

Education Inequality: *What the data says*

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ABSTRACT

One of the major problems across this world is education inequality. Education inequality relates to differences in resources, such as funding, classroom materials, living environments, and quality of educators, among others. Education provides us with the knowledge to be self-sufficient in this world, to be a well-informed member of society, and to have a secure and stable future. K-12 education in the United States is mandatory, however, not all students experience the same education. Various forms of education inequality stem from parental education levels, as well as economical situations. A country without fairness in education cannot be deemed an equitable country.

CCS CONCEPTS

- Human Centered Computing → Visualization
- Information Systems → Data Management Systems → Database Design and Modeling → Data Model Extensions
- Social and Professional Topics → User Characteristics → Geographic Characteristics

KEYWORDS

Education, Inequality, Choropleth, Demographics, Data-visualization, Heat-map

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1 Introduction

For many people, education is seen as a path leading towards a brighter future. “In 2015, during the Obama administration, the federal education department issued a report that showed how the funding gap between rich and poor schools grew 44 percent over a decade between 2001-2 and 2011-12. That meant that the richest 25 percent of school districts spent \$1,500 more per student, on average, than the poorest 25 percent of school districts” [3].

Recent reports have shown that school districts that provided education to “low-income students and students of color get less in state and local education dollars” [6]. Funding plays a great role in education inequality. The more funding that a school gets, the better the quality of education, and the better the academic results. The education inequalities that results from funding inequalities are determined by the federal, local, and state governments. “In most states, school districts serving mostly low-income students get similar amounts of state and local funding for schools as the affluent districts in the same state. And yet if you look across the country, low-income districts are at a notable disadvantage” [6]. There are many factors that play a role in education inequality. The future of our nation lies within the young people of this society. Education is the foundation for navigating through life and for shaping our future.

2 Education Inequality in the past

The United States education system was one of the most attractive features of our country. “America created a public-education system that was the envy of the modern world. No nation produced more or better-educated high-school and college graduates, and thus the great American middle class was built. But then, sometime around the 1970s, America lost its way” [8]. As education inequality increased, the quality of our schools decreased, test scores declined, and the state of our economy fell. The education system in the United States could not keep up with our rapidly advancing technological society. “There were signs in the Trump administration data that the funding gap between rich and poor had worsened during the Great Recession” [3]. The Great Recession created a lasting impact on the state of our education system. “In a follow-up report issued in 2019, the Trump administration documented that the funding gap between rich and poor schools had increased slightly to \$473 per student between the 2014-15 and 2015-16 school years” [3]. The money spent on students is a general indicator of a student’s success in academics. In a federal report covering the 2016-2017 school year, “one out of every four school in America was classified as high poverty” [3].

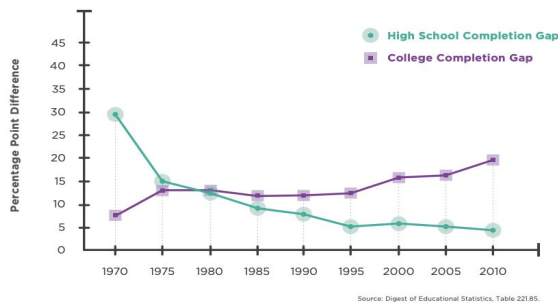


Figure 1: Black-White Gap: High School-College Completion (1970-2010)

In Figure 1 [1], the line that is marked with circles indicates the changes in the black-white gap in high school completion. It is shown in the figure that there has been a decline during the late 1970s. During the time period of 1975 - 2000, the slope has stayed at a constant point, however, during the recent 2000s, the slope begins to decrease again; reaching the point that the high school completion gap was in 1995. “Black-white inequality in the percentage of young people completing college has increased” [1].

Looking at the data in terms of race, “one third of all black children under 18 were living in poverty in 2016-17, compared with a quarter of Hispanic children. White and Asian children have a similar poverty rate of 11 percent and 10 percent, respectively” [3]. Children living in poverty begin their education with a preparedness gap. This gap increases with education level. These children have a greater potential of getting lower test scores and dropping out of school. In a 2019 study by sociologist Sean Reardon at Stanford University, when analyzing the achievement gaps in schools across America, he “found that the difference in poverty rates between predominantly Black and predominantly white schools explains the achievement gaps we see and why white schools tend to show higher test scores than black schools” [3]. Economic status and environmental conditions impact a student’s academic experience. Minority students and students living in poverty often are attending students with similar peers. This inequality needs to be addressed.

2.1 Lower Standards, Lower results

When comparing the information presented in Figure 1 and Figure 2 we see that though the high school completion gap and the black- white gap decrease in college enrollment the college completion gap only increases. It seems that this trend is endemic of a steady decrease in education standards in schools with poor funding and results. A 2009 study found that “nearly a third of the states lowered their academic proficiency standards in recent years, a step that helps schools stay ahead of sanctions under the No Child Left Behind law” [11]. Lower education standards are more haneause then they may appear as they are in effect giving

up on underperforming students and educational institutions pushing them along to eventually fail in higher levels of education.

3 The future of Education inequality

Though recent trends have shown a downturn in the high school attainment gap for minority groups, the college attainment gap is on an extreme upturn that is not showing any signs of stopping [1]. Education is the pathway to opportunities. Opportunities build up the foundation for the future of young generations and our nation. The quality of education given to students at the high-school level is what determines the quality of skills needed to succeed in college and in the real-world.

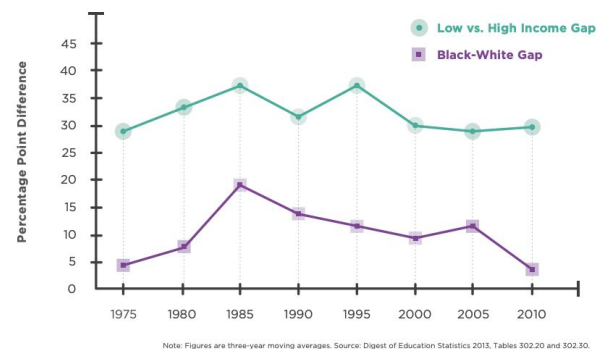


Figure 2: Gaps in College Enrollment

3.1 The past trends continue

“More than ever before in our nation’s history, education is not only the ticket to economic success, but also to basic survival” [4]. Continuing the discussion of how quickly our society is advancing, it is important to note that a basic four-year college degree might not be enough anymore. The foundation for the skills needed in college is built up in high school. Our level of education is a determining factor is what college we get to go to and what job we will obtain. Getting a respectable job in today’s world is much harder than in the past. The competition for jobs has increased. “A high school dropout had two chances out of three of getting a job 20 years ago, today he or she has less than one chance out of three, and the job he or she can get pays less than half of what would have been earned twenty years earlier [12]. Dropping out of education affects just about anyone. However, the effects of dropping out are more detrimental for minorities. Data from 1993 show that a recent school dropout who was black had only a 25% chance of being employed and his or her white peers had a 50% chance [7].

4 Current trends in Education Inequality.

Education inequality has been increasing in recent years but no one could have foreseen how the inequality would be so profoundly escalated by the 2019/20 Coronavirus pandemic. According to the World Economic Forum “About 65% of lower middle income countries and less than 25% of low income

countries have been able to set up remote learning platforms. Even in America now we see how COVID19 has shined a spotlight on inequality in education. In these times, ‘Some students will be fine during this crisis because they’ll have high-quality learning opportunities, whether it’s formal schooling or informal homeschooling of some kind coupled with various enrichment opportunities. Conversely, other students won’t have access to anything of quality, and as a result will be at an enormous disadvantage’” [5]. With a global pandemic in full swing we can see that the trends in education inequality are not just about school funding but also the family income and home life of the students. In 2017 the Economic Policy Institute concluded that “children’s social class is one of the most significant predictors—if not the single most significant predictor—of their educational success” [2].

5 What needs to be done?

The 2015 OECD Key findings from PISA report [9] highlighted 5 key areas that need to be addressed in order to further equitability in education.

1. Education strategy to improve performance and equity.
2. Rigorous and consistent standards across all classrooms.
3. Improved teacher and leader capacity across the system.
4. Equitable access to resources.
5. Targeting at risk students and schools.

The political change needed to truly eradicate education inequality in America is certainly not restricted to the policies in this list but this is a well thought out and succinct approach to reducing the inequality that exists. Other important changes that need to take place include Improved health care system and prison reform.

5.1 Equitability in Education

An equitable education has great impact. Equity ensures that all students have the tools necessary to succeed in their academics. Many of our education systems have funding, but the funding is not properly allocated. Evidence provided by Oxfam, a nonprofit group, in 2014, showed that poor policy choices in public education increased inequality [10]. Investment in early childhood education can help to ensure that every child receives the good education quality that they deserve.

“Finland - long the ‘poster child’ for equity in education - set out on substantial education reforms in the 1970s that are credited with its good performance now. The system was designed around giving every child the same opportunity to learn as an instrument to even out social inequality” [10]. Other countries, such as Estonia, have carried out similar reforms, and have seen similar results. These countries have placed emphasis on creating equitable education. This method has led to high academic performance and a decrease in educational inequality. All children deserve the same opportunities as their peers. Reinvestment in our education system and reallocation of the funding that it receives will be beneficial to the future of the young people and impactful to the state of our nation. A reduction in education inequality has the potential to keep students in school, to create a positive learning atmosphere for students, and to increase opportunities for their success and well-being.

6 The solution we are building.

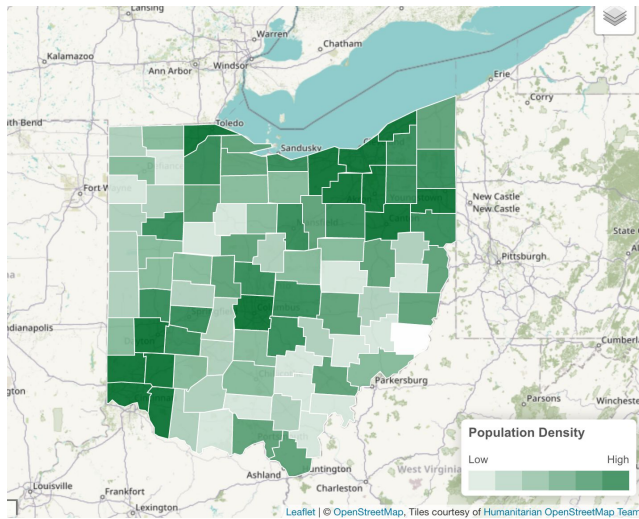
It is our belief that we can build a solution to address the 5th and 2nd areas highlighted by the PISA report [9] mentioned in section 5. We will be building a web application that addresses inconsistent standards across schools and targeting at risk areas by visualizing real data about the state of education in geographical areas. We will use educational attainment data, County education spending data and County demographic data to offer the public a tool that can be used to visualize correlations in education inequality that will hopefully be able to highlight areas where the most at risk students are and where standards are not being met.

6.1 Implementation details.

The implementation of our solution will be built using a JavaScript framework and the OpenStreetMaps tool implemented with the open source Leaflet library. Our Web application will consist of links to useful data sources and references as well as an integrated US county defined Choropleth heat map. As shown in Figure 3 we will allow users to filter variables such as Racial demographics, local education spending and local education attainment. We do not know the exact use case that this tool will be used for but rather hope that it can draw awareness to at risk areas and give education policy makers and researchers the ability to visualize inequality in a simple way.

Figure 3: Choropleth map prototype example with 1 filter

This prototype shows an example of how our application would work using the simple data set of population density.



The data sets we will use to implement our solution include the USDA public county level data sets found at: <https://www.ers.usda.gov/data-products/county-level-data-sets/> this dataset collection includes poverty metrics, population, unemployment/ median household income and educational attainment results for all US counties. We will also be using a data set published by Rutgers University detailing school funding by educational districts in the US.

7 Conclusion

As a society, we need to narrow the gaps in education quality and economic disadvantages. We need to narrow the gaps in dropout rates, test scores, among others. Investing in our education system is investing in the children and the young people that will one day become leaders in our society. If these education inequalities continue to persist, children growing this disadvantaged situations will not get the same opportunities as their peers. Funding is one of the ways to help reduce these education inequalities, but policies make the bigger difference. In efforts to ensure that every child has the same opportunities as their peers, we need to invest in and rebuild our education system, strengthen our healthcare system, and provide more support to families that are disadvantaged.

7.1 Summary

The current state of institutional education inequality in america is sadly a struggle for money, political power and racial equality. In the past century we have seen an incredible surge in the adoption of higher education though trends in data point to a sad decline in educational outcomes starting in the mid 1970s as education standards and funding were decreased in poor and disenfranchised communities, this effectively ruined the opportunities of these

communities to repair themselves and has lead us to the deeply divided America we see today. As the world is devastated by a global pandemic Students world wide are sent home to be educated at home, this shift in the world has shined a spotlight on the true inequality that exists in our education system as students in wealthy private schools barely skip a beat with high speed internet and well funded safety nets, while students in poor and rural areas have no access to internet, vital technology or even a steady parental presence to guide them in their learning. In order for education to become more equitable we must become more equitable we must fix the economic issues impacting students in at risk communities and develop consistent and rigorous standards for all students regardless of who they are or where they live. We truly hope that the tool we are building can help others understand where education policy needs to be focused and where the most disadvantaged are in terms of educational inequality.

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REFERENCES

- [1] Adam Gamoran. 2015. The Future of Educational Inequality in the United States: What Went Wrong, and How Can We Fix It?. Retrieved from: <https://wtgrantfoundation.org/library/uploads/2015/11/The-Future-of-Educational-Inequality-Adam-Gamoran.pdf>
- [2] Emma Garcia and Elaine Weiss. 2017. Education inequalities at the school starting gate: Gaps, trends, and strategies to address them. Retrieved from: <https://www.epi.org/publication/education-inequalities-at-the-school-starting-gate/#:~:text=within%20viable%20reach,-Extensive%20research%20has%20conclusively%20demonstrated%20that%20children's%20social%20class%20is,predictor%E2%80%9494of%20their%20educational%20success>.
- [3] Jill Barshay. 2020. A decade of research on the rich-poor divide in education. Retrieved from: <https://hechingerreport.org/a-decade-of-research-on-the-rich-poor-divide-in-education/>
- [4] Linda Darling-Hammond. 2001. Inequality in Teaching and Schooling: How Opportunity Is Rationed to Students of Color in America. Retrieved from: <https://www.ncbi.nlm.nih.gov/books/NBK223640/>
- [5] Liz Mineo. 2020. Time to fix American education with race-for-space resolve. Retrieved from: <https://news.harvard.edu/gazette/story/2020/04/the-pandemics-impact-on-education/>
- [6] Matt Barnum. 2019. The other school funding divide: States with more poor students tend to spend less, creating hard-to-fix disparities. Retrieved from: <https://www.chalkbeat.org/2019/7/31/21121027/the-other-school-funding-divide-states-with-more-poor-students-tend-to-spend-less-creating-hard-to-fix-disparities>
- [7] National Center for Education Statistics. 1995. Digest of Education Statistics. Retrieved from: <https://nces.ed.gov/pubs95/95029.pdf>
- [8] Nick Hanauer. 2019. Better Schools Won't Fix America. Retrieved from: <https://www.theatlantic.com/magazine/archive/2019/07/education-isnt-enough/590611/>
- [9] Organisation for Economic Co-operation and Development (OECD). 2015. 2015 OECD Key findings from PISA. Retrieved from: <https://www.oecd.org/pisa/keyfindings/>

[10] OXFAM. 2019. The Power of Education to Fight Inequality. How increasing educational equality and quality is crucial to fighting economic and gender inequality. Retrieved from: <https://policy-practice.oxfam.org.uk/publications/the-power-of-education-to-fight-inequality-how-increasing-educational-equality-620863>

[11] Sam Dillon. 2009. Federal Researchers Find Lower Standards in Schools. Retrieved from: <https://www.nytimes.com/2009/10/30/education/30educ.html>

[12] William T. Grant Foundation, Commission on Work, Family and Citizenship. 1988. The forgotten half: Non-college youth in America. Retrieved from: <http://worldcat.org/identities/lccn-n88008473/>