday activities and professional settings based on factors like race and/or socioeconomic class, then demographic data of these districts further suggests that segregative policies are in place that have created homogenous student populations (Legal Information Institute, 2022). Gerrymandering of school districts is one institutional process to reinforce this segregation, creating geopolitical boundaries to physically separate groups of people. Mountain

³ The median household income for Midfield City is significantly higher than other districts with similar educational achievement, free and reduced lunch, and racial demographics. Though the exact reason for this is unclear, I would like to note that the estimated uncertainty for the district's median household income is +/- \$31,466 (United States Department of Education National Center for Education Statistics, 2020). Estimated uncertainty of this amount suggests that the income data for Midfield City may be invalid.

Brook City, with only 2% of its residents being non-white, has a median household income of over nine-times that of Bessemer City, where 81% of the community is non-white. The third grade reading achievement of these districts holds a similar comparison, as Mountain Brook City has 82% proficiency and Bessemer City has 26.2% proficiency (see Table 2).

Revenue

Median household income has significant impacts on educational achievement and opportunity that go far beyond simply how much money each student's family makes per year. This is especially true in Alabama, where a student's given educational opportunity is dependent on recessive educational funding models. Anderson's (2017) study explores the ways that regressive tax systems negatively impact people with low incomes at higher rates, as they are not tied to an individual's actual ability to pay the tax rate. With these policies, all individuals pay the same amount in taxes regardless of income. However, the total amount of property taxes and other local revenue collected in a municipality under regressive tax policies can differ greatly, resulting in significant educational impacts as seen previously in the *Results* section of this study. Districts with higher median household income and fewer low-income households are generally able to raise more in property taxes, since those higher-income households can accrue greater property wealth. In districts with lower median household incomes and higher populations of low-income households, the opposite is true (Anderson, 2017). In Alabama, where 31.8% of revenue for public elementary schools is collected locally, the amount of funds circulating in a local economy is one factor contributing to educational achievement gaps (United States Department of Education National Center for Education Statistics, *National Public Education Financial Survey 2019–20*, 2020).

Alabama uses a formula to calculate each district's budget based on population and student grade level, without consideration of student characteristics or individual education needs, which is named the Alabama Foundation Program. Multiple research analysis of this funding model has proven it to be both inequitable and inadequate, but the State has made no steps towards substantial changes (A+ Education Partnership, 2022). Table 4 below demonstrates school district revenue in each of the twelve districts in Jefferson County, Alabama. Data represented in the table was collected from the United States National Center for Education Statistics, which defines the following terms as:

- Local Revenue per Pupil— “The district's total revenue from local sources divided by the fall membership [...] from such sources as local property and non-property taxes, investments, and revenues from student activities, textbook sales, transportation and tuition fees, and food service revenues.”
- State Revenue per Pupil— “The total revenue from state sources divided by the fall membership as reported on the district finance file [...] include both direct funds from state governments and revenues in lieu of taxation.”
- Federal Revenue per Pupil— “The district's total revenue from the Federal Government divided by the fall membership as reported on the district finance file.”
- Total Revenue per Pupil— “The total General Revenue divided by the fall membership [...] from Federal, State and Local sources” (*Glossary of columns for expressTable: School District Revenue per Pupil, 2020*).

Table 4

Breakdown of Per Pupil Revenue in Jefferson County, Alabama, School Districts (2019-2020 Fiscal Year)

School District	Local Revenue per Pupil (USD)	State Revenue per Pupil (USD)	Federal Revenue per Pupil (USD)	Total Revenue per Pupil (USD)
Homewood City	15,007	5,662	742	21,410
Mountain Brook City	9,703	5,497	396	15,596
Hoover City	7,439	5,881	634	13,954
Vestavia City	7,366	5,950	540	13,856
Trussville City	5,537	6,410	323	12,270
Birmingham City	5,288	6,341	2,119	13,747
Leeds City	4,678	6,547	1,192	12,417
Bessemer City	3,757	6,499	2,186	12,443
Jefferson County	3,401	6,689	1,119	11,209
Midfield City	3,147	9,023	2,303	14,474
Tarrant City	2,781	6,867	1,783	11,430
Fairfield City	2,628	7,426	1,921	11,976

Note: Data sourced from the United States Department of Education National Center for Education Statistics, *Search for Public School Districts* (2020).

When analyzed with existing data on third grade reading achievement in Table 2, Table 4 demonstrates that data on district revenue supports the claim that Jefferson County school districts have created a system through gerrymandering that places low-income students at an educational disadvantage. Historically, school district secessions and the gerrymandering process has resulted in a consolidation of resources, including both local and total revenue. Local revenue is particularly important, as schools generally have the most flexibility when spending these funds, and they are the most consistent. Communities with comparatively less real-estate wealth, and thus less local revenue, are overly dependent on the State to fund their schools, with upwards of 50% of their total revenue coming from State sources. These school districts have

greater potential to be heavily impacted by recessions and educational budget cuts (A+ Education Partnership, 2022). School districts with the highest local revenue—Homewood City, Mountain Brook City, Hoover City, Vestavia City, and Trussville City—are also those with the highest rates of third grade reading proficiency. Similarly, Mountain Brook City, Vestavia City, and Trussville City also have comparatively high median household incomes of students and consist of a mostly white population, as shown in Table 3. However, I will note that total revenue is not as consistently associated with higher rates of proficiency in this data set, which is an interesting recommendation for future study.

These data trends are an example of the long-term impacts of generational shifts in population demographics. As white, middle-upper class families move outside of Birmingham and establish their own districts, they leave behind a district that is significantly poorer. The poverty rate among Birmingham City Schools was only 36% in 1995, but it had risen to 49% by 2014. While families are moving out of changing inner-city districts, like Birmingham City, they are moving into neighboring seceded districts at staggering rates. In the 1994-95 school year, Birmingham City enrolled 41,839 students. By the 2013-14 school year, only 24,858 students remained enrolled in the school district—a 41% decrease. During this same time frame, Vestavia Hills City enrollment grew by 61% and Mountain Brook City by 23% (Edbuild, 2020).

Instructional Expenditures

Paired with demographic segregation, fiscal differences in educational spending between districts portrays a county that sets certain students up to succeed, while others are systemically set up to fail. Table 4 demonstrated that, in Jefferson County, Alabama, districts with higher local revenue generally also show increased proficiency in third-grade reading. Previous research by Baker (2020) has shown that efficient distribution of district funds is a significant predictor of

student achievement—meaning that the ways in which a district spends their funds matters.

Baker’s evidence suggests that increased spending on schooling resources, including things like smaller class size and instructional supports, is critical to positive student outcomes, with low-achieving students from low-income families proportionally seeing greater benefits.

As shown in Table 5 below, in most Jefferson County, Alabama, districts, there is wide disparity of over \$4000 per fiscal year in the total amount of expenditures per pupil, depending on what district a student attends. The United States National Council for Education Statistics defines the following terms as:

- Instructional Expenditures per Pupil— “The total current expenditures for instruction of public prekindergarten and kindergarten through grade 12 programs divided by the fall membership [...] The expenditures include teacher salaries and benefits and instructional supplies and purchased services.”
- Total Current Expenditures per Pupil— “The expenditures for public prekindergarten and kindergarten through grade 12 programs divided by the fall membership” (*Glossary of columns for expressTable: School District Expenditures per Pupil, 2020*).

Table 5

Breakdown of Per Pupil Expenditures in Jefferson County, Alabama, School Districts (2019-2020 Fiscal Year)

School District	Instructional Expenditures per Pupil (USD)	Total Current Expenditures per Pupil (USD)
Mountain Brook City	9,475	14,514
Vestavia City	8,044	12,867
Homewood City	8,028	12,786
Hoover City	7,229	11,508
Birmingham City	6,482	11,905

School District	Instructional Expenditures per Pupil (USD)	Total Current Expenditures per Pupil (USD)
Midfield City	6,258	13,451
Trussville City	5,925	10,174
Fairfield City	5,854	11,159
Bessemer City	5,849	10,876
Jefferson County	5,625	9,723
Tarrant City	5,563	10,948
Leeds City	5,562	9,891

Note: Data sourced from the United States Department of Education National Center for Education Statistics, *Search for Public School Districts* (2020).

A student in the highest achieving district, Mountain Brook City, where zero students are enrolled in free and reduced lunch, can expect to receive 38% more in instructional expenditures than a student in Bessemer City, with the highest rate of students enrolled in free and reduced lunch at 70%. In a more general sense, a student in a district where less than 25% of its students are enrolled in free and reduced lunch programs can expect to earn, on average, 24% more in yearly instructional expenditures when compared to a student in a district where over 50% of its students are enrolled in free and reduced lunch programs.

Teacher Credentials and Class Size

Since instructional expenditures are the primary area that school districts fund schooling-needs, discrepancies have significant impacts on critical factors to success, especially teacher qualifications. Research has proven that highly qualified teachers yield greater student achievement, as they are more likely to implement research-based strategies in their instruction. Furthermore, evidence strongly suggests that class size reductions are another key area to student success. The impacts of reductions on achievement are greatest when thresholds of 15 or 18 are reached, and these impacts are proportionally more pronounced for students of color and in

schools with higher concentrations of low-income students (Bruce, 2018). Both critical areas are funded primarily through instructional expenditures. Consequently, students in different districts are given an unequal opportunity to succeed in terms of what classroom instruction literally looks like. Districts with higher instructional expenditures can provide their students with a higher proportion of teachers with post-graduate credentials and fewer students per class, with more opportunity to have individualized instruction. Table 6 below demonstrates variances in teacher qualification and class size throughout Jefferson County, Alabama:

Table 6

Educator Credentials and Class Size in Jefferson County, Alabama, School Districts (2019-2020 Academic Year)

School District	Educator Credentials (Percent Master's Degree or Higher)	Student/Teacher Ratio
Vestavia City	59.06	17.18
Mountain Brook City	58.43	13.39
Homewood City	57.55	17.08
Hoover City	55.7	15.59
Trussville City	52.24	19.72
Tarrant City	51.74	24.11
Leeds City	46.46	21.06
Jefferson County	46.4	20.36
Fairfield City	44.62	32.93
Midfield City	36.57	23.24
Birmingham City	33.56	20.61
Bessemer City ⁴	33.41	-

Note. Data sourced from the Alabama State Department of Education (2020) and the United States Department of Education National Center for Education Statistics, *Search for Public School Districts* (2020).

⁴ Data for this district is considered not applicable by the National Center for Education Statistics.

These trends are an example how districts in Jefferson County, Alabama, have created an environment where students of higher socio-economic class are placed at a significant educational advantage over low-income students, primarily through segregative acts of gerrymandering which consolidate resources. This research is significant because it suggests that those responsible for educating the children of Jefferson County, Alabama, have failed a large population of their own. Establishing this issue is the first step to finding a solution—we must understand where and why the inequalities lie before we can actively work to fix them.

The Legality of School District Gerrymandering

In this section of the paper, I will answer the question: How exactly did this happen? I will explore two primary explanations concerning the legality of school district gerrymandering in Jefferson County, Alabama, including: secession laws and enforcement of the federal desegregation order.

Secession Laws

School districts in Jefferson County, Alabama, have been able to create segregative school boundaries with few legal consequences. Though the process of school district secession varies significantly depending on the state, only thirty states in the United States allow communities to secede on their own prerogative, Alabama being one of those. Even still, relatively few states of those thirty legally require districts to give attention and racial and income diversity when seceding, with Alabama not being one of those select few. In Alabama, the process of secession is relatively simple, as any city of more than 5,000 residents can negotiate an agreement of secession with the larger county school district. Consequently, the state is experiencing massive numbers of school district fragmentation, defined as, “the proliferation of autonomous school districts, jurisdictions which then retain the ability to engage

in practices such as the assignment of students to schools, which rarely cross district boundaries” (Frankenberg and Taylor, 2017). Between 2000-2017, 10 new school districts were formed statewide in Alabama by seceding from a larger district. During that same period, only 47 new districts were formed across the entire United States (Crain, 2017). This means that over 20% of school secessions in the entire country occurred in the state of Alabama.

Enforcement of Federal Desegregation Order

Though, the legality of school district secessions in Jefferson County becomes more complicated when you consider that the County has been under a court desegregation order since 1971, which was recently reinstated by Judge Haikala of the United States District Court in 2018 and is still in effect as of 2023 (Stancil, 2018). However, the court’s order has not historically been rigidly enforced, which has led to the intense fragmentation of school districts observed in Jefferson County today (see *Results* section). Even prior to enforcement of the desegregation order, three school districts—Mountain Brook City, Vestavia City, and Homewood City—split from Birmingham City schools prior to 1970 with explicit motives of resisting integration. The demographic makeup for both race and socioeconomic class of each of these districts remains today like when the districts were established prior to the 1970s (Frankenberg, E. & Taylor, K, 2017). Furthermore, these districts have persisted in annexing predominately white communities within Jefferson County and Birmingham City, increasing racial imbalance within each district involved. For example, the city of Vestavia Hills annexed the nearby, large Cahaba Heights community, with a population that was 95% white, in 2010 (*Stout v. Jefferson County Board of Education*, 2018).

Though the United States Supreme Court ruled in 1972 that federal judges are within their rights to stop school secessions that would impede court-ordered desegregation efforts, like

those of Jefferson County, Alabama (*Wright v. Council of City of Emporia*, 1972), other predominately white, upper-middle class districts have continued to fragment off Jefferson County and Birmingham City over the past few decades, without penalty or attention from the federal courts. While one splinter district, Pleasant Grove, was required to dissolve back into the larger Jefferson County in the 1970s, due to racial discriminatory motives, other districts that have been discussed in this paper (Trussville City, Leeds City, and Hoover City) were permitted to form after the desegregation order. At the time of secession, each of these districts was predominately white and middle-class, which remains true today (Frankenberg, E. & Taylor, K, 2017).

It was not until as recently as 2017 that a district was again ordered to halt secession, with the case of Gardendale, Alabama, a town north of Birmingham, Alabama, currently zoned for Jefferson County schools. Though the district court found that the Gardendale Board of Education was acting with discriminatory purpose to exclude black students from the proposed Gardendale City School District, it decided to nonetheless permit a partial secession of Gardendale (*Stout v. Jefferson County Board of Education*, 2018). Had it not been for concerned parents, alongside the Legal Defense Fund, filing a lawsuit with the Court of Appeals, the secession would have continued, and Gardendale would have become yet another gerrymandered district in Jefferson County, Alabama. However, the Court of Appeals ruled the secession to be segregative and unlawful, and the city was required to remain in Jefferson County Schools (Legal Defense Fund, n.d.). Though the overturning of the district court's decision is certainly something to be celebrated—a motion holding an independent school board responsible for their attempted discriminatory actions—it does ask the question: had other similar secessions been

overturned as well, what would the state of education equality look like in Jefferson County, Alabama, today?

Possible Solutions

The concept that a child's zip code can determine their educational opportunity, both inside and outside of school, is concerning. However, research has made it clear that there are solutions to this issue. However, solutions are complex, and true integration requires cooperation and the desire of both communities. At the local school level, researchers at the Schools of Opportunity project at the University of Colorado Boulder's National Education Policy Center have identified more than 50 public high schools that are using evidence-based practices to improve educational opportunities and work to close the achievement gap. Of these fifty plus schools, the majority are in either the Western or Northeast United States, with only two located in the South. Specifically, both are different high schools in Athens, Georgia (Welner and Somerville, 2023). For the state of Alabama, these schools serve as an example of changes that can be made at the local school or district level to counter the opportunity gap, without reliance on legislation or governmental intervention. Though these case-studies are for high schools, and this study primarily analyzes third grade, the key lessons to be learned from the project remain true across the field of education. Welner and Somerville (2023) highlight the following four key actions taken by "Schools of Opportunity" and legislators thereof that best address educational disparity:

- Schools must address societal inequities that create opportunity gaps, such as food and housing insecurity and access to high-speed internet, to reduce achievement gaps.

Without sufficient access to social support, students living in poverty are more likely to

experience high-degree stressors that impact both mental well-being and academic performance. Social support is critical to student success.

- When significant opportunity and achievement gaps are proven, those making educational decisions must look to research-based strategies and exemplar schools to make informed decisions on how to close them. Increasing factors like positive school climate, Positive Behavior Intervention and Supports (PBIS), expanding learning enrichment opportunities, and meaningful professional development are a few successful ways schools are combatting the achievement gap.
- Rather than focusing legislative power on implementing policies and resources that restrict schools, like oppressive curriculum bans or excessive test-based accountability, policies should be designed to implement research-based opportunity gap closing practices.
- Accountability must work in both directions, and systems of accountability must be reciprocal. For teachers to support students, teachers must be supported by school and district leaders, who in turn are supported by state and federal legislators. Demands and expectations must be in accordance with the resources and support provided by chains of reciprocal accountability.

Furthermore, evidence of research-based integrative policies at work can be found in multiple school districts throughout the United States. Jefferson County Public Schools in Louisville, Kentucky, is an example of a district that has transformed from court ordered desegregation, much like the state of Jefferson County, Alabama, currently, into one of the largest examples of voluntary integration in the United States. For the state of Alabama, Jefferson County, Kentucky, is an example of successful legislative change and governmental

intervention to ensure equal access to a high-quality education. Parents first express preference for what school they would like their child to go to, which is in the district. Then, considering the characteristics of diversity of the census block groups that the student resides in, using educational attainment, income, and racial composition, the county assigns a student to an elementary school in the district. At the high-school level, Jefferson County, Kentucky, draws district boundaries that maximizes the diversity of neighborhoods, and students attend their assigned zoned school (Richards, 2017). Examining the practices of high-performing school districts that make a legitimate effort to support all its students provides hope for the future of educational equity. Though these policies and practices do not solve the achievement gap overnight—nor even in a matter of decades in some cases—we must celebrate all strides towards solving this complex issue.

Conclusion

This study has presented an image of Jefferson County, Alabama, currently divided educationally by definitionally segregative boundary lines. Students in predominantly white, upper-middle class districts are placed at an educational advantage, not only in academic achievement, but also in terms of supporting factors and allocated resources that are critical to student success. From revenue and per pupil expenditures to teacher credentials and reductions in class size, students in low-poverty schools are offered a plethora of resources and opportunities to be successful that are not given, in the same degree, to students in high-poverty, predominately people of color, districts within the same geographical county. This disparity has been heavily influenced by decades of school district secessions, creating boundaries that keep those of varying socio-economic classes out and ensuring a homogenous school with an overabundance of resources. I argue that school districts within Jefferson County, Alabama, have

intentionally created their boundaries to disadvantage certain students, which has had significant impacts on third grade reading achievement in struggling districts.

Issues related to systemic educational inequity, like those presented in this study, are of the utmost importance if we wish to improve our educational system and ensure the next generation are of the highest quality. All students have a right to a quality education that prepares them for a successful future, but the current state of Alabama's system is treating education like a privilege. Homogenous schools are harmful for everyone involved and keep all students from having valuable experiences in the classroom—which include meaningful interactions with peers who live fundamentally different lives from yours. Such disparity, especially at the statistically significant rate observed in Jefferson County, Alabama, has dramatic impacts on both the individual and society at large. Not only does it perpetuate generational social immobility, but educational disparity increases societal tension, sending students the message that they are not worthy of their federal right to access to an equal, high-quality public-school education (Every Student Succeeds Act, 2015). If legislators in Jefferson County, Alabama, continue to ignore research-based solutions and data consistently demonstrating deeply rooted educational inequality, we will continue to see increased social unrest and a gradual inability to function as a coherent, collaborative society.

The results of this study provide many opportunities for extensions and recommendations for future study. The following list identifies major areas of extending research and identified gaps in literature:

- Analyze educational inequality in rural counties of Alabama. Though the foundational issue discussed in this paper, gerrymandering and secession, may not be present to the

same degree, it would be interesting to see how rural schools struggle with many of the same funding and quality issues of urban schools.

- Extending upon discussed variances in teacher credentials between districts and student achievement. How is teacher pay and retention different between districts on a larger-scale, and are there significant correlations with long-term student achievement?
- Extending upon discussed variances in class size (student to teacher ratio) and student achievement, specifically at the elementary level. Why does reduced class size have the greatest impact on disadvantaged students? Why are under-served districts reporting comparatively high ratios—is this a teacher retention issue, an over enrollment issue, or something else entirely?
- Further research into both expenditures and revenue to find how exactly money is spent at the district level. If high-poverty districts are documenting relatively high total revenue, which is comparable to high-achieving, low-poverty districts, where is the discrepancy lying? Is funding making it to the actual student or being used for other expenses?
- Formalizing methodology to directly quantify educational gerrymandering through geospatial analysis, as is done in political science.

Each of these recommendations are important to further educational equality and ensuring all students have access to a high-quality education. Through compiling a complete research-based understanding of educational achievement and opportunity gaps, we are able to come closer to providing all students with an equal and high-quality public education.

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Table 1

Jefferson County Local School Percent Free and Reduced Lunch and Percent Proficient in Third Grade Reading (2018-2019)

School Name	Percent Free and Reduced Lunch	Percent Proficient in Third Grade Reading
Birmingham City		
Avondale Elementary School	63	29.9
Barrett Elementary School	80	12.9
Bush Hills Academy (STEAM magnet)	78	9.8
Bush K-8	73	17.9
Central Park Elementary School	74	18.9
Charles A Brown Elementary School	70	17.5
Christian School	37	32.4
Epic School	35	63.3
Glen Iris Elementary School	49	27.4
Hayes K-8	84	10.8
Hemphill Elementary School	79	15.9
Hudson K-Eight School	81	17.2
Huffman Academy	63	20.9
Inglenook School	68	27.8
Martha Gaskins K-5	61	23.8
Minor Elementary School	73	21
Norwood Elementary School	73	31.7
Oliver K5 School	84	17.3
Oxmoor K-5	76	14.9
Phillips Academy	33	52.6
Princeton School	37	40.5
Robinson Elementary School	68	24
South Hampton K-8	71	39.7
Sun Valley Elementary School	72	23.4
Tuggle Elementary School	70	19.8
Washington Elementary School	74	17.4
West End Academy	78	12.4

School Name	Percent Free and Reduced Lunch	Percent Proficient in Third Grade Reading
Wylam K-8	76	33.3
Jefferson County		
Adamsville Elementary School	72	28.6
Bagley Elementary School	26	53.2
Brighton School	84	17.3
Brookville Elementary School	68	37.2
Bryan Elementary School	21	51.1
Chalkville Elementary School	73	32.2
Clay Elementary School	39	50.5
Concord Elementary School	36	56.5
Crumly Chapel Elementary School	70	19.6
Erwin Intermediate School	86	17.9
Fultondale Elementary School	67	36.3
Gardendale Elementary School	28	52
Greenwood Elementary School	45	45.5
Gresham Elementary School	66	33.8
Hillview Elementary School	73	25
Hueytown Elementary School	52	38.6
Irondale Community School	69	27.4
Kermit Johnson Elementary School	61	35.9
Lipscomb Elementary School	86	20
McAdory Elementary School	38	38
Minor Community School	83	30.2
Mount Olive Elementary School	27	58.6
North Highland Elementary School	62	41.5
Oak Grove Elementary School	40	38.4
Pleasant Grove Elementary School	54	43.6
Snow Rogers Elementary School	25	68.6

School Name	Percent Free and Reduced Lunch	Percent Proficient in Third Grade Reading
Warrior Elementary School	53	57.1
West Jefferson Elementary School	60	40
Bessemer City		
Abrams Elementary School	76	16.3
Charles F Hard Elementary School	89	18.2
Greenwood Elementary School	55	34.1
Jonesboro Elementary School	74	19.5
Westhills Elementary School	57	42.9
Hoover City		
Bluff Park Elementary School	18	70.7
Brock's Gap Intermediate	9	72.3
Deer Valley Elementary School	7	72.2
Edgewood Elementary School	12	71.6
Green Valley Elementary School	48	51.6
Greystone Elementary School	6	70.8
Gwin Elementary School	34	52.9
Hall Kent Elementary School	30	62.6
Riverchase Elementary School	19	66.9
Rocky Ridge Elementary School	34	69
Shades Cahaba Elementary School	19	60.7
Shades Mountain Elementary School	29	54
Trace Crossings Elementary School	34	58.8
Mountain Brook City		
Brookwood Forest Elementary School	0	70.9
Cherokee Bend Elementary School	0	79.2
Crestline Elementary School	0	92.3

School Name	Percent Free and Reduced Lunch	Percent Proficient in Third Grade Reading
Mountain Brook Elementary School	0	85.7
Vestavia Hills City		
East Elementary School	4	82
Liberty Park Elementary School	0	83.7
Vestavia Hills Elementary School	8	75.7
West Elementary School	6	78.7
Trussville City		
Cahaba Elementary School	6	87.6
Magnolia Elementary School	11	75
Paine Elementary School	5	76.7
Leeds City		
Leeds Elementary School	45	47.4
Fairfield City		
Donald Elementary School	71	13.6
Glen Oaks Elementary School	61	2.1
Robinson Elementary School	61	28.6
Midfield City		
Midfield Elementary School	70	14.7
Tarrant Intermediate School	64	22.6

Note. Data is sourced from Dailey (2020), which was obtained from the Alabama State Department of Education.