

Consequences of the Inequitable School Finance System in Pennsylvania

Ed Fuller, PhD

Introduction

The recent ruling in the Pennsylvania school finance court case makes abundantly clear that the current process of funding schools in the Commonwealth is unconstitutional. This is an incredibly important decision given that there is now a [consensus](#) among [researchers](#) that [money matters](#)— especially for academically struggling students, children in families facing economic difficulties, and children of color.

Why does money matter? There are [many reasons](#) why additional money can improve student outcomes. One of the primary mechanisms is access to well-qualified teachers and access to support personnel such as counselors and librarians that affect student outcomes.

In this brief, I examine student access to well-qualified teachers, school counselors, school librarians, and the dollar amount of expenditures on teacher salaries in schools within the lowest funded districts and schools within the highest funded districts in the Commonwealth. In this study, determination of funding level is based on the adequacy of the funding necessary to achieve certain levels of student outcomes. Thus, the lowest funded districts are those with the most inadequate levels of funding based on their needs and the highest funded districts are those with the most adequate funding based on their needs.

I find that, *in comparison to schools in the highest funded districts, schools in the lowest funded districts have less access to well-qualified teachers, counselors, and librarians as well as and spend significantly less on teacher salaries per pupil, per classroom, and per school.* In short, the Commonwealth’s current system of funding provides fewer human and fiscal resources to the children who need access to human and fiscal resources the most. These children tend to be disproportionately children of color and children in poverty. To improve overall outcomes for all children in the Commonwealth, we must adopt a more equitable and adequate school funding system.

Schools Included in the Analysis

Only schools included in the Pennsylvania [Future Ready PA Index](#) system were included in the analysis. Schools were divided into elementary schools, middle schools, and high schools. In general, schools including kindergarten through 5th grade were identified as elementary schools, schools that included grades 6

through 8 were identified as middle schools, and schools that included grades 9 through 12 were identified as high schools. Some schools have grade levels that span two different levels. In such cases, a school was placed in the higher of the two levels. So, for example, a school that serves children in kindergarten through 8th grade would be identified as a middle school.

School Funding Groups

For this analysis, I rely on the estimates of the adequacy of funding for 2022 by Dr. Matthew Gardner Kelly, Assistant Professor at Penn State in the College of Education.

Using Dr. Kelly’s funding adequacy measure, I ranked all 500 districts in descending order based on their level of funding adequacy. Thus, the district with the greatest funding adequacy was ranked first and the district with the lowest funding adequacy was ranked last. Four districts did not have adequate data which left 496 districts. I placed districts into five quintiles with the first quintile being the 20% of districts with the highest funding adequacy. The last quintile included the 20% of districts with the lowest funding adequacy. The number of districts in each quintile and the break points in funding adequacy for each quintile are shown below in Table 1.

Table 1: Number of Districts and Break Points for Quintiles of District Funding Adequacy

Quintile of Adequacy	Number of Districts	Lowest in Quintile	Highest in Quintile
Quintile 1	99	\$13,966	\$22,687
Quintile 2	99	\$12,883	\$13,959
Quintile 3	99	\$11,798	\$12,882
Quintile 4	99	\$10,852	\$11,782
Quintile 5	100	\$6,901	\$10,849

I used these quintiles in all analyses in this study. Because of space limitations, I present the results for the top and bottom quintiles only. For the teacher salary study, I also divided districts by labor market. More details on the methods of the teacher salary analysis are in the appendix.

Access to Well-Qualified Teachers

Research has shown that well-qualified teachers are more effective than their less-qualified peers. In general, teachers with greater than [three years](#) of

[experience](#), teachers with a [certification for the subject area to which they are assigned](#), and teachers who are [certified](#) to be a teacher are more effective than teachers with three or fewer years of experience, teachers assigned to teach out of their area of expertise, and teachers who are not certified.

There is a strong research consensus about the relationship between experience and student outcomes—especially over the first five to ten years of a teacher’s employment. The research is more mixed regarding teachers assigned out-of-field and teachers without certification. There is fairly strong evidence that teachers with greater subject matter knowledge tend to have greater student achievement. This is especially true in mathematics and science but not a consistent finding in other subject areas. There has been difficulty in identifying the effect of out-of-field teaching and teaching without a certification because of two issues: data limitations on teacher assignments and their certifications and relatively few teachers assigned to teach without any preparation or certification in subject areas with student test scores.

Currently the Pennsylvania Department of Education reports three different measures of teacher qualifications. These three measures include:

- Percentage of novice teachers (teachers with three or fewer years of experience),
- Percentage of teachers assigned out-of-field (teaching a subject or grade for which they are not fully certified, and
- Percentage of teachers teaching a subject area or grade level for which they are not fully certified and are teaching on an emergency permit.

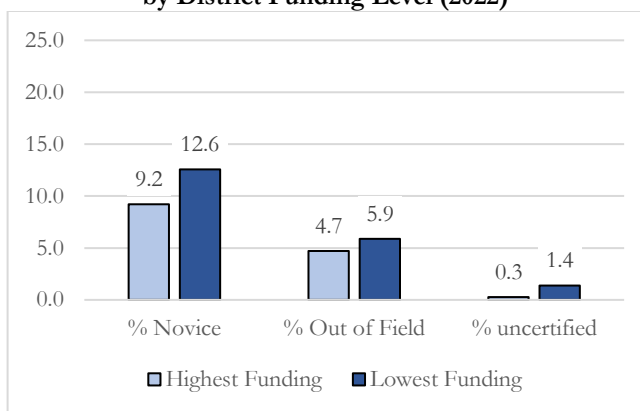
Below, I examine the percentage of each of these measures at the three school levels (elementary schools, middle schools, and high schools) for schools in districts with the least funding and schools in districts with the most funding. For space purposes, I only present the data for schools in districts with the highest funding levels and the most inadequate funding.

Elementary Schools

As shown in Figure 1, schools in districts with the lowest funding levels had a greater percentage of novice teachers, teachers assigned out-of-field, and teachers without certification than schools in districts with the greatest funding levels. While the differences were not substantial, the impact of differential access to well-qualified teachers accumulates over time. Indeed, the difference in access is magnified as students encounter multiple teachers who are not well-qualified as they progress through the system. Some research suggests that even one ineffective teacher can have a negative impact on a child’s academic trajectory and having two

ineffective teachers can have a lasting and profound impact on their academic achievement.

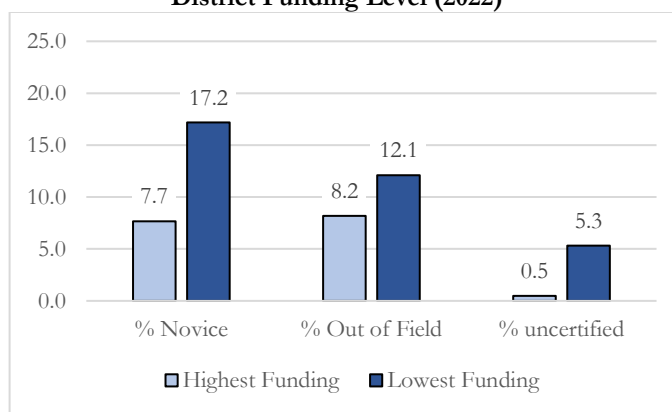
Figure 1: Teacher Qualifications in Elementary Schools by District Funding Level (2022)



Middle Schools

As shown in Figure 2, schools in districts with the lowest funding levels had far greater percentages of novice teachers, teachers assigned out-of-field, and teachers without certification. Specifically, the percentage of novice teachers in schools in districts with the lowest funding levels was more than twice the percentage in schools in districts with the highest funding levels while the percentage of teachers assigned out-of-field in schools in districts with the lowest funding levels was 50% greater in schools than in schools in districts with the highest funding levels. The greatest disparity was for the percentage of uncertified teachers—schools with the lowest funding levels had a percentage that was 10 times the percentage in schools with the highest funding levels.

Table 2: Teacher Qualifications in Middle Schools by District Funding Level (2022)

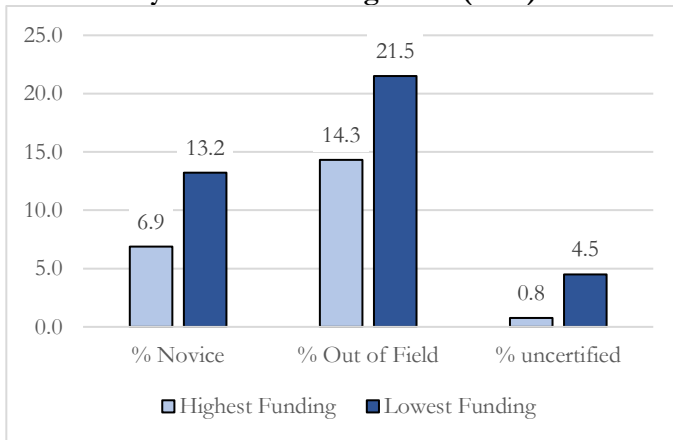


High Schools

As shown in Figure 3, schools in districts with the lowest funding levels had greater percentages of novice teachers, teachers assigned out-of-field, and teachers without certification. The lowest funded schools had twice the percentage of novice teachers, 50% more teachers assigned out-of-field, and six times the percentage of uncertified teachers than the highest

funded schools. Strikingly, more than one out of every five teachers in the lowest funded schools were assigned out-of-field. Thus, on average, every student in schools with the lowest funding levels is taught by at least one teacher assigned out-of-field each year.

Table 3: Teacher Qualifications in High Schools by District Funding Level (2022)



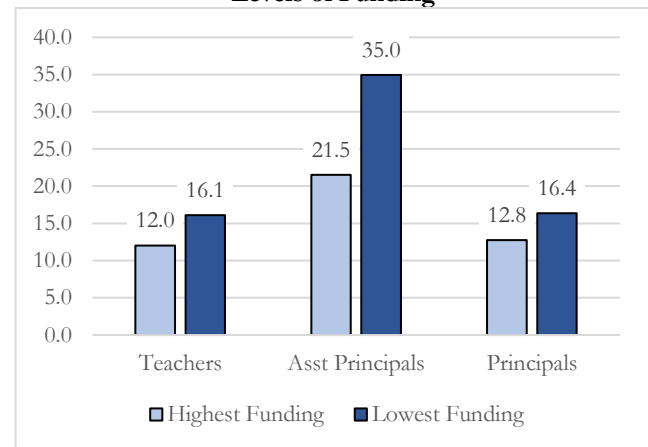
Teacher and Leader Turnover

In this section, I examine the annual turnover for teachers, assistant principals, and principals. Teacher turnover is important to investigate because research has shown that *high teacher turnover has a negative impact effect on a variety of student outcomes*, including achievement. Because teacher turnover varies by school level, I analyze teacher turnover separately for each of the three school levels.

I also include the turnover of assistant principals and principals. Although there is no research on the effects of assistant principal turnover, research has shown that principal turnover has negative effects on teacher stability, school climate, and student outcomes.

As shown in **Figure 4**, turnover for all three types of educators was greater in schools in districts with the lowest funding levels than in schools in districts with the highest funding levels. For schools in districts with the lowest funding levels, 16.1% of teachers left the school and almost 13% of principals left the school. In contrast, only about 12% of teachers and principals left schools in districts with the highest funding levels. In addition, greater than 1 out of every 3 assistant principals left schools in districts with the lowest funding levels compared to only about 1 out of every 5 assistant principals in schools in districts with the highest funding levels. This constant churn of teachers and leaders has a negative effect on student outcomes.

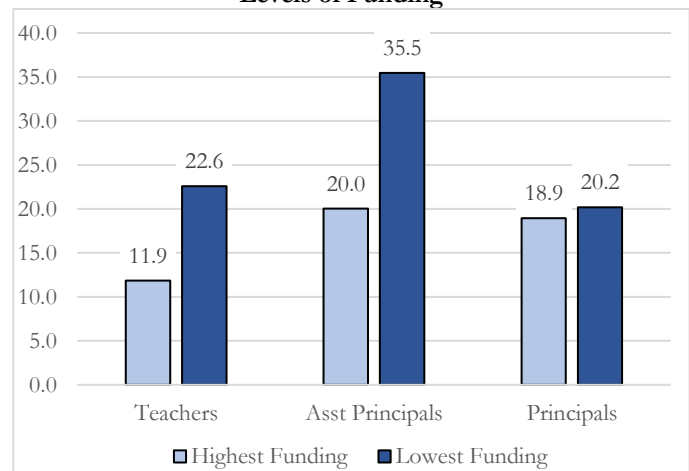
Figure 4: Annual Elementary School Educator Turnover for Schools in Districts with the Lowest and Highest Levels of Funding



As shown in **Figure 5**, middle school teacher turnover is also substantially greater for schools in districts with the lowest funding levels than schools in districts with the highest funding levels schools. On average, the annual teacher turnover for schools in districts with the lowest funding levels was 22.6%—more than 10 percentage points greater than for schools in districts with the highest levels of funding.

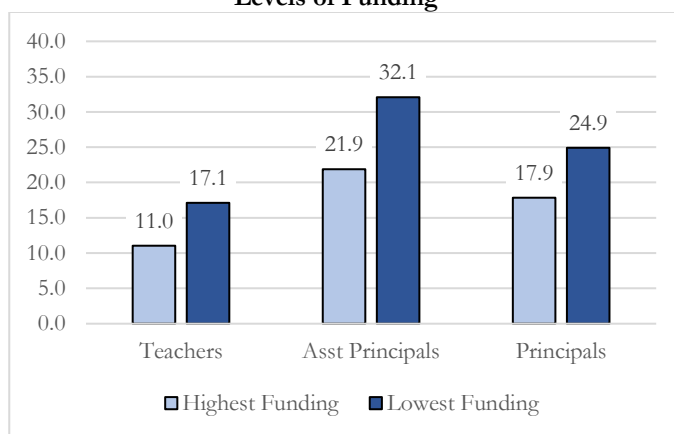
While there was only a small difference in the turnover rate for principals between schools in districts with the lowest levels of funding and schools in districts with the highest levels of funding, greater than 1 out of every 3 assistant principals left schools in districts with the lowest funding levels compared to only about 1 out of every 5 assistant principals in schools in districts with the highest funding levels. This constant churn of teachers and leaders has a negative effect on student outcomes.

Figure 5: Annual Middle School Educator Turnover for Schools in Districts with the Lowest and Highest Levels of Funding



As shown in **Figure 6**, high school teacher turnover was also substantially greater for schools in districts with the lowest level of funding compared to schools in districts with the highest level of funding. The annual teacher turnover for schools in districts with the lowest levels of funding was about 6 percentage points greater than for schools in districts with the highest level of funding. There were also substantial differences in principal and assistant principal turnover. The turnover rate for principals in schools in districts with the lowest level of funding was about 25% which was 7 percentage points greater than the 17.9% turnover rate in schools in districts with the highest level of funding. Finally, about 1 out of every 3 assistant principals left schools in districts with the lowest funding levels compared to only about 1 out of every 5 assistant principals in schools in districts with the highest funding levels.

Figure 6: Annual High School Educator Turnover for Schools in Districts with the Lowest and Highest Levels of Funding



Access to Support Personnel

In this section, I examine student access to counselors, librarians, and nurses. In each section, I present the comparisons between schools with the highest funding levels and lowest funding levels at the three school levels.

Access to Counselors

Recent research concludes *counselors play a critical role in the educational experiences of students, providing resources that improve student mental health, academic achievement, student attendance, student behavior at school, and post-secondary readiness.*

A recent [study](#) of counselors in Massachusetts found that counselors have a causal effect on both academic achievement and enrollment in post-secondary institution and this effect is similar in strength to that of teachers.

Counselors are particularly important in helping students living in poverty and first-generation college applicants navigate the complicated college admissions and financial aid process. For all these outcomes,

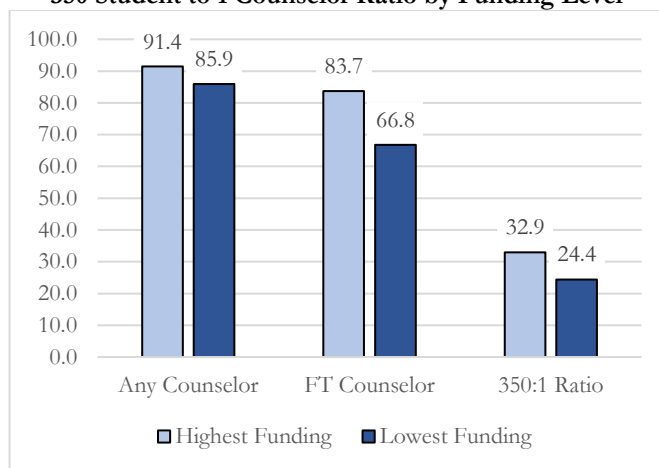
counselors have an even more profound influence for students living in poverty and minoritized students.

Further, research shows that having a smaller student-counselor ratio increases the positive influence that counselors have on students. The recommended student-counselor ratio is 250 students for every one counselor. Very few schools in Pennsylvania meet this standard. Thus, in the analyses below, I examine the percentage of schools that provide a 500 student to one counselor ratio. I present an analysis for each school level below.

Elementary Schools

As shown in **Figure 7**, a greater percentage of schools in districts with the highest funding levels than schools in districts with the lowest funding levels employed any counselor, a full-time counselor, and met a 350 student to 1 counselor ratio. The difference in access to a full-time counselor was substantial—17 percentage points. Almost 1 out of every 3 schools in districts with the highest funding levels met a 350 student to 1 counselor ratio while only 1 out of 4 schools in districts with the lowest levels of funding did so.

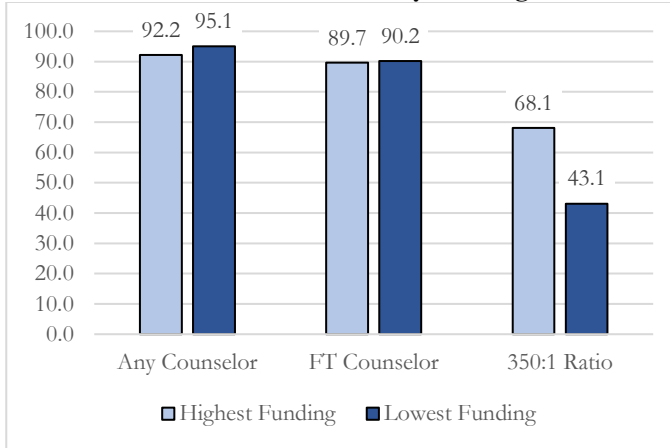
Figure 7: Percentage of Elementary Schools Employing Any Counselor, Full-Time Counselor, and Meeting a 350 Student to 1 Counselor Ratio by Funding Level



Middle Schools

As shown in **Figure 8**, there were only small differences between the two sets of schools with respect to employing any counselor or a full-time counselor. However, a substantially greater percentage of schools with the highest funding levels than schools with the lowest funding levels met a 350 student to 1 counselor ratio. In fact, the difference between the two sets of schools was about 25 percentage points in favor of schools with the highest funding levels.

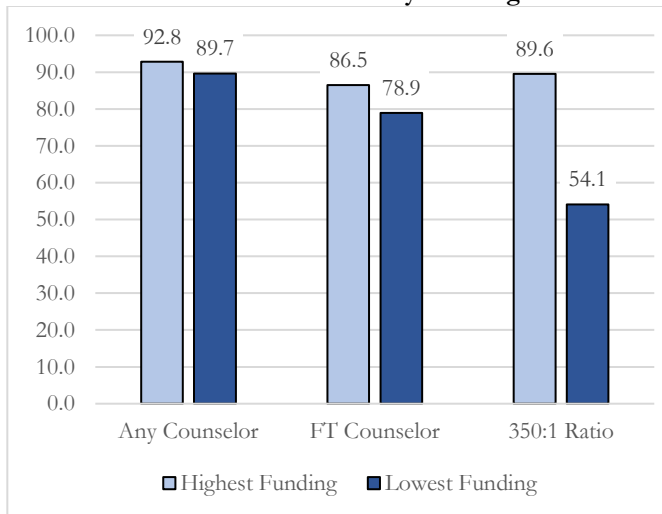
Figure 8: Percentage of Middle Schools Employing Any Counselor, Full-Time Counselor, and Meeting a 350 Student to 1 Counselor Ratio by Funding Level



High Schools

As shown in **Figure 9**, a greater percentage of schools in districts with the highest funding levels employed any counselor, employed a full-time counselor, and met a 350 student to 1 counselor ratio. The difference for the student-counselor ratio was substantial—about 36 percentage points. About 9 out of 10 high schools with the highest funding levels provided a 350 student to one counselor ratio while only about 1 out of every 2 schools with the most inadequate funding did so.

Figure 9: Percentage of Middle Schools Employing Any Counselor, Full-Time Counselor, and Meeting a 350 Student to 1 Counselor Ratio by Funding Level



Access to Librarians

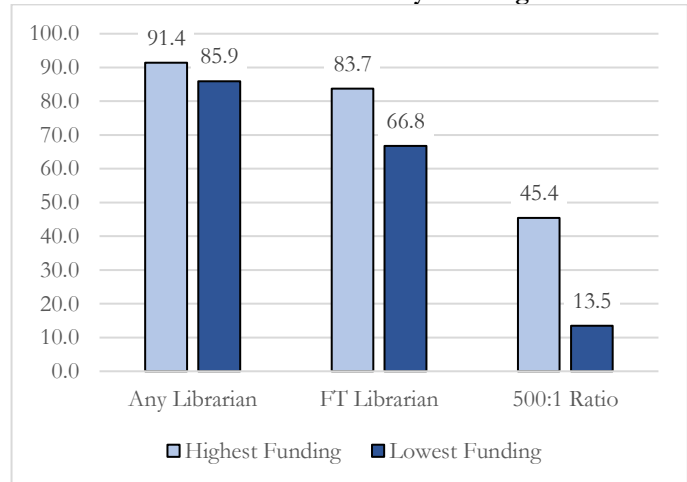
While there is not research consensus about the relationship between access to librarians and student achievement, research does suggest a positive relationship such that students who have access to a school library staffed by a qualified librarian tend to have greater achievement as well as achievement growth, even after controlling for other factors. This finding is strongest for students living in poverty since they tend to have less access to books at home and

increasingly have less access to books through public libraries. Finally, access to libraries and librarians has also been found to be positively associated with children engaging in literature, developing hobbies, and developing social skills.

Elementary Schools

As shown in **Figure 10**, a substantially greater percentage of schools in districts with the highest funding levels employed any librarian, a full-time librarian, and met a 500 student to 1 librarian ratio. For access to any librarian, the difference was about 37 percentage points while the difference for access to a full-time librarian was about 40 percentage points. About 3 out of every 5 schools with the highest funding levels employed a full-time librarian while only 1 out of 5 schools with the lowest funding levels did so. Finally, a substantially greater percentage of schools in districts with the highest funding levels met a 500 student to 1 librarian ratio than schools in districts with the lowest funding levels. Specifically, 45% of schools in districts with the highest funding levels met the 350 students to 1 librarian while less than 14% of schools in districts with the lowest levels of funding did so.

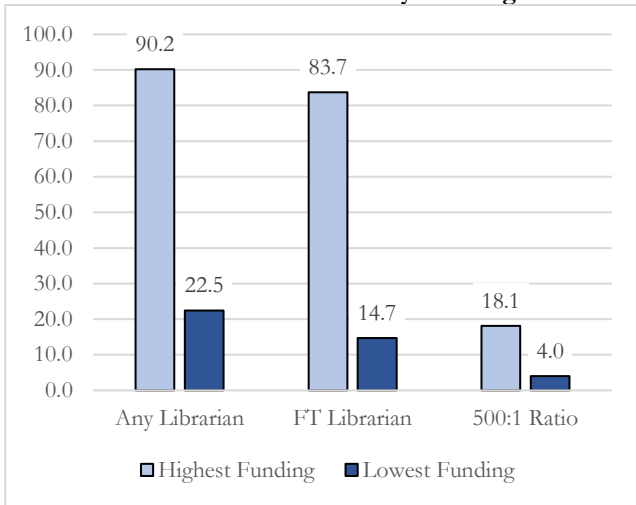
Figure 10: Percentage of Elementary Schools Employing Any Librarian, Full-Time Librarian, and Meeting a 500 Student to 1 Librarian Ratio by Funding Level



Middle Schools

As shown in **Figure 11**, there were massive differences in access to a librarian between the two sets of schools at the middle school level. While about 9 out of 10 schools with the highest funding levels employed a librarian, only slightly more than 2 out of 10 schools with the lowest funding levels did so. More than 8 out of 10 schools with the highest funding levels employed a full-time librarian while only slightly more than 1 out of 10 schools with the lowest funding levels did so. Finally, about 18% of schools with the highest funding levels had a 500 student to 1 librarian ratio while only about 4% of schools with the lowest funding levels did so.

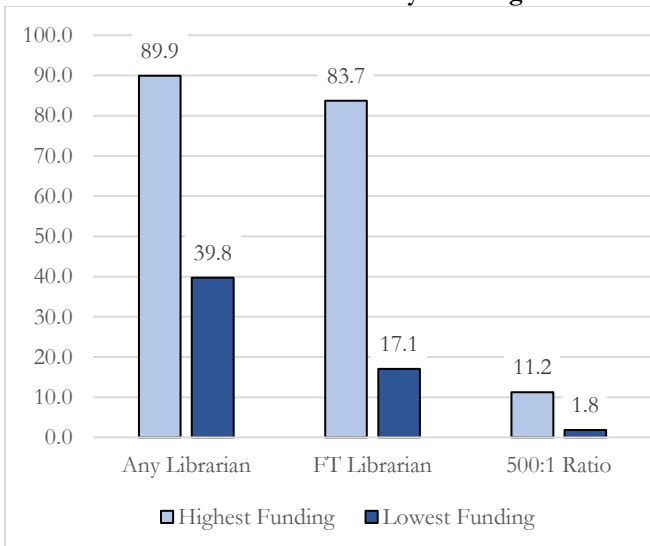
Figure 11: Percentage of Middle Schools Employing Any Librarian, Full-Time Librarian, and Meeting a 500 Student to 1 Librarian Ratio by Funding Level



High Schools

As shown in **Figure 12**, there were also very substantial differences at the high school level. About 9 out of 10 schools with the highest funding levels employed a librarian compared to only about 4 out of every 10 schools with the most inadequate funding. While about 6 out of 10 schools with the highest funding levels employed a full-time librarian compared to less than 2 out of 10 schools with the most inadequate funding. Finally, 11.2% of schools in districts with the highest funding levels had a 500 student to 1 librarian ratio. While this was extremely low, the percentage for these schools was more than six times greater than the percentage of schools in districts with the lowest funding levels, which was almost five times greater than the 2.5% of schools with the most inadequate funding.

Figure 12: Percentage of High Schools Employing Any Librarian, Full-Time Librarian, and Meeting a 500 Student to 1 Librarian Ratio by Funding Level



Expenditures on Teacher Salaries

Another consequence of the disparity in funding between schools in the highest- and lowest- funded districts is expenditures on teacher salaries. Differences in expenditures on salaries can partially explain differences in the qualifications and retention of teachers between schools that have been reviewed above. In the analyses below, I document the disparities in teacher salaries per pupil, per classroom, and per school.

Because salaries differ by school level and labor market, we need to ensure we are making an “apples-to-apples” comparison. This could be done through statistical techniques that are difficult to explain and understand. Another method is to restrict comparisons to the same school level and labor market.

By restricting the analyses within the same labor market, I ensure that districts have access to the same supply of teachers and that the same amount of dollars buys the same amount of goods—including employees. In this study, I used the core based statistical areas (CBSAs) provided by the US Census Bureau. Inclusion in a labor market was based on data from the Pennsylvania Department of Education and National Center for Education Statistics.

Only seven of the 10 labor markets in Pennsylvania included a sufficient number of schools in both the highest- and lowest- funded districts. These seven labor markets were: Allentown-Bethlehem, Harrisburg-Carlisle, Lancaster, Philadelphia, Pittsburgh, Reading, and York-Hanover.

Below, I present the results for teacher salaries per pupil for each school level and labor market. I then present data on salaries per classroom and salaries per school.

Teacher Salaries Per Pupil

In this section, I document the per pupil expenditures on teacher salaries by school level and labor market.

As shown in **Figure 13**, schools in the highest-funded districts had substantially greater per pupil teacher salaries than schools in districts with the lowest funding for all three school levels.

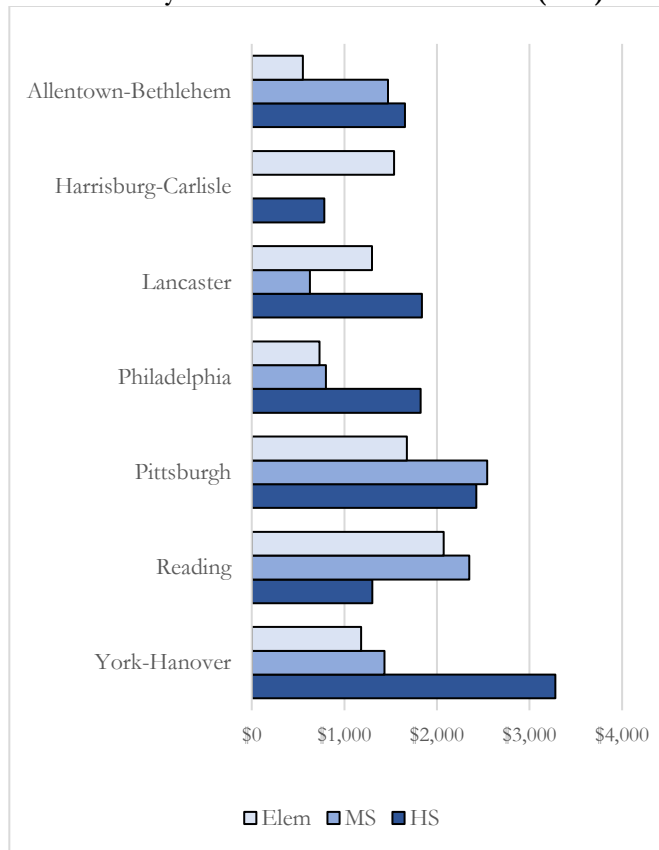
At the elementary school level, the average difference in per pupil expenditures on teacher salaries was \$1,292 in favor of the highest funded districts. In other words, schools in the highest funded districts spent \$1,292 more on teacher salaries per student than schools in the lowest funded districts. The smallest difference was about \$700 per pupil in the Allentown-Bethlehem labor market. The largest difference was about \$2,000 per pupil for the Reading labor market.

At the middle school level, the average difference in per pupil expenditures on teacher salaries was \$1,318. The smallest difference was \$628 for the Lancaster labor market while the greatest difference was \$2,542 for the

Pittsburgh labor market. The difference in the Reading labor market was also greater than \$2,000 per pupil.

For high schools, the average difference across labor markets was \$1,837. The smallest difference was \$784 for the Harrisburg-Carlisle labor market while the greatest difference was \$3,280 for the York-Hanover labor market.

Figure 13: Per Pupil Difference in Teacher Salaries Between Schools in the Highest- and Lowest- Funded Districts by Labor Market and School Level (2022)

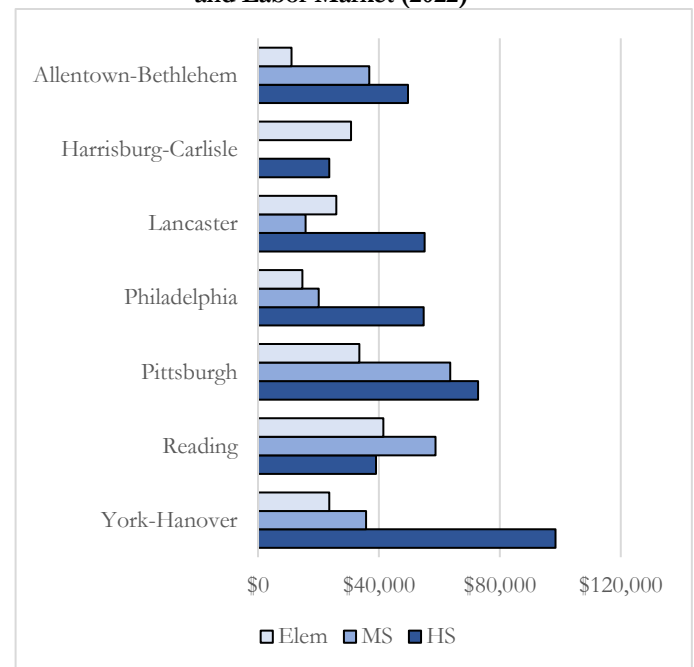


At the elementary school level, the smallest difference was \$14,645 for the Philadelphia labor market. The greatest difference was \$41,438 for the Reading labor market.

At the middle school level, the smallest difference was \$15,701 for the Lancaster labor market. The greatest difference was \$58,734 for the Reading labor market.

Finally, at the high school level, the smallest difference was \$223,533 for the Harrisburg-Carlisle labor market. The greatest difference was for the Yor-Hanover district at nearly \$100,000 per classroom.

Figure 14: Classroom-Level Differences in Teacher Salaries Between Schools in the Highest- and Lowest- Funded Districts by School Level and Labor Market (2022)



Teacher Salaries Per Classroom

In this analysis, I compare expenditures on teacher salaries per classroom between schools in the highest- and lowest- funded districts within the seven labor markets. Again, the analysis is disaggregated by school level. For comparison purposes, I assume an elementary classroom has 20 students, a middle school classroom has 25 students, and a high school classroom has 30 students. The number of students, of course, varies by school and even within schools. However, my approach creates an easy to understand “apples-to-apples” comparison.

As shown in **Figure 14**, the average difference at the elementary school level was nearly \$29,000. The average difference at the middle school level was almost \$33,000 while the average difference at the high school level was slightly greater than \$56,000. These are all substantial differences in expenditures when considering these differences are *per classroom*.

Teacher Salaries Per School

In this analysis, I compare expenditures on teacher salaries per school between schools in the highest- and lowest-funded districts by school level within the seven labor markets. For comparison purposes, I assume an elementary school enrolls 500 students, a middle school enrolls 750 students, and a high school enrolls 1,000 students. This approach creates an easy to understand “apples-to-apples” comparison.

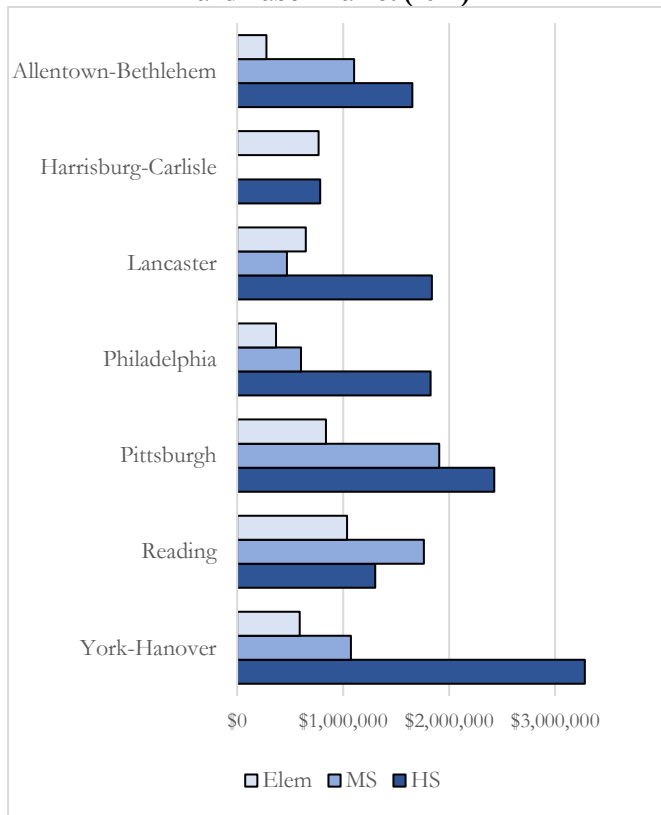
As shown in **Figure 15**, there were substantial differences in the school-level expenditures between schools in the highest- and lowest- funded districts. For elementary schools, the average difference was about \$646,000. For middle- and high- schools, the differences were about \$988,000 and \$1,870,000, respectively. These are extremely large differences in expenditures that stem primarily from the Commonwealth’s inequitable school finance system.

For elementary schools, the smallest difference was about \$276,000 in the Allentown-Bethlehem labor market. The greatest difference was more than \$1,000,000 for the Reading labor market.

For middle schools, the smallest difference was about \$471,000 for the Lancaster labor market. The greatest difference was \$1,900,000 for the Pittsburgh labor market.

Finally, at the high school level, the smallest difference was about \$784,000 for the Harrisburg-Carlisle labor market. The greatest difference was \$2,420,000 for the Pittsburgh labor market.

Figure 15: School-Level Differences in Teacher Salaries Between Schools in the Highest- and Lowest- Funded Districts by School Level and Labor Market (2022)



Student Characteristics

In this section, I review the characteristics of students enrolled in schools in the lowest funded districts and the highest funded districts across the Commonwealth.

Elementary Schools

As shown in Table 2, there were substantial differences in the student characteristics between the two sets of schools. As compared to schools in the highest funded districts, schools in the lowest funded districts had at least twice the percentages of Black, Hispanic, economically disadvantaged, and English Language Learner students. Alternatively, schools in the highest funded districts had 1.5 times the percentage of white students as schools in the lowest funded districts.

Table 2: Elementary School Student Characteristics for Schools in the Lowest Funded Districts and Highest Funded Districts (2022)

Student Characteristic	Highest-Funded	Lowest-Funded	HF - LF
Black	8.9	20.7	-11.8
Hispanic	6.5	22.1	-15.6
White	71.3	46.9	24.4
Multi Race	5.8	6.6	-0.9
Asian	7.3	3.4	3.9
Econ Disadv	29.1	67.6	-38.5
Special Educ	14.9	16.4	-1.5
ELL	3.7	8.5	-4.8

Middle Schools

Table 3 shows that differences at the middle school level were even greater than at the high school level.

Specifically, the differences in percentages of students were three times greater for Black and Hispanic students and more than four times greater for ELL students.

Schools in the lowest funded districts also had more than double the percentage of economically disadvantaged students than schools in the highest funded districts.

Table 3: Middle School Student Characteristics for Schools in the Lowest Funded Districts and Highest Funded Districts (2022)

Student Characteristic	Highest-Funded	Lowest-Funded	HF - LF
Black	12.8	39.0	-26.2
Hispanic	6.6	22.6	-15.9
White	68.3	29.3	39.0
Multi Race	5.4	4.9	0.5
Asian	6.7	4.0	2.7
Econ Disadv	33.3	73.6	-40.3
Special Educ	19.5	20.2	-0.7
ELL	2.3	9.9	-7.6

High Schools

Table 3 shows similar trends in student characteristics as at the elementary school level. Specifically, as compared to schools in the highest funded districts, schools in the lowest funded districts had at least twice the percentages of Black, Hispanic, economically disadvantaged, and English Language Learner students. In fact, the differences were near three times greater for Black and Hispanic students and more than four times greater for ELL students.

Table 4: High School Student Characteristics for Schools in the Lowest Funded Districts and Highest Funded Districts (2022)

Student Characteristic	Highest-Funded	Lowest-Funded	HF - LF
Black	10.5	30.7	-20.2
Hispanic	5.7	16.1	-10.3
White	75.1	45.6	29.5
Multi Race	3.8	4.2	-0.4
Asian	4.6	3.2	1.5
Econ Disadv	33.0	62.8	-29.9
Special Educ	19.8	20.3	-0.4
ELL	1.4	6.0	-4.6

Data Source: PDE Future Ready Index

Conclusions

As a Commonwealth that cares deeply about our children, we should place our greatest investments in schools that serve the children who most need our help. Yet, as this brief shows, we have created a system that provides fewer fiscal and human resources to students enrolled in schools in our lowest funded districts as compared to their peers in the highest funded districts. Specifically, students in schools in our lowest funded districts are more likely to be taught by a novice teacher, a teacher assigned out-of-field, and an uncertified teacher. They are also likely to be in schools that experience greater teacher, assistant principal, and principal turnover. Finally, schools in the lowest funded districts spend substantially less money on teacher salaries per pupil, per classroom, and per school. In short, our current system of education—especially funding—creates greater obstacles to success for children enrolled in schools in our most underfunded districts. In fact, our system provides more resources and support for children who are already more advantaged in many ways.

We must find a way to create an equitable funding system that ensures all districts can compete on a level playing field for effective educators. At the same time, we must also increase the supply of educators—especially educators of colors. Adopting a more equitable and adequate funding system without addressing the teacher pipeline will not completely solve the issues faced by communities that have suffered decades of neglect.

Suggested Citation

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Appendix: Data and Methods

CBSAs and Labor Markets

According to the Office of Management and Budget, “The general concept of a core based statistical area (CBSA) is that of an area containing a large population nucleus, or urban area, and adjacent communities that have a high degree of integration with that nucleus.” CBSA is often used in education research to identify a labor market for educators with the goal of making an apples-to-apples comparison of fiscal matters—especially salaries—within the same labor market.

Teacher Salary Analysis

After schools were identified for the analysis, I used the PDE educator employment file to select all teachers employed in those schools.

The file includes the name of the teacher, a unique identifying number for each teacher, the full-time equivalent for each teacher and each of their assignments, the school’s name and numeric identifier for each teacher and each assignment, and the annual salary for each teacher and assignment.

A full-time equivalent (FTE) is the percentage of the day a teacher is assigned to teach a particular subject in a particular school.

After selecting only teachers employed in the schools in the analysis, I aggregated the data by person and school. Most importantly, this step results in an FTE total for each person and for each of the schools in which the person worked. This is an important step because I need to identify the FTE and salary for each school in which a person works.

For the majority of the teachers, each teacher was assigned to one school and had an FTE of 1.0 (meaning the person was employed full-time as a teacher in the schools). In these cases, the salary of the teacher was simply the salary provided by the district. This was true even for the temporary substitute teachers with salaries lower than the minimum teacher salary.

Teachers who had an FTE total of less than 1.0 presented a problem. Take, for example, Teacher A and Teacher B. Suppose both teachers have an FTE of 0.5 and Teacher A has a salary of \$30,000 and the salary of Teacher B is \$50,000. Are the salaries correct? They might be correct, but they also might be incorrect.

Determining whether the salaries of teachers with FTEs lower than 1.0 requires additional information. For example, knowing the years of experience of the teacher, their 2023 FTE and salary, and the average salary for full-time teachers in the school in which the teacher works would all be useful in determining if a salary was correct. I was able to calculate and connect all of this data and used it to identify salaries that were correct and to modify salaries that were incorrect. For example, consider Teacher A and teacher B again with the information shown in Table A1.

Table 1A: Example of Teacher Salary Decisions

Teacher	A	B
Exper 22	14	8
FTE 22	0.5	0.5
Salary 22	30,000	50,000
FTE 23	1.0	0.5
Salary 23	61,750	51,000
Sch Avg	57,500	55,500

From this information, it would be reasonable to conclude that the salary of \$30,000 was correct for Teacher A, but that the salary of \$50,000 was incorrect for Teacher B. In fact, the available information suggests the salary for Teacher B should be $0.5 \times \$50,000 = \$25,000$. Thus, I used the available information to identify a salary that appeared to be most accurate.

List of Districts in Teacher Salary Analysis

Allentown-Bethlehem

Highest Funding Quintile	Lowest Funding Quintile
Nazareth Area SD	Panther Valley SD
Saucon Valley SD	Allentown City SD
Jim Thorpe Area SD	
Northwestern Lehigh SD	
Salisbury Township SD	
Southern Lehigh SD	

Harrisburg-Carlisle

Highest Funding Quintile	Lowest Funding Quintile
Camp Hill SD	Harrisburg City SD
Halifax Area SD	Steelton-Highspire SD
	Susquehanna Township SD

Lancaster

Highest Funding Quintile	Lowest Funding Quintile
Eastern Lancaster County SD	Penn Manor SD
Pequea Valley SD	

Reading

Highest Funding Quintile	Lowest Funding Quintile
Brandywine Heights Area SD	
Conrad Weiser Area SD	Antietam SD
Kutztown Area SD	Muhlenberg SD
Oley Valley SD	Reading SD
Tulpehocken Area SD	

York-Hanover

Highest Funding Quintile	Lowest Funding Quintile
South Eastern SD	Hanover Public SD
	York City SD

Pittsburgh

Highest Funding Quintile	Lowest Funding Quintile
Avella Area SD	Albert Gallatin Area SD
Peters Township SD	Brownsville Area SD
Pittsburgh SD	Connellsville Area SD
Allegheny Valley SD	Uniontown Area SD
Avonworth SD	Charleroi SD

- Pine-Richland SD
- Bethel Park SD
- Carlynton SD
- Chartiers Valley SD
- Cornell SD
- Fox Chapel Area SD
- Hampton Township SD
- Keystone Oaks SD
- Montour SD
- Mt Lebanon SD
- North Allegheny SD
- Quaker Valley SD
- Riverview SD
- Shaler Area SD
- Steel Valley SD
- Upper Saint Clair SD
- West Allegheny SD
- Seneca Valley SD
- South Side Area SD

- Ringgold SD
- Baldwin-Whitehall SD
- McKeesport Area SD
- Sto-Rox SD
- Belle Vernon Area SD
- Jeannette City SD
- New Kensington-Arnold
- Norwin SD
- Southmoreland SD
- Aliquippa SD
- Ambridge Area SD
- Big Beaver Falls Area SD
- Freedom Area SD
- New Brighton Area SD

Philadelphia

Highest Funding Quintile	Lowest Funding Quintile
Centennial SD	Norristown Area SD
Central Bucks SD	Chester-Upland SD
Council Rock SD	Southeast Delco SD
New Hope-Solebury SD	Upper Darby SD
Palisades SD	William Penn SD
Pennsbury SD	Philadelphia City SD
Abington SD	
Cheltenham SD	
Colonial SD	
Hatboro-Horsham SD	
Jenkintown SD	
Lower Merion SD	
Lower Moreland Twnship SD	
Methacton SD	
North Penn SD	
Perkiomen Valley SD	
Souderton Area SD	
Springfield Township SD	
Spring-Ford Area SD	
Upper Dublin SD	
Upper Merion Area SD	
Wissahickon SD	
Great Valley SD	
Octorara Area SD	
Owen J Roberts SD	
Phoenixville Area SD	
Tredyffrin-Easttown SD	
Unionville-Chadds Ford SD	
Chichester SD	
Garnet Valley SD	
Marple Newtown SD	
Radnor Township SD	
Rose Tree Media SD	
Wallingford-Swarthmore SD	