Assessment of Delaware Public School Funding

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Contents

Exhibits

1. Introduction

In early 2018, Delawareans for Educational Opportunity and the NAACP Delaware State Conference filed a complaint that the state of Delaware was not meeting its state constitutional requirement to provide an adequate education. Rather than proceed with the complaint through the court system, in the fall of 2020, the state and the plaintiffs agreed to a settlement. The settlement was followed by legislation that made Opportunity Funding permanent, providing districts with supplemental funding to support the learning needs of low-income and English learner (EL) students. By providing differentiated support, Opportunity Funding represented an effort to address long-standing gaps in meeting the educational needs of low-income and EL students and introduced elements of a student-based weighted funding system, which deviated from the primarily resource-based unit-count approach of the current system.[1] The legislation also earmarked funding to support an assessment of Delaware's public school funding system to be conducted by an organization independent of the state. In July 2022, the American Institutes for Research (AIR) was awarded a contract to conduct the independent funding assessment stipulated by the settlement and the subsequent request for proposals. This report documents the activities and analyses undertaken to complete the school funding assessment, presents the results from those analyses, and provides recommendations and conclusions.

Study Overview

To provide a holistic assessment of Delaware's public school funding system, the AIR study team designed a multifaceted study to address the following research questions:

- How does Delaware's current system of funding elementary and secondary public education operate, and how does it compare to education funding systems in other states?
- What are district and charter school leaders' perceptions of Delaware's current school funding system, and what are the advantages and disadvantages with respect to how the current system operates?
- To what extent are resources, including spending and teachers, distributed equitably under Delaware's existing funding system?

[1] Details of the unit-count system are provided in Title 14 of the Delaware state code (see https://delcode.delaware.gov/title14/c017/index.html) and are described in Chapter 3.

- To what extent are students afforded equal educational opportunities as demonstrated by outcomes of students and schools?
- To what extent is education funding in Delaware adequate in meeting target outcome goals, and how might funding be distributed across schools and districts to achieve adequacy?

To answer these questions, we engaged in the data collection and analysis activities outlined in Exhibit 1.

Exhibit 1. Study Data Collection and Analysis Activities

Activity	Description
Data collection activities	
Collection of administrative data	Gathered and compiled extant administrative data on school enrollment and demographics, student and school outcomes, spending, and other school characteristics.
Interviews with district and charter school leaders	Conducted interviews with district and charter leaders regarding perceptions of the existing funding system.
Convening of professional judgment panels	Recruited expert educators within Delaware to participate on panels, who described school-level programming and resources required to provide an adequate education.
Analysis activities	
Analysis of administrative data	Quantitatively analyzed administrative data to examine equity of resources, the extent of equal opportunity, and adequacy.
Review of policy documents and existing literature on Delaware's and other states' funding systems	Reviewed policy documentation on Delaware's funding system and other state funding systems to understand how Delaware and other states allocate funding to districts and schools.
Analysis of interview transcripts	Analyzed transcripts of interviews with district and charter school leaders to identify key themes and findings.
Analysis of professional judgment panel data	Quantitatively estimated adequate costs based on resources specified by PJPs and compared adequate costs to actual spending in schools. Qualitatively analyzed program design descriptions to understand common themes in programming across panels.

Description of Data

We engaged in a number of different data collections, including two primary data collection activities: (a) interviews with district and charter school leaders and (b) the conduct of professional judgment panels. Administrative data collected through the Delaware Open Data Portal and provided by the Delaware Department of Education were also essential to most of the study's analyses. The administrative data used for this study, described in the following paragraphs and referenced throughout this report, includes expenditures, enrollments, student outcomes, school characteristics, and geographic contexts. The enrollment and outcome data are for school years 2014–15 through 2021–22. The fiscal data containing education expenditures are from the school years 2017–18 through 2021–22.[2]

Enrollments, School Characteristics, Student Outcomes, and Geographic Context

The enrollment data used in this report largely came from the Delaware Open Data Portal (data.delaware.gov) student enrollment file. The student enrollment file contains two enrollment counts for each school—end-of-year enrollment and fall enrollment. The enrollment figures presented in this report use the average of the end-of-year and fall enrollment figures for each school within each year. The enrollment file also disaggregates enrollments according to various student groups, including students with disabilities (SWD), ELs, and low-income students and by grade level. Using these disaggregated enrollments, we calculated the percentages of students in each school within each of these student groups and by grade. We also used data from the unit count annual reports to obtain the percentage of students with intensive or complex special education needs and the percentage of units that were assigned for vocational education in each school. We used school-aggregated outcome data to determine student test scores and rates of attendance, graduation, dropout, and suspension from the Delaware Open Data Portal. For other variables describing schools' geographic contexts, we used population density by ZIP code provided by the Delaware Department of Education and a measure describing geographic differences in the price levels of educational staff called the Comparable Wage Index for Teachers (CWIFT), available from the U.S. Department of Education's Institute for Education Sciences.[3]

Fiscal Data

Fiscal data used in this report were provided by the Delaware Department of Education. The fiscal data contained end-of-year expenditures for each district and school, organized by the state's chart of accounts. Using these data, we calculated school-level spending per pupil for each school in the state,[4] which consisted of the following steps:

1. We isolated expenses that were directly attributed to specific school sites within the data and calculated the total amount of spending attributed to each individual school.
2. We divided the total attributed spending for each school by its enrollment totals to calculate the amount of attributed spending per student for each school.

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[2] For the remainder of the report, we simply list the year in which the school year ended. The year 2015, for example, refers to the 2014–15 school year.

[3] The CWIFT is publicly available for download at https://nces.ed.gov/programs/edge/Economic/TeacherWage.

[4] Because we calculated school-level spending per pupil using our own decision rules, our school-level spending per pupil figures do not precisely match those reported by the state. However, to ensure the two were comparable, we compared our calculations with those reported by the state using 2020 data and found a correlation between the two of 0.97, giving us confidence that our method of calculating per pupil spending is not substantively different from the state's method.

3. We calculated the total amount of spending not assigned to individual schools for each district.
4. We divided this unassigned spending by total district enrollment to calculate a per-student amount.
5. We added the district-wide spending per student to the school attributed spending for each school to calculate an overall expenditure per-student figure for each school that accounts for all spending (both at the district level and attributed to specific schools).

For charter school expenditures, we checked the accuracy of our calculated expenditures by comparing them to current spending figures from the charter school fiscal audits that charter schools are required to post to their websites. We conducted these comparisons over 3 years of data (2019 through 2021). On average, there was less than a 3% difference in the reported spending on audits compared with that calculated from state data, and, for approximately 65% of the observations, there was less than a 10% difference between the two. These comparisons gave us additional confidence that the reported spending for charter schools in the state data was comprehensive and accurate.[5,6]

Schools Excluded From the Analysis

For most of the analyses presented in this report, we excluded certain schools, including schools observed in the data for fewer than 3 years between 2015 and 2022. The purpose of this exclusion was to ensure the use of a relatively stable set of schools when comparing results over time. Schools often close for a reason, such as being under-enrolled; therefore, those schools with less data may not have typical patterns of spending. We also excluded other unique school types that likely have atypical patterns of spending, including early childhood schools, special schools, adult schools, and intensive learning centers. For some analyses, we focused on schools present in the 2022 school year. For these analyses, we did not apply the restriction of being present for 3 years between 2015 and 2022, and we included early childhood schools to more fully account for Delaware's total enrollment.

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[5] In a prior study we conducted in California, we found that charter school spending reported by the state was systematically lower than that reported by charters directly (Atchison et al., 2018).

[6] When comparing schools, we must use spending as opposed to revenue or funding data. Accounting for revenues occurs at the district level, as districts are the educational organizations that receive revenues (e.g., individual schools do not receive local revenue from property taxes). In contrast, most spending takes place at the school level, and most expenditures are attributed to specific school sites within the fiscal data. Although we use data on spending, the policy levers that influence spending are with respect to funding. Our assumption is that spending is a fair proxy for funding, given that dollars spent must come from revenues (funding) provided. Spending and funding in a given year may not match precisely if districts choose to roll over revenues to the next school year rather than spend them in the current school year or if districts spend from funds that were rolled over from a prior year. When examined over time and averaged across districts and schools, we assume that the aggregate amount spent in a given year on current spending is approximately equal to the amount of revenue received for current spending.

Estimating Adequacy

While all of the activities and analyses conducted for this school funding assessment are important, the heart of the study lies in the estimation of the cost of providing an adequate education, defined as one in which all students have the opportunity to achieve a common set of desired goals or outcomes. Although state policymakers do not have perfect information regarding the cost of education, policymakers in all states recognize that the cost of education is not constant across different educational contexts. State education funding formulas are developed to adjust funding for different cost factors including student needs and other school and geographic contexts (e.g., size or rurality). Studies that estimate the adequacy of existing educational funding in states can inform the design of new state funding formulas or the adjustment of existing funding formulas. Adequacy studies explicitly attempt to estimate the cost of achieving desired educational goals or outcomes and how those costs vary according to differences in student and school characteristics and contexts. These studies provide useful information regarding the adequacy of the overall level of funding and how funding should be differentiated for districts and schools with different needs and contexts. For this study, we took two approaches to estimating adequacy: (a) an outcome-oriented approach known as education cost modeling and (b) an input-oriented approach known as professional judgment. Here, we briefly describe the conceptual underpinnings of these two methods and describe their strengths and weaknesses.

The Education Cost Model Approach

The primary tool of outcome-oriented cost analysis is the Education Cost Model (ECM) – a cost function modeling approach.[7] ECMs focus on schools or districts to evaluate the empirical relationship between aggregate per pupil spending and student outcomes, given the educational context. The goal of this analysis is to estimate what must be spent to achieve the desired outcomes. Salient cost factors include scale of operations (i.e., the existence of diseconomies of scale where costs are higher for very small schools or districts), geographic variation in the price of resources, and the characteristics of the student populations served with respect to their needs. Typically, low-income students, ELs, and SWDs are the student groups recognized as requiring additional resources to achieve educational success. In addition, rigorous ECMs account for the fact that there may be investments in outcomes that are either not measured or not included in the model. For example, having an exemplary basketball program may be something that a community values and is willing to invest in but may not affect the types of student outcomes included in the ECM. A thorough ECM, therefore, considers spending as a function of (a) measured outcomes; (b) characteristics of the educational setting (economies of scale, population density, etc.); (c) regional variation in the

[7] For a review of cost model analyses, see Duncombe and Yinger (2011) and Gronberg, Jansen, and Taylor (2011).

prices of inputs (such as teacher wages); (d) student population characteristics; and (e) factors affecting spending that are unrelated to outcomes.[8]

Identifying statistical relationships between spending and outcomes under varied conditions requires high-quality measures of desired outcomes, spending, and cost factors as well as a large number of schools or districts that exhibit sufficient variation in those factors. Much can be learned from the variation that exists across districts and schools regarding the production of student outcomes. Specifically, these models can be used to estimate the cost of achieving a target level of outcomes and how those costs differ across schools and districts according to their student populations and other contextual differences. One limitation of ECMs, as traditionally used, is that they provide no direct information on *how* resources are used to produce desired outcomes.[9]

The Professional Judgment Approach

As another strategy, input-oriented analyses attempt to identify the inputs or resources necessary for providing an adequate education and then determine the cost of those resources. One basic method exists for input-oriented analysis, which since the late 1970s has been given two names: the Ingredients Method and Resource Cost Modeling (RCM) (Chambers, 1999, 2001; Chambers & Hartman, 1981; Levin, 1983; Levin & McEwan, 2001; Levin et al., 2018). Going forward, the latter term (RCM) is used to denote input-oriented analysis. RCM involves three basic steps:

- identifying the various personnel and nonpersonnel resources, or “ingredients,” necessary to implement educational programming and services;
- determining appropriate input prices for these resources; and
- combining the necessary resource quantities with their corresponding prices to calculate a total cost estimate (Cost = Resource Quantities × Price).

Convening professional judgment panels (PJP) is one approach for identifying the resources in step one above. PJP involves convening focus groups of expert educators to propose the resource quantities needed to achieve specific outcome goals at a minimum cost for prototypical schools that reflect the different contexts that are found within a given state. The prototype schools are defined by the varying levels of school needs (percentages of low-income

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[8] Additional technical details regarding the ECM can be found in Chapter 7 as well as Appendix E in the Technical Appendix.
[9] However, the models can be useful for exploring how otherwise similar schools or districts achieve different outcomes with the same level of spending or the same outcomes with different levels of spending. That is, the ECM can reveal differences across schools and districts in terms of their relative efficiency. Once schools or districts that are more efficient have been identified, patterns of resource allocation and use of specific programming can be investigated as a means to better understanding best practices in terms of their use of inputs.

students, ELs, and SWDs) and scale of operations (enrollment size) that typically occur in a state.[10] Once costs for the prototype schools are calculated, relationships can be estimated between cost and different school characteristics. Using those relationships, we can estimate a cost for all schools in a state, calculate a statewide overall cost, and identify a weighted student formula that can achieve the overall cost and differentiation in costs across schools and districts.

Strengths and Weaknesses of the Cost-Function and Professional Judgment Approaches

The greatest shortcoming of the PJP approach is that the link between resources and outcomes is hypothetical. The approach relies on the professional opinion of expert educators to recommend the appropriate combinations of resources to achieve the state's educational goals based on their knowledge and experiences as educators. There is no guarantee that the planned programs and associated collections of resources necessary to support them represent the most *efficient* way to produce the desired student outcomes. The programs and resources that expert educators suggest are needed to produce the desired student outcomes may be more than are necessary, leading to cost figures that are too high. PJP also does not examine the full spectrum of contexts. Because convening panels of expert educators is burdensome and time-consuming, the number of different school prototypes that can be examined during the PJP convenings is limited. The applicability of the calculated costs resulting from the PJP approach is therefore also limited and can be less generalizable if fewer hypothetical school contexts are presented to the panels. A strength of the PJP approach is that it is not bound by a limited set of quantitatively measurable outcomes. States may have goals for education such as preparing citizens for democratic participation or improving students' character. The expert educators on the panels are able to consider these more abstract and less directly measurable goals when deliberating the resources necessary to provide an adequate education.

The greatest weaknesses of the ECM approach are that (a) predictions may understate adequate costs where outcome measures included in the model are too narrowly defined (e.g., they may not include measures of citizenship or student character even though these may be key educational goals); and (b) the results are not able to shed light on the types of programs and resource configurations that were used to produce student outcomes. A key strength of

[10] Note, the Evidence-Based (EB) approach is an alternative input-oriented approach for identifying resources. The EB approach involves the compilation of published research studies on existing school interventions that have proved effective at producing specific outcomes and deriving from these the resources used and their associated costs. These interventions are chosen as models because they have been shown to generate desired outcomes in their particular school and district contexts (defined by the needs of students served, scale of operations and geographic setting of the school, etc.) at a given point in time. However, the generalizability of the combined findings of research studies performed in a variety of contexts and time periods to current schools/districts in a given state that is different from where some or all of studies were performed is unknown.

the ECM approach lies in the fact that it does not rely on a hypothetical relationship between resources and outcomes. ECM analyzes the empirical relationships between spending, outcomes, and cost factors. Because it includes data on *all* schools or districts in a state, the results are necessarily representative of all contexts and do not suffer from the potential lack of generalizability of the PJP approach.

For all costing-out approaches, when the desired goals far exceed those presently achieved, the cost projections represent out-of-sample extrapolations that may be suspect. Stressing this latter point, all costing-out approaches are most useful where schools and districts in the sample or population actually perform to expectations and/or meet desired standards. That is, costing out an adequate education is most reliable when the range of variation among existing institutions includes those that are sufficiently resourced, successful, and efficient as well as those that are not. Such a context reduces the need to extrapolate well beyond observed conditions.

Key Findings

This section highlights the findings that most strongly informed our main conclusions and recommendations. We describe our findings as they relate to key desirable properties of education funding systems. Chambers and Levin (2009) indicate that systems for distributing resources should ideally:

- provide *adequate* levels of resources appropriate to meeting the needs of the unique populations served by schools and districts;
- provide *equitable* resources, such that program quality meets the needs of the students served and funding levels are not associated with the amount of local wealth of school districts;
- be *transparent* and understandable by all concerned parties with straightforward calculations and procedures that avoid unnecessary complexity;
- be *predictable* and *stable*, such that policymakers can count on receiving a certain level of resources from year to year and such that the system allows policymakers to develop the long-term planning necessary to allocate resources properly;
- allow for *flexibility* in resource use, such that resources can be used to address specific circumstances and conditions unique to a given school or district; and
- be *cost-based*, such that funding amounts are related to measured cost differences in providing adequate programming across educational contexts.

Although Delaware's current system has certain strengths, we find that there is opportunity for improvement in relation to each of the desirable properties that anchor the organization of our findings.

Adequate

Based on an analysis of data from the National Assessment of Education Progress, Delaware's student outcomes lag behind those of other Mid-Atlantic states and have declined over the past decade, even prior to the COVID-19 pandemic. Delaware's current outcomes also do not meet the stated goals for K-12 student performance. To meet target outcomes, the ECM and PJP adequacy analyses indicate a need to invest approximately $600 million to $1 billion more in education, respectively, relative to 2021–22 education spending levels. These figures represent increases in funding of 27% using the ECM approach and 46% using the PJP approach.

Equitable

In Delaware's current system, marginally more is spent on schools serving higher proportions of low-income students, ELs, and SWDs; however, differentiation in spending across schools in Delaware's current system is largely achieved through higher spending for SWDs and a positive correlation between SWDs and low-income students. One barrier to improved equity is the clear negative relationship between teacher experience and the percentage of low-income students in schools, which results in lower average salaries and less spending on teacher salaries per student in schools with high percentages of low-income students. Although more is currently spent overall in schools with higher percentages of low-income students, SWDs, and ELs, the findings suggest that this additional spending is not sufficient to meet the needs of those students. A strong negative relationship exists between a school's student outcomes and the percentage of low-income students served by that school, indicating that those students are not being provided an equal opportunity for academic success. The adequacy analyses presented here indicate a need to differentiate funding more strongly based on student needs, providing more to schools with the highest needs.

We also examined equity between districts and charter schools. Charter schools spend less than district schools, on average. Some of the difference is explained by differences in student needs across the two sectors, with charter schools serving lower percentages of low-income students, SWDs, and ELs. The remaining gap, after accounting for differences in those characteristics, indicates that charter schools are receiving less than they would if they were treated similarly to districts. Based on our adequacy analyses, however, charter schools had similar gaps between target funding levels and actual spending when expressed as a percentage of actual spending.

Delaware's funding system also insufficiently adjusts for districts' capacity to raise local revenues. The result is a system where state revenue and local revenue are largely treated independently, and districts have a responsibility to raise their own revenue from property taxes. Property tax rates and local revenue raised per student vary widely across districts and state revenue is minimally differentiated across districts. The component of Delaware's system that intends to address these differences in capacity, known as equalization funding, has not been updated recently and was described by district administrators as "broken," "flawed," and "outdated." The lack of faith in the existing equalization formula can be attributed to the fact that property values have not been reassessed in the state for several decades.

Transparent

Delaware's current system of funding consists of many separate formulas, each distributing a different type of staffing position or funding allocation primarily through a unit system. Although district and charter leaders describe the teacher unit formula—often thought of as the main formula—as easy to understand, getting a clear and comprehensive picture of the funding (after accounting for the various formulas) is difficult. Charter leaders also had concerns about the transparency of the calculation for local cost per pupil-- the share of local revenue that charter schools receive from school districts for students that reside within a given district and attend charter schools.

An additional barrier of the unit system is that units are not readily converted into dollars of funding. The price of individual units, in terms of state funding, depends on the experience and education of individual staff members. Certain schools and districts have disproportionately more experienced or more educated staff, resulting in schools receiving different actual funding amounts, which is not apparent from the formula or unit allocations. Delaware's unit system is atypical of how most states structure their systems for funding education. Many states, such as New Jersey and Maryland, use systems that allocate dollars to districts through student weights, accounting for both state and local revenue. A local share is then determined, varying across districts according to the capacity to raise revenue locally.

Predictable and Stable

District and charter leaders widely noted that a key strength of the unit system is its predictability and stability; however, they were concerned about the predictability of other state allocations that are based on specific qualification criteria. The lack of predictability and stability of local funding was also a concern for both districts and charters. District leaders described the referendum process for raising tax rates as costly and risky and were concerned how failed referendums would affect their budgets. Charter school leaders noted that the local cost share they receive from districts was not predictable in that different districts paid different amounts due to differences in local revenue raised across districts, and the amounts fluctuate over time.

Flexible

As a system that allocates staffing positions to schools and districts rather than dollars, flexibility is limited. Although districts have some ability to trade certain positions for others or to cash out positions for funding, the implication is that districts and schools should use the units for the positions for which they were allocated. District administrators noted the inflexibility that comes with additional allocations outside of the unit system, when allocations are for a specific position or resource type and have specific requirements for reporting how those resources are used.

Cost-Based

The discrepancies between actual spending and target funding levels suggested by the two adequacy analyses demonstrate that the current system does not provide resources based on the true cost of required resources and programming. We also show that the amounts provided by Opportunity Funding are far short of what our adequacy analyses indicate are the costs of appropriately serving low-income and EL students. Interviews with district and charter leaders revealed that the current system is outdated, despite recent updates to the system resulting from Opportunity Funding and units for mental health services. In particular, interviewees suggested that special education units have not kept pace with the increasing costs of special education and that staff were needed to provide IT support.

Recommendations

We provide the following recommendations for Delaware’s system of funding education:

1. Increase overall investment in Delaware’s public education.
2. Distribute more resources according to student need.
3. Improve funding transparency.
4. Allow more flexibility in how districts use resources.
5. Better account for local capacity to raise revenue and address tax inequity.
6. Regularly reassess property values.
7. Simplify the calculation of the local share provided to charter schools.
8. Implement a weighted student funding formula—also known as a foundation formula.

Although Delaware could implement some of these recommendations by modifying its existing resource-based allocation system, we believe that a foundation formula that allocates funding to districts through student weights would be most appropriate for implementing our recommendations.

Report Organization

This report details the main activities and analyses undertaken during our study, as well as the results.

- Chapter 2 describes the ways other states adjust for different types of costs in their funding formulas and identifies how many and which states use different approaches for differentiating funding for different cost factors.
- Chapter 3 details Delaware's current approach to funding its public school system and provides some short vignettes of how other states in the Mid-Atlantic region fund public education. A call-out box at the end of Chapter 3 describes equalization funding.
- Chapter 4 assesses the extent to which Delaware's current funding system is equitable for both students and taxpayers. A call-out box at the end of Chapter 4 discusses Delaware's referendum requirement.
- Chapter 5 examines the variation in student outcomes across schools to inform whether Delaware's current system of funding provides students in the state with an equal opportunity to succeed educationally.
- Chapter 6 compares spending in Delaware's district and charter schools to inform whether charter schools are funded equitably. At the end of Chapter 6 is a discussion of capital funding in Delaware.
- Chapter 7 presents further details on the education cost model for estimating adequacy and the results from that analysis.
- Chapter 8 presents details regarding the PJP approach to estimating adequacy and the results from that analysis.
- Chapter 9 presents a comparison of the results from the ECM and PJPF approaches to estimating adequacy. At the end of Chapter 9 is a discussion of Opportunity Funding.
- Chapter 10 summarizes our evaluation of the current funding system with respect to desirable properties of education funding systems.
- Chapter 11 provides overarching recommendations and conclusions.

The main report is accompanied by a Technical Appendix. The Technical Appendix is organized as follows:

- Appendix A contains a full write-up of the results of interviews with district and charter school leaders describing their perceptions of the current funding system.
- Appendix B contains additional exhibits related to the equity analyses presented in Chapter 4.
- Appendix C contains additional exhibits related to the analysis of student outcomes in relation to student needs presented in Chapter 5.
- Appendix D contains additional exhibits related to the analysis comparing spending in district and charter schools presented in Chapter 6.
- Appendix E contains technical details about the ECM methodology as well as additional exhibits related to the ECM adequacy analysis presented in Chapter 7.
- Appendix F contains additional details about the PJP process, the materials provided to panelists, technical details about the analysis, and additional exhibits related to the PJP analysis presented in Chapter 8.

Lastly, as part of the study, we created a tool allowing users to simulate how a weighted student funding foundation formula could work in Delaware. The weighted student funding simulator shows how target funding levels would be calculated for schools and districts based on a selected set of weights as well as a target level of funding. A separate district or local education agency (LEA) simulator models how revenue could be raised to achieve the target level of funding. We also model how a modified unit system could be used to distribute funding to schools within the simulator tool. Along with the simulator tool, we provide documentation describing the features of the tool and how they work as well as the assumptions made in modeling the modified unit system.

2. State School Funding Systems

States are responsible for providing an adequate education to all students. Providing an adequate education to all students necessarily means that educational resource levels should differ across districts, schools, and students according to the needs of students and other contextual characteristics influencing the cost of providing educational services. Students come to school with dissimilar learning needs and socioeconomic backgrounds that require different types and levels of educational supports for them to achieve standards or outcomes deemed adequate. Similarly, schools in different contexts may require different levels of resources because they differ in size (scale of operations) or in the price they must pay for key resources. Dissimilar resource requirements that vary based on student needs and context translate to differences in the cost of education among districts and schools.

Presently, all states operate school funding formulas and supplemental grants-in-aid programs that attempt to address differences in educational costs across school districts. However, the policies used to adjust for cost differences vary considerably across states.

In this chapter, we present a framework for understanding differences in educational costs across school districts. We then describe the range of cost factors states adjust for in their education funding policies and present a typology of the different approaches states use to allocate additional aid to school districts to offset these differences in costs.

Framework for Understanding Differences in Educational Costs

The cost of educating students to common standards and outcome goals varies across school districts according to the level of student needs or other contextual factors that influence the level of spending necessary to provide an opportunity to produce the standards or outcomes. In short, cost is the level of spending required to provide particular students an opportunity to achieve a specified set of outcome goals. Typically, outcome goals are operationalized as achieving common targets on state assessments or graduation rates. Cost factors are things that affect the level of spending required to achieve stated goals *and* are outside the control of local school and district administrators.[11]

[11] School districts may make many other choices that result in spending differences but are not cost differences. These choices include whether to provide specific types of programs and services or smaller classes than might be absolutely necessary to merely achieve the outcome targets in question. These choices may result in achieving higher outcomes or different outcomes (as with arts and athletic programs). These spending differences are not necessarily inefficiencies but are spending choices based on local preferences. They are not, however, considered cost factors for the purposes of developing state education funding policy. Cost factors may include specialized programs that may be mandated by the state and demanded by parents and other education stakeholders (such as gifted and talented programs or CTE programs) that are more expensive than general academic course offerings as these types of programs may be outside of the control of local policymakers.

Exhibit 2 describes the four primary categories of cost factors that affect districts and schools: (a) student need, (b) context and programming, (c) grade range, and (d) price level of inputs. Two types of student need factors—individual student factors and collective population characteristics—impact education costs. Individual students with specific educational needs (e.g., SWDs, ELs, and economically disadvantaged students) may need specialized programs, services, or interventions to achieve common outcomes. These efforts require additional resources to implement, which come at a higher cost to schools and districts.

The student population, collectively, has other characteristics, such as the local concentration of student economic disadvantage, that may require schoolwide intervention to achieve common outcomes. For example, an economically disadvantaged student may not have a specific educational need to be remediated, but a school population with many economically disadvantaged students may require smaller classes, early childhood programs, and other services in order for students there to have an equal opportunity to achieve common goals. These schoolwide interventions increase the cost to schools and districts with high concentrations of student need.

School context—particularly the size of a district or school and the population density of the community in which it is located—and specialized programming requirements—such as career and technical education (CTE)—may also affect costs.[12] For example, research has shown that districts with fewer than 100 students operate at almost double the per-pupil cost as districts with 2,000 students, and districts with 100 to 300 students are about 50% more costly than those with 2,000 students (Baker, 2005). Such cost differences are largely attributable to differences in underlying staffing ratios. Similarly, population sparsity can result in higher transportation costs because students must travel longer average distances to school. Specialized CTE programming may require additional nonpersonnel resources and smaller class sizes.

Needed educational resources also differ across grade ranges. For example, younger students in early elementary school may require smaller class sizes or instructional aides, which increases cost. High schools, however, often provide specialized courses and extracurricular activities (such as athletics or marching band) that also require additional resources.

Finally, school districts within the same state may be required to pay different prices for specific goods and services. In particular, the compensation required to recruit and retain a similarly

[12] Such characteristics constitute cost factors in circumstances where they are unalterable. For example, economies of scale is a major cost factor for very small schools and districts that are remotely located when they are unable to consolidate to achieve scale (Andrews et al., 2002). Additionally, states may require districts to offer certain types of programming, such as CTE programming, making it unalterable from the local administrator's perspective.

qualified teacher may differ across districts within a state due to competing job opportunities, differences in the cost of living, and different amenities making certain locations more desirable in which to live and work (Chambers, 1995; Taylor, 2015).

Exhibit 2. Cost Factors Considered in School Funding Formulas

Student need	Contexts/programming	Grade range	Price level of inputs
Individual student characteristics • Economic disadvantage • Disability status • English learners • Gifted and talented **Collective population characteristics** • Concentrations of students living in poverty or EL students	• District or school enrollment • Population sparsity or extent of rurality • Career and technical education	• Differences in academic and nonacademic programming needed for students in different grades	• Geographic differences in wages and prices of nonpersonnel

Adjusting for Differences in Costs Using State School Finance Policy

Most states implement K–12 education funding policies that in some way address the differences in the cost of educating different students. A key goal for these policies has been to provide additional resources to school districts with higher costs, particularly those located in communities that are less able to locally raise the revenues needed to pay for the cost of education (Baker, 2018).

Although each state's school funding formula is structured differently, nationally, all state policies:

- recognize a core set of cost factors that contribute to differences in educational costs across districts and
- use one or more mechanisms to distribute supplemental aid to offset the additional costs introduced by these factors.

Together, the cost factors and mechanisms incorporated in school funding formulas comprise the building blocks of state efforts to redistribute educational resources among school districts.

Mechanisms by Which Additional Funding Is Allocated

For each cost factor considered, state school finance formulas apply different mechanisms to adjust for differences in cost. The most frequently used mechanisms are (a) single student weights or stipends, (b) multiple student weights, (c) resource-based allocations, (d) cost reimbursement, (e) capitated, and (f) categorical grant programs.

- **Single student weights or flat per-pupil amount.** Some states use a single weight for a given student group to provide additional funding to school districts. For example, the number of students in a district who are free and reduced-price lunch (FRPL) eligible might be assigned a weight of 0.50, or 50% more than the established base per-pupil funding amount. Alternatively, rather than tie the additional funding to some percentage of the base, states may simply provide a district with a flat per-pupil amount (for example, an additional dollar amount per enrolled FRPL student).
- **Multiple student weights.** States may adjust funding using multiple weights or dollar amounts that are tied to different levels of need within a student group. For example, states may use multiple weights corresponding to the amount of time a student has been classified as an EL (e.g., Ohio) or differences in students' English proficiency (e.g., Maine) (Augenblick, Palaich and Associates et al., 2018). Multiple weights are also often used to adjust for differences in costs associated with educating SWDs who have different needs (e.g., by disability category or more general categories of mild or moderate disability).
- **Resource-based allocations.** Under this model, states allocate specific tangible resources (e.g., teacher time, paraprofessionals, and teacher aides) based on the number of students with certain characteristics (e.g., at-risk, EL). The amount of additional state revenues a district receives is based on the additional costs (determined by the state) of purchasing these resources. For example, Delaware's state funding formula provides districts with one unit (equivalent to one teaching position and some nonpersonnel funding) for every 16.2 students in Grades K–3 (Delaware Code, Section 1706 of Title 14).
- **Cost reimbursement.** Rather than provide a fixed dollar amount, under this model the state reimburses districts for the additional costs associated with providing educational services and supports to certain students. This approach differs from the other mechanisms in that it ties state aid directly to district expenditures rather than some predetermined amount. Vermont's existing approach to providing school districts with supplemental state aid to educate SWDs operates as a reimbursement system, in which the state reimburses school districts for up to 60% of allowable expenses. Illinois reimburses districts for the additional costs of educating EL students that are over and above a district's average per-pupil expenditure for a student of comparable age and who does not receive special education or related services (Augenblick, Palaich and Associates et al., 2018).
- **Categorical grant programs.** Some states operate categorical grant programs that provide additional state aid to school districts for specific purposes from separate (stand-alone) appropriations. For example, most states provide supplemental funding for special

education and related services through a categorical grant program that operates separately from the state’s general education funding formula. States also may use categorical grant programs to direct additional funding to school districts for educational programs for at-risk, gifted and talented, and EL students. With this mechanism, districts qualify for additional funding through a formula that ties state aid to student need or through a competitive process that awards funding based on demonstrated need or merit.

- **Capitated.** Capitated (also called census-based) funding mechanisms allocate state funds to local education agencies based on the number of students within a school district. Typically, the funding takes the form of a flat grant paid to a district per student identified in its average daily membership (ADM) headcount (not the number of students who meet a specific eligibility criteria). This approach is most often used to allocate funding for SWDs and gifted and talented students. In these instances, per-capita funding is allocated according to a district or school’s total head count, not just program-eligible students. The rationale for this funding mechanism is to avoid incentivizing the over-identification of students where there may be some amount of discretion and subjectivity.

Cost Factors Considered in State Funding Formulas

Student Need

State funding policies incorporate adjustments for differences in the cost of educating students with higher levels of need, in particular:

- **SWDs.** All states provide local school districts with some form of supplemental funding to help pay for special education and related services for SWDs (Exhibit 3). Funding is typically tied to either the overall share of SWDs in a district or the count of students who have been identified for special education using one of 13 federally defined disability categories (e.g., specific learning disability, autism spectrum disorder, visual impairment; Kolbe, 2019).

  About two thirds of states operate high-risk pools, in which the state pays a significant portion of the cost of the services and supports provided to students with particularly severe disabilities (Griffith, 2008). Students with severe disabilities require intensive or unique supports that can exceed normal standards of cost for SWDs. For the most expensive students with disabilities (i.e., the top 5%), spending has been documented to be as much as 5.5 to 8.7 times greater than the average spending for a general education student and 8.8 to 13.6 times larger for students in the top 1% of per-pupil special education student expenditures (Chambers et al., 2003). Qualifying for reimbursement or a supplemental grant from a state’s high-risk pool is typically tied to a specific spending threshold, over which the state pays most of the special education costs for a particular student.

- **Economically disadvantaged or at-risk students.** Most state school finance formulas (44) consider differences in student disadvantage and the resulting increase in educational costs that come with investments in compensatory programs and student support services for students living in poverty or who have been identified as at risk for academic failure.[13]

  In schools and districts, the extent of financial need is typically tied to either a count of students who meet specified criteria or the percentage of a district's or school's population who are identified as economically disadvantaged. States use different indicators to identify economically disadvantaged students. The most commonly used indicator for the extent of student need in a school district is the share of students who receive or who are eligible to receive nutrition benefits through the National School Lunch Program (NSLP). Under the NSLP, the threshold for eligibility for free lunch is 130% of the Census poverty line or below, and reduced lunch is 185% or below. The extent of need in a school district is typically tied to either a count of students who meet specified criteria or the percentage of a district's or school's population who are identified as economically disadvantaged. An increasing number of states and districts are using indicators of poverty from other administrative data sources collected by the state to reduce administrative burden on families. For example, Illinois uses eligibility for Medicaid, the Children's Health Insurance Program, Temporary Assistance for Needy Families (TANF), or the Supplemental Nutrition Assistance Program (SNAP) as proxies for low-income students. Delaware currently defines low-income students as those receiving benefits through TANF or SNAP.

  Fewer states use average levels of student achievement in a school district to identify districts that require additional resources. For example, in Georgia, the state provides additional funding for remedial students (that is, students who are identified as not reaching or maintaining adequate academic achievement relative to grade level). School districts in Florida may apply for funding from the Supplemental Academic Instruction Categorical Fund by submitting a plan that identifies students to be served and the scope of academic instruction that will be provided. However, in both of these cases the funding provided is not specifically meant to account for the impact of poverty on student outcomes.

  When considering differences in costs among school districts, some states distinguish among districts according to the concentration of economically disadvantaged or at-risk students. For example, California's formula includes a concentration grant that allocates an additional 65% of the base grant amount to districts in which more than 55% of students

[13] Six states (Alaska, Florida, Georgia, Idaho, South Dakota, and West Virginia) do not have policies for providing additional state funding to account for the impacts of poverty on student achievement.

meet the state's definition of at-risk student.[14] Alternatively, other states use a sliding scale to allocate state aid, in which districts with greater concentrations of students living in poverty receive more aid per student than those with lower concentrations (e.g., Nebraska, New Jersey).

- **ELs.** Similarly, all but two states provide additional funding to educate students who are ELs—that is, students who cannot communicate fluently or learn effectively in English.[15] ELs have different language, academic, and social-emotional needs that require specialized instruction and support services for them to meet common academic standards.

  Most states provide supplemental funding for either the number or share of EL students served by a school district. Maine, however, applies a sliding scale that corresponds with the concentration of ELs in a district. Larger concentrations of EL students result in increasingly larger weighting factors. By contrast, Hawaii assigns different weights according to students' level of English language proficiency; that is, larger weights are given for students who are less proficient in English and smaller weights for students with greater proficiency. Massachusetts's formula places additional weight on ELs, but the weight varies according to grade level.

- **Gifted and talented students.** Thirty-four states implement policies that provide school districts with additional funding for programs targeted at gifted and talented students. Most states allocate funding on a per-capita (student count) basis. However, across states, there is no commonly accepted approach to identifying the number or share of gifted and talented students in a school district.

  By contrast, a few states assume that the share of gifted and talented students is the same for all school districts—for example, Arkansas and North Carolina assume that 4% of a school district's membership qualifies as gifted and talented and provides funding on this basis. Alternatively, some states embed funding for gifted and talented students in their special education funding programs (e.g., Kentucky, Georgia, Tennessee).

[14] California's definition of an at-risk student includes the unduplicated count of FRPL-eligible students, EL students, or foster youth.
[15] Mississippi and Montana are the only two states that do not have existing policies to provide school districts with additional funding to offset the cost of providing supplemental educational supports to EL students.

Exhibit 3. Student Need Adjustments, 50-State Summary

Cost adjustment	Total number of states applying adjustment	Formula adjustments					Categorical grant
		Single weight/ dollar amount	Multiple weights	Resource-based allocation	Cost reimbursement	Capitated	
Students with disabilities	50	12 (AK, HI, LA, MD, MO, NH, NY, NC, ND, NV, OR, WA)	17 (AZ, CO, FL, GA, IN, IA, KY, ME, MN, NM, OH, OK, PA, SC, SD, TN, TX)	4 (DE, IL, MS, VA)	7 (KS, MI, NE, VT, WI, WV, WY)	5 (AL, CA, ID, MA, NJ)	2 (MT, UT) 3 (for high-cost students only: AR, CT, RI)
Economically disadvantaged students	44	26 (AL, AZ, HI, IN, IA, KY, LA, ME, MI, MN, MS, MO, NH, NM, NV, NY, ND, OH, OK, OR, RI, SC, TN, VT, WA, WY)	13 (AR, CA, CO, CT KS, MA, MD, NE, NJ, PA, TX, UT, VA)	2 (IL, NC)			3 (DE, MT, WI)
English learners	48	27 (AK, AZ, AR, CA, CT, FL, GA, IS, KS, KY, LA, MD, MO, NE, NH, NJ, NM, NY, OK, OR, PA, RI, SC, SD, TX, VT, WY)	10 (CO, HI, IN, ME, MA, MI, MN, ND, OH, TN)	4 (IL, NC, VA, WA)	1 (WI)		6 (AL, DE, ID, NV, UT, WV)
Gifted and talented students	34	12 (AK, GA, IA, IL, KY, LA, MN, NV, OK, SC, TX, WY)	1 (NM)	4 (MS, OH, TN, VA)	3 (KS, ND, WV)	5 (AR, AZ, HI, NC, WA)	9 (AL, CO, FL, IN, ME, MT, NE, UT, WI)

Note. Data are from Augenblick, Palaich and Associates et al. (2018); EdBuild (n.d.); Education Commission of the States (2019).

Contexts and Programming

State policies identify districts and schools qualifying for supplemental aid based on size, geographic location, or some combination of both size and geography (Exhibit 4). Many states provide supplemental funding to offset differences among school districts in the cost of transportation. With respect to specialized programs, several states provide additional funding for CTE.

- **Geographic location or population density.** Thirteen state school finance formulas include cost adjustments for either the geographic location or the population density of the community in which a district or school is located.

  State policies differ in how they measure population density and the threshold used to determine which districts are located in sparsely populated areas. For example, Michigan defines a sparsely populated school district as having fewer than 4.5 students per square mile. Wisconsin identifies districts with fewer than 10 students per square mile, and New York identifies districts with fewer than 25 pupils per square mile. By contrast, North Dakota defines sparsity as fewer than 100 students in a 275-square-mile area (i.e., equivalent to 0.36 students per square mile).

  In addition to population density, some state policies incorporate criteria based on a school district's physical geography and the distance between neighboring districts and schools. When considering physical geography, states recognize that some school districts operate in remote or geographically isolated areas. In Maine, additional consideration is given to districts in remote areas of the state and "island schools," which are located on islands accessible only by boat. Michigan qualifies supplemental aid to small and remote schools in the Upper Peninsula as being at least 30 miles from any other public school or being located "on islands that are not accessible by bridge." Arkansas's definition of a geographically isolated school identifies those in which no more than 50% of the bus route is on hard-surfaced roads or where geographic barriers impede travel to other programs.

  Some states further condition aid on the driving distance between districts or schools. In Arkansas, for example, a district must not only have low enrollment and be located in a geographically sparse area but also be at least 12 miles from the nearest out-of-district high school. To qualify for additional aid in Colorado, a small school must be at least 20 miles from the nearest district school with the same grade levels. Similarly, in Nebraska, small elementary schools must be at least 7 miles away from the nearest elementary school or the only elementary school in their district.

- **District or school size.** Twenty-six states recognize that small districts and schools are less able to take advantage of operational economies of scale and must spend more on a per-student basis to provide equivalent educational opportunities. Of states that incorporate an adjustment for district or school size in their formula, 13 conditioned this funding on some measure of geographic isolation (i.e., districts and schools that are small and in a geographically isolated or sparsely populated area).

States use different thresholds to determine at what point a district or school becomes sufficiently small to qualify for additional assistance. Most states use student enrollment as an indicator for size but apply different cut points for receiving aid. For example, Arizona classifies districts with fewer than 600 students as sufficiently small, whereas Michigan identifies districts enrolling fewer than 250 students. In contrast, in Colorado the threshold for receiving "size factor" funding is enrollment of fewer than 5,000 pupils. North Dakota uses different enrollment thresholds for K–12 and K–8 school districts (fewer than 900 and 200 students, respectively). New Mexico uses different enrollment criteria for schools and districts; small schools are those with fewer than 400 students, and small districts are those with fewer than 4,000 students.

Other states set enrollment thresholds by the number of students in a grade or average class size in a school. Oregon, for example, identifies small elementary schools as having no more than 28 students per grade (and located more than 8 miles from the nearest elementary school). At the secondary level, Oregon districts must have fewer than 9,500 students and a school with fewer than 350 students if the school has four grades and fewer than 267 students if the school serves only three grades. Similarly, Maine identifies small elementary schools (PK–8) as those with fewer than 15 students per grade (and no more than 8 miles to the nearest PK–8 school), and at the secondary level fewer than 29 students per grade or 200 total students (and no more than 8 miles from the nearest high school).

Only a handful of states identify small districts and schools using staff-based criteria. For example, Idaho provides additional instructional resources to districts with fewer than 40 support units (inclusive of teachers and support staff) and an additional increment to those with fewer than 20 support units.[16] New York defines a small school as one that has fewer than 8 FTE teachers.

- **Transportation.** Most states (43) provide some sort of additional support for student transportation. Transportation aid usually operates as a categorical grant program, separate from adjustments for school size or population density and in addition to base funding provided by the state. The criteria for receiving aid differs considerably across states. Some states reimburse districts for a share of allowable transportation costs. For example,

[16] Support units are the foundation of how schools in Idaho are funded and are thought of and referred to as classroom units. A school district generates support units based on the number of students it has in average daily attendance in various categories such as kindergarten, elementary, and secondary. The student counts are then divided by a series of divisors to calculate the number of support units of funding.

Wyoming reimburses local school districts for 100% of transportation costs, whereas in Missouri districts are reimbursed for a little less than 30% of costs. Other states condition funding on miles driven or the average distance between students' homes and schools, or provide a flat grant amount for each student the district transports to school.

- **CTE programming.** Finally, every state except Nebraska provides dedicated funding for CTE programs (although the definition varies greatly by state). Most states provide funding for CTE programs as a categorical item. For example, California authorized approximately $150 million for CTE programs through the Career Technical Education Incentive Grant program and $248 million through the Strong Workforce Program. Other states such as Florida use a single weight for CTE programs in their funding formula. Texas uses multiple weights for CTE programs ranging from 1.1 to 1.47, depending on whether the courses are part of an approved program of study. Washington uses a resource-based formula for CTE programs, providing a 23-to-1 student-to-teacher ratio for CTE classes in Grades 7 through 12 and a ratio of 20-to-1 for skills centers, which are regional centers that provide CTE programs that are deemed too expensive to offer at high schools.

Exhibit 4. Cost Adjustments for Contexts and Programming, 50-State Summary

Cost adjustment	Total number of states applying adjustment	Formula adjustments				Discretionary grant program or appropriation
		Single weight	Multiple weights	Resource-based allocation	Flat grant per pupil	
Geographic isolation or population density	13	4 (AR, FL, ND, NE)	4 (AK, AZ, NY, SD)	2 (ID, WV)	1 (FL)	2 (MI, TX)
District or school enrollment	26	4 (IA, OK, PA[a], WV[a])	8 (AK, AR*, AZ*, FL*, KS, LA, ME*, ND, NM, TX)	5 (NC[a], SD, UT[a], WA, WY)	4 (MN[a], MO, OR[a], WI[a])	5 (CA[a], GA, ID, MI[a], VT)
Operates Transportation Grant/Aid Program	43	AK, AL, AR, AZ, CA, CO, DE, FL, GA, HI, ID, IA, IL, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, TN, TX, UT, VT, WA, WI, WY				
Career and Technical Education	49	12 (FL, GA, IA, KS, LA, MA, MN, NJ, NY, SC, VT, WY)	8 (AK, AZ, AR, IN, KY, OH, TX, UT)	5 (DE, MS, NC, TN, WA)	4 (ID, MI, VA, WI)	20 (AL, CA, CO, CT, HI, IL, MD, ME, MO, MT, ND, NV, NH, NM, OK, OR. PA, RI, SD, WV)

[a] For these states, the adjustment for enrollment is applied only to districts/schools that are geographically isolated. *Note. Discretionary grant program or appropriation* refers to states that do not have an explicit formula for allocating money for geographically isolated or smalls schools or districts but have a pot of money set aside for the given purpose. Each year, the state then decides how to allocate the money set aside for the given purpose. In most states, supplemental aid for student transportation operates as a separate categorial program, each relying on an array of transportation-specific distribution strategies (e.g., percentage reimbursement for costs, per-student or per-route flat grants). The summary of state policies is based on information reported by EdBuild (n.d.) and Verstegen (2018). In addition, individual states' statute and other documents were reviewed when further information or clarification was needed.

Grade Range

Thirty states' funding formulas adjust for differences in educational costs across grade levels (Exhibit 5). Cost differences across grade levels can be tied to smaller class sizes in early elementary grades and increased course offerings and supplemental academic and nonacademic programming in the middle and secondary grades. For example, of the states that adjust for differences in costs associated with educating students in different grade levels, most consider cost differences across multiple grade spans; however, the grade range criteria used in the formula vary across states (e.g., K–3, 4–8, 7–8, and 9–12; Exhibit 6).

Exhibit 5. Grade Range Adjustments, 50-State Summary

Cost adjustment	Total number of states applying adjustment	Formula adjustments				Different base amount
		Single weight	Multiple weights	Resource-based allocation	Flat grant per pupil	
Grade range	30	4 (ME, MN, TX, VT)	8 (AZ, FL, GA, HI, NJ, NM, OK, OR)	12 (AL, AR, DE, ID, IL, NC, OH, TN, UT, VA, WA, WY)	2 (LA, MI)	4 (CA, MA, MT, SC)

Note. Data are from EdBuild (n.d.).

Exhibit 6. Grade Levels Considered in Grade Range Adjustments, 50-State Summary

Grade level	Number of states
Kindergarten (separately)	6
Elementary (K–3, K–2, Grades 1–3, or Grades 1–2)	21
Intermediate (Grades 4–6 or Grades 4–5)	10
Middle-level (Grades 4–8, Grades 7–8, Grades 6–8, Grades 7–9)	9
Comprehensive elementary/middle (Grades K–8)	1
Secondary (Grades 9–12)	9
Comprehensive middle/secondary levels (Grades 4–12, Grades 6–12, Grades 7–12)	9

Note. Data are from EdBuild (n.d.).

Resource Prices or Geographic Cost Differences

Eleven states adjust for differences in the price school districts must pay to hire similarly qualified teachers (Taylor, 2015). States use one of three approaches to adjust for these labor costs: (a) Comparable Wage Index, which measures regional differences in the cost of hiring teachers by comparing regional differences in the cost of hiring of nonteachers who are college graduates (e.g., Florida, Massachusetts, and New York); (b) Comparable Living Index, which describes the differences among communities in the cost of a purchasing a similar "basket" of consumer goods and services (e.g., Colorado); or (c) Hedonic Wage Index, which adjusts costs based on factors that impact teachers' employment choices (within education) and attempt to provide districts with comparable resources to recruit and retain teachers of similar quality (e.g., Maine and Maryland; Baker, 2008; Taylor, 2015).[17]

[17] See Taylor (2015) for additional information on state-level strategies for adjusting for regional differences in the cost of teacher wages.

Chapter Summary

All states operate school funding formulas and supplemental grants-in-aid programs in an attempt to address differences in education costs across school districts. Cost factors that are commonly recognized in state funding formulas include adjustments for (a) student needs, including economically disadvantaged and at-risk students, ELs, SWDs, and gifted and talented students; (b) district and school size and location; (c) CTE or other specialized programming; (d) grade range; and (e) resource price levels. State funding formulas use different mechanisms to adjust for cost differences, including weights, resource-based allocations, cost reimbursement, and categorical funding.

The policy frameworks used by other states point to several considerations for designing school finance reforms in Delaware.

- *What types of cost factors should Delaware's funding formula incorporate?* Currently, Delaware's funding formula adjusts for differences in education costs across school districts associated with grade levels and the percentage of SWDs through a resource-based formula. Delaware attempts to address the need for economically disadvantaged students and ELs through a categorical funding program—Opportunity Funding. This brief highlights some other cost factors that might be considered, in particular those associated with school or district size. Although the empirical analysis described in subsequent chapters identify specific factors and corresponding cost differentials, state policymakers will still need to decide whether and how best to incorporate these factors into a revised funding formula.
- *What funding mechanisms should Delaware use to adjust for cost differences in its formula?* State policymakers have multiple tools at their disposal for making cost adjustments. Delaware's formula is atypical in that it does not make use of funding weights in any of its cost adjustments. Instead, Delaware relies on resource-based allocations to make grade adjustments and adjust for students with disabilities and CTE programming and relies on a categorical grant program to adjust for economically disadvantaged students and ELs. In contrast, 29 states use single or multiple weights to differentiate funding for students with disabilities, just under 40 states use weights to differentiate funding for economically disadvantaged students and ELs, and 20 states use weights to make adjustments for CTE programming (an additional 20 states fund CTE through a separate grant program or appropriation outside of the main funding formula).

3. Delaware's School Funding System and State Vignettes

All states incorporate multiple cost factors and funding mechanisms in their overarching school funding policies. Together, these factors and mechanisms work to provide different types and amounts of supplemental aid to school districts to offset differences in education costs.

To illustrate, we describe the current policies in place in Delaware along with four mid-Atlantic states proximate to Delaware: Maryland, New Jersey, Pennsylvania, and Virginia (also see Exhibit 7). The descriptions of the policies in place in these states are not intended to serve as policy archetypes but, rather, as examples of the range of cost factors and mechanisms incorporated in state education funding policies within the region.

Delaware's School Funding System

Delaware's system of state appropriations is a resource-based mechanism that converts student enrollments into units and then provides resources to districts based on the number of units calculated for each district. Units are calculated across three divisions: Division I units are for the purpose of paying the salaries and benefits of teachers; Division II units are for paying energy costs and other nonpersonnel operational costs exclusive of transportation services; and Division III units are intended for district equalization—providing additional state dollars for districts with low local tax capacity. In Delaware, the state covers the majority of funding for education, but school districts also raise funds locally through property taxes.

Each Division I unit represents a teacher, and are assigned to districts based on the number of students. The student-to-unit ratio varies according to grades of students and whether students receive special education services. For students with no additional needs,

Perception of District and Charter School Administrators Related to Transparency, Flexibility, and Stability

Transparency. District and charter school leaders perceive that the main formula for generating teacher units is generally clear to all stakeholder groups. However, they noted that most stakeholders do not have a comprehensive understanding of the many additional components of the state's education funding system.

Flexibility. District leaders noted that the patchwork of different appropriations for specific types of staff, programming, and/or student groups leads to inflexibility in how districts and schools can use their funds. District leaders often contrasted their perceived inflexibility with the flexibility afforded to charter schools.

Stability. District administrators perceived the unit system to be reliable and stable, with several noting this to be the systems greatest strength. They noted that the unit system provides a predictable number of staff from year to year. District and charter leaders found appropriations outside of the unit formula and local funding to be less stable.

For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

Delaware provides one unit for (a) 12.8 preschool students, (b) 16.2 students in Grades K–3, and (c) 20 students in Grades 4–12 (14 Del. C. 1703).

For SWDs, Delaware uses three categories based on the severity of disabilities: basic, intensive, and complex. For these categories, one unit is assigned for (a) 10.2 students in Grades K–3 with basic disabilities, (b) 8.4 students in Grades 4–12 with basic disabilities, (c) 6.0 students with intensive disabilities, and (c) 2.6 students with complex disabilities. Units for special education can be used for different types of professional staff, including special education teachers, school psychologists, speech/language pathologists, reading specialists, educational diagnosticians, counselors, classroom aides, and social workers. The state also provides Related Services Units to provide additional services for special education students (e.g., speech therapy, physical therapy, counseling, etc.) at a rate of one additional unit per (a) 57 units of regular education and basic special education, (b) 5.5 units of intensive special education, and (c) 3 units of complex special education. Each Division I unit also generates one Division II and III unit (14 Del. C. 1716A).

Concerning CTE programs, Delaware provides vocational units at a rate of 30 pupils per unit for specialized vocational high schools or 1 per 27,000 pupil minutes per week for nonvocational high schools. Half of the occupational/vocational Division I units are then deducted from the regular unit allotment. Extra Division II units are assigned for occupational/vocational programs.

In addition to the main units allocated through the three divisions, several categories of supplemental units have been added to address growing needs. The state recently added units for mental health services to be used for counselors, social workers, school psychologists, or mental health therapists in Grades K–8. This allocation started as one unit per 700 students in Grades K–5 in 2021, but is set to grow to one unit per 250 students in grades K–8 by 2025 (14 Del. C. 1716E-F). Academic excellence units are to be used for reading, math, science, social studies, counseling, foreign languages, gifted and talented programs, and more. These units are assigned at a rate of one per 250 students in Grades K–12 (14 Del. C. 1716). Starting in July, 2023, schools where at least 50% of students are low-income will also receive dedicated funding for substitute teachers (14 Del. C. 1716G).

Administrative and support positions are assigned to districts and schools using prescribed formulas that vary based on position type. These positions include superintendents, assistant superintendents, directors, supervisors, principals, assistant principals, administrative assistants, school nurses, driver education specialists, transportation supervisors, and school lunch supervisors. For example, one school nurse is assigned for every 40 units (14 Del. C. 1310) and district-level directors are assigned at a rate of one for the first 200 units and one per additional 100 units, not to exceed 6 per district (14 Del. C. 1321).

Regarding economically disadvantaged students (called low-income) and ELs, Delaware does not provide units through its formula directly. Instead, the state offers additional funding through a categorical grant program known as Opportunity Funding. To determine the per-pupil amount for each economically disadvantaged student and EL, the state divides $55 million (amount to be effective in July 2024) by the sum of low-income students and ELs for each school district or charter school. Low-income students are defined using Direct Certification through TANF or SNAP. An additional $5 million for mental health or reading supports is allocated to schools where at least 60% of students are low-income or 20% of students are ELs. Districts must submit plans to the state for these funds to be spent (Del. Code Ann. tit. 14).

Delaware does not adjust its per-pupil funding for differences in costs by district or school size, or resource price levels (EdBuild, n.d.).

Delaware's resource-based funding system is driven largely by staffing allocations. Delaware has state salary schedules that dictate how much state funding will be provided for various position types. The state salary schedule for teachers, for example, provides varying amounts depending on their years of experience and educational attainment.

Vignettes from Other States

Maryland

Maryland operates a foundation formula for allocating aid to school districts. The base per-pupil fund is $7,991 for students with no additional needs (fiscal year 2022; EdBuild, n.d.). This amount is expected to increase annually using the approximate rate of inflation.

Maryland applies pupil weights to its base-per-pupil funding amount to account for differences in student needs. For SWDs, Maryland provides a single pupil weight of 1.86 times the base amount. Maryland intends to increase the pupil weight for SWDs each year, and it is expected to peak at 2.53 times the base amount in fiscal year 2030 (Maryland House of Delegates, 2021).

For economically disadvantaged students, Maryland applies a weight of 1.91 times the base amount. This multiplier is expected to reduce to 1.73 by fiscal year 2033. Maryland uses eligibility for FRPL under the NSLP as the threshold for economic disadvantage and allows districts to use eligibility for TANF or SNAP to identify economically disadvantaged students. In addition to providing funding for student-level economic disadvantage, Maryland has established a grant for concentrated poverty. Schools in which 80% or more of students qualify for FRPL are eligible. In fiscal year 2022, Maryland provided $248,833 per eligible school (EdBuild, n.d.; Maryland House of Delegates, 2021). For ELs, the state provides 2.0 times the base amount but expects to reduce this pupil weight to 1.85 times the base amount by fiscal year 2033 (Maryland House of Delegates, 2021).

After determining a target foundation amount, Maryland determines a state share accounting for the local wealth levels of each school district according to a ratio of local wealth per pupil to statewide wealth per pupil. Maryland does not adjust its per-pupil funding for differences in costs attributable to student grade level or district or school size. However, it does attempt to account for difference in resource price levels across counties through the use of a Geographic Cost of Education Index (GCEI). The GCEI accounts for the wages of professional and nonprofessional workers, energy prices, and instructional expenditures (Imazeki & Picus Odden and Associates, 2015).

New Jersey

New Jersey uses a foundation funding formula to allocate state aid to districts. Like other states that use a foundation formula, the state assigns a base amount to the typical student who has no special needs and does not require additional education services. For fiscal year 2022, the base per-pupil amount was $12,177. Weights are then applied to the base to generate funding targets. Funding to achieve the target is split between the districts and the state based on a formula to calculate local fair shares based on a combination of income and property wealth of district residents (Baker et al., 2020).

With respect to economically disadvantaged students, New Jersey provides funding to districts based on concentration of poverty. The state applies a weight of 1.47 times the base amount for districts where fewer than 20% of students are eligible for FRPL under the NSLP, 1.52 for districts in which between 20% and 60% of students are eligible for FRPL, and 1.57 for districts in which more than 60% of students are eligible for FRPL (New Jersey Department of Education, 2022).

For ELs, the state uses a pupil weight of 1.5 times the base amount. Students who are eligible for both economic disadvantage and EL funding receive the pupil weight for economic disadvantage plus a combination weight multiplier of 1.125, which is lower than the separate weight for ELs (New Jersey Department of Education, 2022).

The state adjusts funding by grade level. Preschool students receive a per-pupil amount of $13,209 instead of the base amount. Grades K–5 receive the base funding per pupil, students Grades 6–8 receive 4% more per pupil, and Grades 9–12 receive 15% more per pupil (New Jersey Department of Education, 2022).

Funding for SWDs is provided outside of the foundation formula. For special education funding, New Jersey employs a census-based system and assumes that 15.4% of students will be eligible for special education services and 1.57% will be eligible for speech language services. The state provides additional per pupil funding of $18,612 for SWDs and $1,220 for students eligible for speech language services. The state also provides extraordinary aid for SWDs whose special education costs exceed $40,000 per pupil per year (New Jersey Department of Education, 2022).

New Jersey does not adjust for district size or school size. However, it does apply a Geographic Cost Adjustment (GCA) at the county level. The GCA compares salaries for similar occupations across counties after adjusting for age, race, gender, education level, and hours worked (New Jersey Department of Education, 2014).

Pennsylvania

Pennsylvania has a student-based funding formula with pupil weights for economic disadvantage and ELs (Basic Education Funding Formula). However, less than 13% of funding for education was distributed through the state's formula in fiscal year 2022. The state's hold harmless policy has meant that the funding formula has been applied only to funding above the 2013–14 school year funding levels. The majority of funding is provided on the basis of historical allocations (EdBuild, n.d.).

For the portion distributed through the formula, the state calculates a weighted student count for each district that accounts for economic disadvantage, ELs, and a sparsity/size adjustment. Economically disadvantaged students are weighted with a multiplier of 1.3 for students whose family income is between 101% and 184% of the federal poverty line and 1.6 for students with family incomes below 100% of the federal poverty line. The state provides funding for concentrated poverty by applying a multiplier of 1.9 for districts in which more than 30% of the population falls below the poverty line. For ELs, the state applies a multiplier of 1.6 in its weighted student count.

Pennsylvania incorporates a sparsity and size adjustment to the weighted count through a sparsity ratio and a size ratio. The sparsity ratio is calculated by dividing the district 3-year average of ADM by the square mileage of the district (from the Census). For the size ratio, the state divides the 3-year average of ADM for the district by the 3-year average ADM for all school districts. The state weights the sparsity ratio at 40% and the size ratio at 60% to estimate a combined sparsity/size ratio. For districts that are at or above the 70th percentile for the sparsity/size ratio for all school districts, the state applies a multiplier of 1.7. The state then adjusts the weighted student count for each district to account for local revenue capacity though both a measure of median household income and property valuation (Markosek, 2018).

To determine how much each district receives under the formula, the state calculates the share of formula funding for each district as the school district's total weighted and adjusted student count divided by the statewide total of the weighted and adjusted student count and divides and distributes the formula funding accordingly (Markosek, 2018).

Although special education funding is provided through a separate formula, the formula operates in a conceptually similar way as with basic education funding. Most funding is distributed according to historical allocations. Funding increases are allocated only according to student counts and weights. Pennsylvania has created the following three categories of students based on special education students' costs as reported by districts: (a) below $25,000 per pupil, (b) between $25,000 and $50,000 per pupil, and (c) greater than $50,000 per pupil. Pennsylvania then uses weights or multipliers of 1.51, 3.77, and 7.46 for those categories, respectively. The state then calculates weighted student counts for each district, adjusting the counts for district capacity in the same way as in the basic education formula and distributes the additional funding according to the share of each district's weighted and adjusted student count out of the statewide total.

Pennsylvania does not adjust funding by grade level or for resource price levels.

Virginia

Virginia, like Delaware, uses a resource-based funding system that provides funding to districts based on prescribed ratios of staff to students through its Standards of Quality Program. For basic aid, the state provides one teacher for every 24 students in Grades K–3; 25 students in Grades 4–6; and 21 students in Grades 7–12. The state determines the number of positions for other staff such as principals, administrators, librarians, guidance counselors, and clerical staff using various formulas dictating numbers of students or schools per position type. However, a key difference from Delaware is that rather than prescribing positions to districts, the positions are converted to dollars and dollars are provided to districts. This conversion is performed by multiplying counts of positions by the statewide mean annual salary for each position type (this also contrasts with Delaware, which funds varying amounts based on a state salary scale and the actual individuals employed by districts). The state then calculates the district local capacity (ability to pay) based on the district's property values, gross income, and retail sales. The state covers a share of the costs inverse to districts' local capacity. This Local Composite Index of Ability to Pay (LCI) is applied for all state aid to districts (EdBuild, n.d.; Virginia Department of Education, 2018).

Regarding SWDs, Virginia follows a similar methodology. The state has prescribed caseload ratios of staff to students based on 12 disability categories (similar to the federal classifications), the severity of needs, and whether a paraprofessional is needed 100% of the time. These range from as low as six students per staff for high-severity students requiring paraprofessionals 100% of the time to as high as 24:1 for lower severity students. Districts report the number of classified students by disability classification and severity level to the state. The state then calculates the number of positions required based on caseload ratios, converts them into dollar values by multiplying by the statewide mean annual salary by position type, and applies the LCI (Virginia Department of Education, 2018; Virginia Admin Code 8VAC20-81-340).

For economically disadvantaged students, Virginia offers categorical funding through the At-Risk Add On. “At risk” students are defined as those who qualify for FRPL. After calculating the Basic Aid for each school district based on staffing ratios and grade levels served, the state adds a minimum of 1% per pupil in additional funding for each pupil eligible for FRPL. For districts serving greater concentrations of at-risk students, the state may contribute as much as 26 percent in additional aid per pupil. The state does not specify what the threshold is for higher or lower concentrations of at-risk students (Virginia Department of Education, 2018; Virginia General Assembly, 2021). To be eligible for the At-Risk Add On, districts must match the state for funding. Virginia also uses eligibility for FRPL as a factor in several additional categorical funding streams, in which the goal is to provide additional staff and hours of instruction for at-risk students to meet adequate academic outcomes. For example, for K–3 Class Size Reduction funding, the state mandates that schools with FRPL concentrations of 75% or more must have smaller class sizes, and the state provides additional funding accordingly (Virginia Department of Education, 2018; Virginia General Assembly, 2021).

For ELs, the state provides 20 full-time equivalent instructional positions per every 1,000 EL students served. The state then calculates the number of positions required for each district, multiplies by the mean average salary by position type, and applies the LCI (Virginia General Assembly, 2021).

Virginia does not adjust funding for sparsity or size. It does adjust for resource price levels with a Cost of Competing Adjustment to address higher labor costs in Northern Virginia and the Washington, D.C., suburbs. The Cost of Competing Adjustment is a comparable wage index that compares the salaries for educators with those of other college graduates within the same region (Taylor, 2015).

Exhibit 7. Overview of Selected States' School Funding Formula

	Delaware	Maryland	New Jersey	Pennsylvania	Virginia
Funding model	Resource based	Foundation	Foundation	Hybrid	Resource based
Cost adjustments					
Students with disabilities	Multiple staff ratios by category	Single student weight	Census-based allocation	Multiple student weights by category	Cost reimbursement
Economic disadvantage/ at-risk students	Categorical grant	Weight = 1.91	Multiple weights based on poverty concentration	Multiple weights based on poverty concentration	Multiple weights based on poverty concentration
English learners	Categorical grant	Weight = 2.0	Weight = 1.5; combo weight = 0.125	Weight = 1.6	20 FTE per 1,000 ELs
Gifted and talented	N/A	N/A	N/A	N/A	1,000 pupils per teacher
Grade level	Different staff ratios by grade level	N/A	Different weights by grade (elementary = base funding)	N/A	Different staff ratios by grade level
Size and geography	N/A	N/A	N/A	Sparsity/ size ratio	N/A
Resource prices	N/A	Geographic Cost of Education Index (county-level)	Geographic cost adjustment (county-level)	N/A	Cost of Competing Adjustment

Note. FTE is full-time equivalent. The summary of state policies is based on information reported by EdBuild (n.d.) and Verstegen (2018). In addition, individual state statutes and other documents were reviewed when further information or clarification was needed.

Comparison of School Finance Indicators

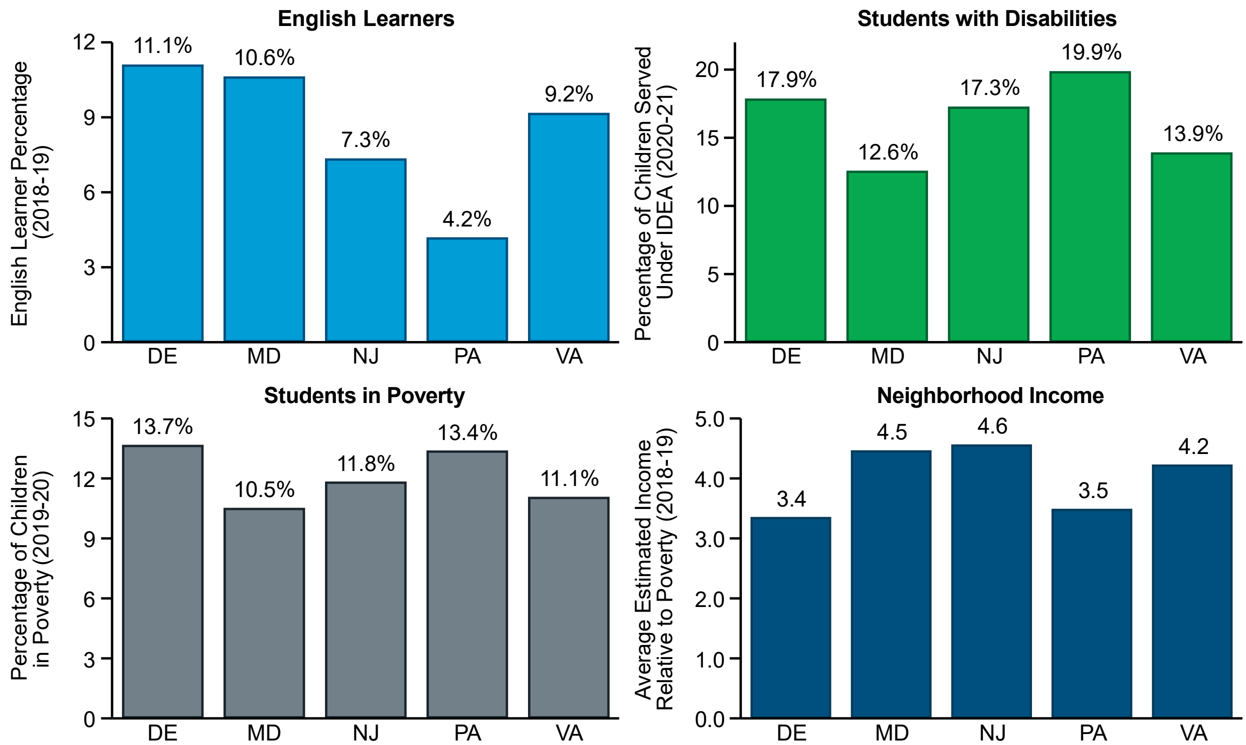
In this section, we make some additional comparisons across the selected states to look at how they differ in terms of student needs, educational outcomes, and indicators of how well states fund their education systems.[18]

To begin, we compare four measures of student need across the set of example states. Exhibit 8 shows that Delaware has the highest percentages of ELs and students in poverty and the lowest

[18] The measures of school funding are from the *School Finance Indicators Database* (Baker et al., 2021)

income levels of the comparison states. In addition, Delaware has the second highest percentage of SWDs, trailing only Pennsylvania.

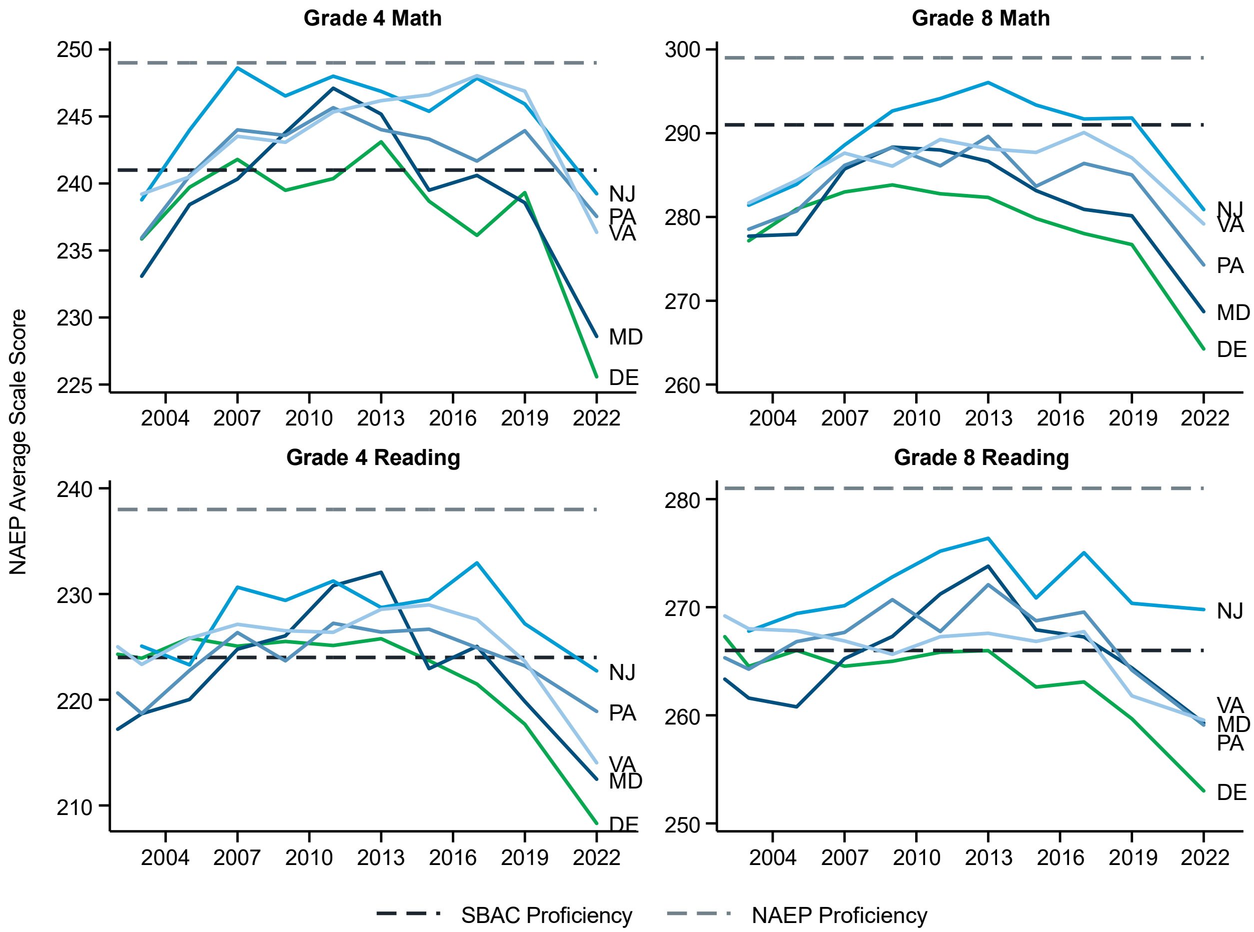
Exhibit 8. Comparison of Student Needs Across Comparison States



Note. EL and SWDs percentages are from the Digest of Education Statistics (U.S. Department of Education, 2021). The percentage of children in poverty is based on the Census Small Area Income and Poverty Estimates. Neighborhood income is from the Education Demographic and Geographic Estimates data from the National Center for Education Statistics.

In Exhibit 9, we compare scores in math and reading from the National Assessment of Educational Progress between 2002 and 2022. Although in the early 2000s, Delaware performed comparably in Math and reading at both the fourth- and eighth-grade levels, from the early the 2010s onward, Delaware has typically performed below the set of comparison states. Performance in all of the comparison states has trended downward since around 2013. Importantly, during this time the difference in performance between Delaware and several of the higher-performing comparison states has widened. Delaware has shown larger declines in performance over the past decade.

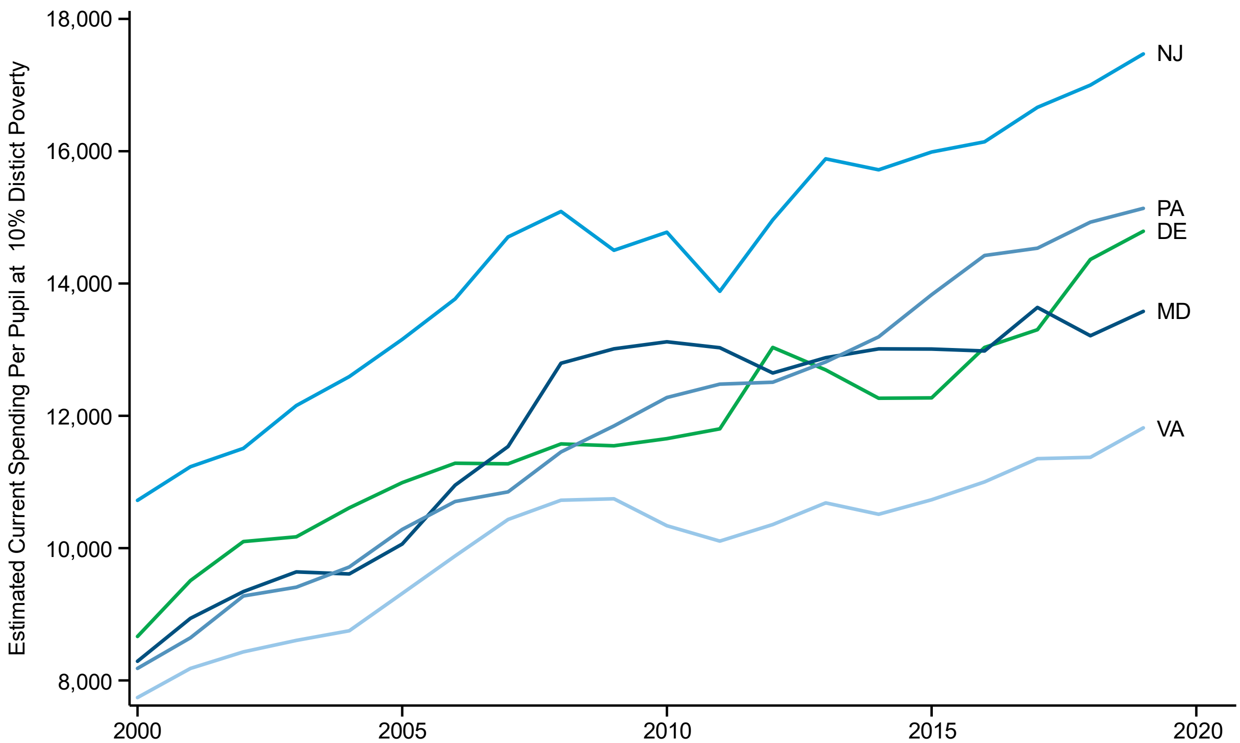
Exhibit 9. Comparison of Fourth- and Eighth-Grade Math and Reading National Assessment of Education Progress Scores Across Comparison States



Note. NAEP is National Assessment of Education Progress; SBAC is Smarter Balanced Assessment Consortium. Data are from the National Assessment of Education Progress.

Exhibit 10 displays levels of estimated spending per pupil for districts with a relatively low incidence of poverty (10%) across the comparison states. As of 2019, Delaware's estimated spending levels are in the middle of the set of comparison states—higher than Maryland and Virginia but lower than in New Jersey and Pennsylvania. Since 2015, spending levels in Delaware have increased substantially and at a faster rate than the comparison states.

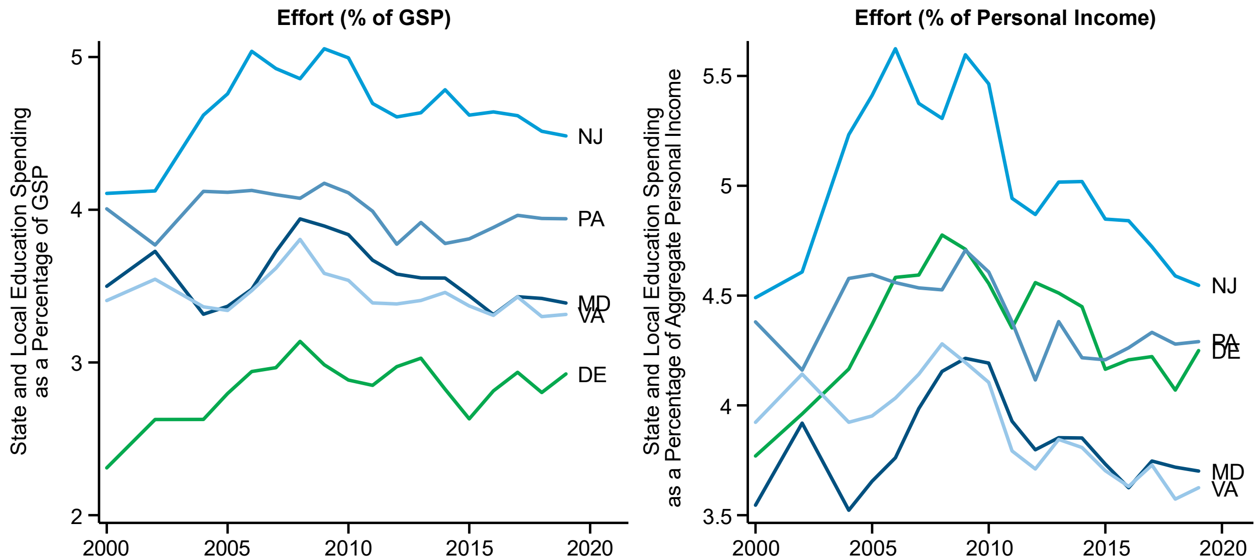
Exhibit 10. Comparison of Current Spending Per Pupil Across Comparison States



Note. Data are from the *School Finance Indicators Database* (Baker et al., 2021).

Effort is a measure of how much a state spends relative to its fiscal capacity. Baker et al. (2021) defined fiscal capacity in two ways: (a) using gross state product and (b) using state aggregate personal income. Effort is then defined as total state and local spending as a percentage of the two fiscal capacity measures. As shown in Exhibit 11, Delaware's fiscal effort is lower than the other states when measured as a percentage of gross state product, but in the middle of the states and most similar to that of Pennsylvania when measured as a percentage of personal income. New Jersey, in particular displays quite high fiscal effort on both dimensions. Across all comparison states, effort has stagnated or declined since 2008 or so, coinciding with the start of the Great Recession.

Exhibit 11. Comparison of Fiscal Effort for Education Across Comparison States

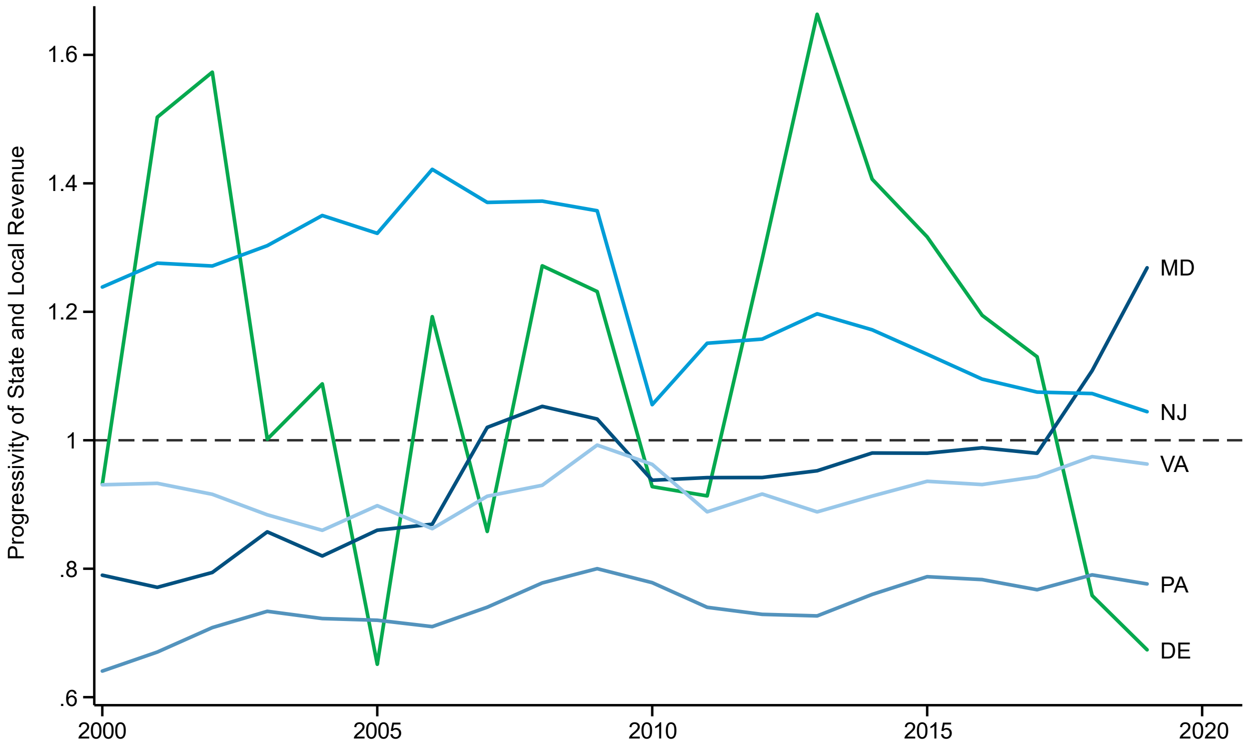


Note. GSP is gross state product. Data are from the School Finance Indicators Database (Baker et al., 2021).

Last, we compare progressivity across the set of comparison states. Progressivity is a measure of equity in terms of the relationship between district-level funding and student socioeconomic disadvantage. The measure of progressivity shown represents a ratio of the expected level of state and local revenue in a district with 30% poverty compared with a district with 0% poverty. Values greater than 1 are progressive, meaning that higher-poverty districts, on average, receive more state and local funding. In contrast, values less than 1 are regressive. Because Delaware has few school districts, estimates of progressivity are somewhat less stable than other states. As shown in Exhibit 12, estimates of progressivity in Delaware have fluctuated widely since 2000. In some years, funding was progressive and in other years funding was regressive. As of 2019, however, Delaware's funding system is shown as being quite regressive, close to on par with Pennsylvania, a state whose funding system is known for being particularly inequitable.[19] During the entire time period, New Jersey's funding system has been progressive, but the degree of progressivity has waned in recent years. Maryland has substantially improved the equity of its funding system over time, and in recent years it has been the most progressive of the set of comparison states.

[19] The Urban Institute calculates a measure of progressivity for each state, but it uses a different methodology (Blagg et al., 2022). Measures of progressivity using the Urban Institute's methodology show a similar trend over time. Delaware was quite progressive as of 2013 but has declined consistently since then; funding was regressive in 2018 and 2019.

Exhibit 12. Comparison of Progressivity (Equity) Across Comparison States



Note. Data are from the *School Finance Indicators Database* (Baker et al., 2021).

Chapter Summary

The state vignettes provide several examples of how different states approach education funding. Maryland and New Jersey each employ fairly prototypical foundation aid formulas that set target funding levels based on a series of weights then define the amount that the state versus local districts will pay for based on measures of the capacity of districts to raise revenue locally. Indeed, these districts are the most equitable in terms of providing additional resources to districts serving the highest percentages of low-income students (Exhibit 12).

Virginia is an interesting case, which, on the surface seems quite similar to Delaware in that they both use a resource-based method for determining funding allocations. However, there are several key differences. Rather than allocate actual staff positions to districts, as in the case of Delaware, First, Virginia converts positions into funding amounts and allocates dollars to districts. Rather than allocate varying amounts per position based on each position’s actual years of experience and educational attainment, Virginia converts positions to funding based on statewide average salaries. Finally, rather than address differences in local capacity through a separate funding allocation as in the case of Delaware, Virginia determines a varying state share of the overall target funding allocation based on measures of local fiscal capacity, in a similar way to Maryland and New Jersey.

Lastly, Pennsylvania provides a good example of what not to do when transitioning to a new formula. Although Pennsylvania has a weighted formula, which has seemingly quite strong weights for low-income students, ELs, and SWDs. However, the bulk of education funding in the state simply provides districts funding based on what they received in the 2013–14, based on a perpetually applied hold harmless policy. As of 2022, only 13% of funding was distributed through the formula. The result is that Pennsylvania is annually one of the most regressive states with respect to school funding, where districts with the highest percentage of low-income students receive less funding than those with lower percentages of low-income students. The adoption of the new formula almost a decade ago has done little to improve the progressivity of education funding in Pennsylvania.

The comparison of student needs, student outcomes, and school finance indicators across states highlights several key differences between Delaware and the comparison states and points to some states that might serve as models for improvement. In terms of key differences, Delaware has greater student needs in terms of student economic disadvantage and English learners than the other states and lower average student outcomes. Having greater student needs means that Delaware will likely need to invest greater resources than comparison states to achieve similar educational outcomes. Furthermore, Delaware's EL concentration has more than doubled from 2005 to 2019, indicating that the need associated with this student group may continue to increase (National Center for Education Statistics, 2021) and deserves particular attention when considering revisions to the school funding mechanism. Although Delaware has made great strides since 2015 in the level of resources invested in education, the analysis of fiscal capacity suggests that there is room to invest more.

The analysis of indicators points to New Jersey as a potential model state that has high spending levels, has a high level of investment in education as measured by fiscal effort, and distributes its state and local funding progressively. In addition, New Jersey achieves strong educational outcomes relative to the comparison states as measured by NAEP scores.

Equalization Funding

Equalization funding is intended to provide additional funding to districts with lower ability to raise local revenue. It works through a rather complicated formula that accounts for a district's effort in raising local revenue as well as the district's ability to raise local revenue in reference to a state authorized amount, which is the maximum possible equalization funding per Division I unit. The authorized amount has been set at $29,650 per unit since 2006.

Specifically, the formula defines effort as the amount of local revenue raised from the current expense tax per dollar of the district's full property tax valuation (in other words, the effective tax rate). Districts with effective tax rates lower than the state average are penalized and receive a lower share of the authorized amount.

The formula defines a district's ability to raise revenue locally as the full property tax valuation per unit. At a constant tax rate districts with higher ability can raise more revenue on a per-unit basis. As district ability increases the amount of equalization funding per unit decreases. Under the formula, a district with statewide average ability that has an effort rate at least as high as the state average receives one quarter of the authorized amount (or $7,413 per unit). In addition, the law governing application of the equalization formula states that no district will receive less than 5% of the authorized amount if it is also at or above statewide average effort rates (14 Del. C. 1707).

In practice, the per-unit equalization values have been frozen since 2009 out of concern that property assessment data are inaccurate or unreliable as a result of property taxes not being reassessed for several decades (State of Delaware Equalization Committee, 2023). Under the frozen formula, the amount of equalization funding per unit provided to districts ranges from $1,225 to $20,617. Assuming an average of 13 students per unit, the districts at the highest end of the range of equalization funding receive an extra $1,500 per student in state funding. Although this surely helps, it likely does not do enough to truly equalize the capacity of districts to raise revenue. Analyses in the subsequent chapter examine equity with respect to district wealth in more detail.

The vast majority of states operate what is known as a foundation formula (which are often weighted student formulas). Typically, under these formulas a target funding level is set that accounts for both state and local revenue. A local share is then determined, where the local share varies across districts such that districts with greater tax capacity are expected to contribute more on a per-student basis. State revenue is then distributed to districts on top of the local revenue so that each district is funded at the target level. In this way, districts with lower capacity with a larger gap between their local share and the target funding amount receive more state revenue.

In interviews, district leaders thought that the concept of equalizing funding across districts to account for differences in districts' abilities to raise revenue locally was an essential component of the education funding system. However, district administrators described the current equalization formula as "broken," "flawed," and "outdated." The fact that the formula has been frozen for much of recent history and that property values have not been reassessed for several decades have eroded confidence and trust that the formula accomplishes what it intends to. For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

4. Equity of the Distribution of Education Funding

In most states, funds are distributed to public schools via a statewide formula. The details of these formulas vary substantially from state to state, but they are designed, in theory, to accomplish two goals:

1. Account for differences in the costs of achieving equal educational opportunities across schools and districts based on the students that they serve (e.g., some schools and districts serve larger shares of students from low-income families).
2. Account for differences in fiscal capacity, or the ability of local jurisdictions to pay for the costs of education (e.g., their ability to raise local revenue, mostly via property taxes).

Districts and schools differ with respect to the populations they serve, which manifests in differential needs for educational programming and services to offer the same opportunities to students. In addition, districts can vary widely in terms of wealth, which means the capacity to raise revenues through property taxes also varies widely. These two factors are often linked. That is, districts with lower local taxable wealth often have higher concentrations of student poverty in their schools, and student poverty is one determining factor of the costs of providing students with equal opportunities to achieve common outcome goals.

In recent years, researchers and prominent educational organizations have adopted a common understanding that state school finance systems should provide not merely the same but substantially more resources per pupil to districts serving greater shares of students in poverty (Baker & Green, 2008; Baker & Levin, 2014).[20] This conception of equity can be operationalized by defining school funding systems that systematically provide more resources (i.e., funding) to districts and schools with higher student poverty rates as being relatively “progressive” and those that provide fewer resources to districts with higher student poverty rates to be relatively “regressive.”[21] Given the mounting evidence that money matters for educational outcomes, and particularly so for students from low-income families (Baker, 2016; Jackson, 2018; Jackson et al., 2016; Johnson & Tanner, 2018; Lafortune et al., 2018), maintaining a progressive distribution of resources is an important step toward ensuring that students have access to equal educational opportunities.

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[20] These educational organizations include The Education Trust, the Urban Institute, and the School Finance Indicators Database.

[21] This report often refers generally to student poverty and in various analyses makes use of measures meant to serve as a proxy for poverty. Delaware’s measure of “low income” is defined as students who receive federally provided benefits under Temporary Assistance for Needy Families or the Supplemental Nutrition Assistance Program.

Although equity for students is of the utmost importance when evaluating school finance systems, equity to taxpayers should also be considered (Berne & Stiefel, 1979). In systems such as Delaware's, where local revenue is primarily determined through local property taxes, high wealth districts can often raise greater amounts of revenue through lower tax rates. A school funding system that appropriately accounts for differences in fiscal capacity would allow a district with lower fiscal capacity (i.e., property valuation per student) to raise a similar overall amount of revenue at a similar tax rate. In other words, state revenue should be distributed in such a way that districts with lower property wealth should not have to tax themselves at higher rates to achieve similar levels of overall funding.

In this section of the report, we examine the existing distribution of education spending in Delaware with respect to student needs to examine the progressiveness of the current system of funding. We conduct a deeper dive with respect to whether and how differences in teacher salaries across districts contribute to inequity. We also look at the variation in tax rates and property valuation across districts to examine issues of tax equity.

Evaluating Equity of School Funding

Evaluating equity must go beyond simply calculating the existing variation in school or district resource levels (i.e., revenue or spending per pupil) or determining whether spending is higher or lower in communities as related to levels of taxable wealth (i.e., fiscal neutrality). More thorough approaches are necessary to distinguish between variation in financial inputs that promotes equal opportunities (i.e., equity advancing) and variation that is random, unexplainable, or derived from differences in local wealth (i.e., equity eroding).

A starting point for evaluating the equity of financial inputs is regression modeling of inputs with respect to the factors that should explain variation in costs and student need. This type of model shows whether levels of education spending or revenues are associated with determinants of costs and need. Although student poverty often is a proxy for student need, the standard model of student need has evolved across time to include multiple factors: (a) the share of students from families in poverty, (b) the share of students with disabilities, (c) the share of English learners (ELs), (d) the distribution of students by grade range, (e) the size of the district or school, (f) population density, and (g) geographic differences in the price of resources.[22]

[22] Exhibits B1 and B2 in Appendix B provide descriptive statistics for the cost factors we have incorporated into the analyses in this report.

Of primary interest is whether and to what extent schools and districts serving student populations needing higher levels of educational investment to provide equal opportunities have access to more funding (or spend more per student) to support those needs, after controlling for the other factors that influence costs. In other words, is the system progressive with respect to student poverty and other student characteristics indicative of greater need?

Equity in Delaware

Student Equity

Our examination of student equity focuses on the relationship between school-level student poverty—measured as the percentage of students from low-income families—and total current spending of schools.[23] The analysis begins with a visual representation of the relationship between student poverty and spending across Delaware schools, followed by a regression-based examination of the relationship.[24]

Exhibit 13 shows a scatterplot of the relationship between school spending per student and student poverty. Each dot on the scatterplot represents a district school (i.e., a non-charter school) in the 2021–22 school year, where the size of the dot is weighted by total enrollment (i.e., larger dots are schools with more students). The horizontal and vertical lines depict the statewide averages of current spending per pupil and low-income student percentage, respectively. The dark green line of best fit and the correlation coefficient (*r*) represent the overall average relationship between the low-income enrollment percentage and current spending per pupil where each school is weighted by enrollment.

These scatterplots show that, on average, schools enrolling higher percentages of low-income students have higher spending levels. In particular, the line of best fit indicates that schools with the lowest percentages of low-income students would be

Perception of District and Charter School Administrators on Student Equity

District and charter school administrators appreciated the funding adjustments included in the funding formula for students with additional needs. The interviewees recognized that the additional units provided for students with disabilities are a necessary and rational component of equity in education funding. They also unanimously agreed that additional funding for low-income and EL students was necessary for meeting those students' needs and acknowledged the intent of Opportunity Funding in addressing the needs of those students.

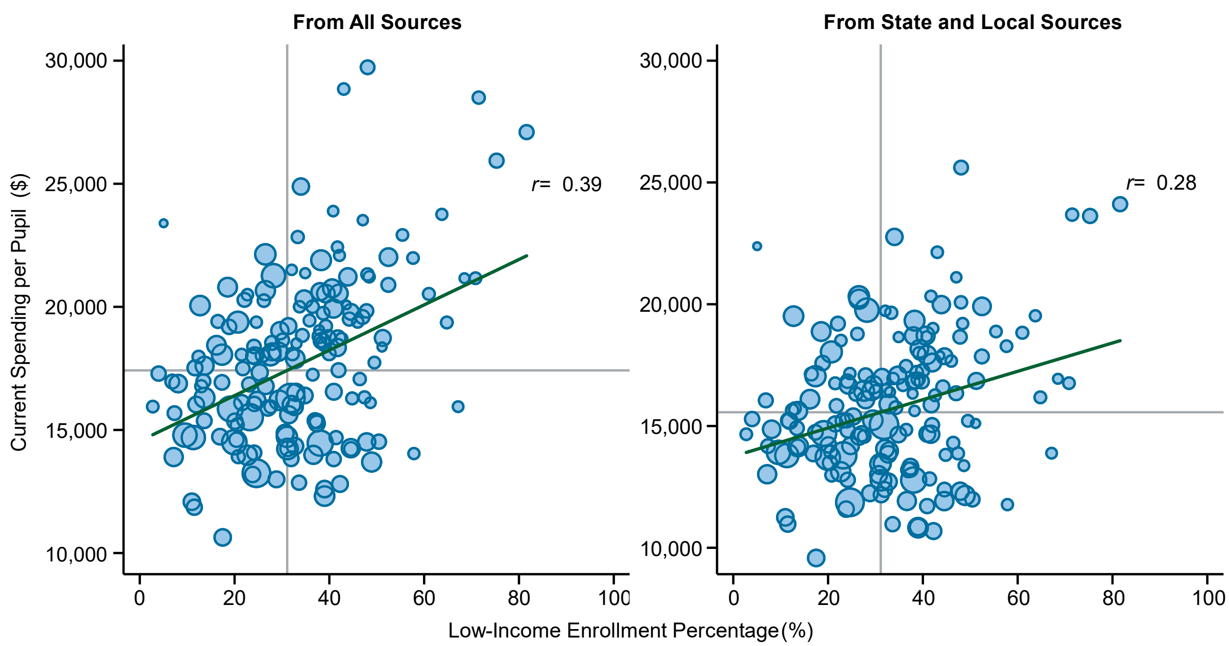
However, many of those interviewed indicated that the funding adjustments currently in place were insufficient. A number of administrators noted the rising cost of providing special education services and suggested that the current increases in units for students with disabilities have not kept pace with rising costs. In addition, several administrators interviewed indicated that the amount of Opportunity Funding to meet the needs of low-income and EL students was insufficient.

For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

[23] Total current spending excludes specific capital expenditures such as building construction spending and debt service.
[24] For this analysis we exclude charter schools. We present analyses in Chapter 6 where we explicitly compare spending in district and charter schools.

expected to spend around $15,000 per student, whereas those with the highest percentages of low-income students would be expected to spend above $20,000 per student. At face value, this is a sign of progressiveness of Delaware's funding system.[25]

Exhibit 13. Relationship Between Current Spending Per Student and Low-Income Enrollment Percentage (2022)



Note. N=167 schools. This analysis does not include charter schools. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average current spending per pupil in FY 2022 was $17,419 from all sources and $15,565 from only state and local sources. The average low-income enrollment percentage was 31%. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education, 2021–22.

The scatterplot, however, accounts only for a single dimension out of several cost factors that potentially affect educational costs (i.e., the spending levels necessary to provide equal educational opportunities for students). A more robust regression analysis accounts for other aspects that also could affect costs, such as student needs other than those related to family income (e.g., EL designation and disability status of students), grade levels served, school size,

[25] Exhibit B3 in Appendix B shows the same figure but aggregated to the district level. When aggregated to the district, the variation in both spending and the low-income enrollment percentage is much narrower, and the relationship between spending and the low-income enrollment percentage is somewhat less strong. However, the general pattern is the same.

population density, and geographic cost differences.[26] To improve the stability of the results, we pooled data across five school years: 2017–18 to 2021–22.

Exhibit 14 shows the regression results for four models that vary with respect to whether federal spending is included or not and the years of data included. The results indicate that schools with higher proportions of low-income students spend only slightly more than those with lower proportions of low-income students. The coefficient for the low-income enrollment proportion in Model A, showing spending across all funding sources pooled from 2018 to 2022, is 1.105 (not statistically significant). The coefficients presented are relative to 1 and can be thought of as multipliers of the base. Therefore, the coefficient of 1.105 for low income indicates that an otherwise similar school with 100% low-income students would spend 10.5% more than a school with 0% low-income students. When restricted to only state and local spending (Model B), the coefficient for low-income is very close to 1, indicating that otherwise similar schools with higher percentages of low-income students spend approximately the same as those with lower percentages of low-income students. Therefore, any spending advantage for low-income students over the most recent five school years is the result of progressively distributed federal funding as opposed to Delaware-specific funding providing additional resources for low-income students.

When restricted to the most recent two years of data, the coefficients describing the relationship between spending and the percentage of low-income students are somewhat larger, and they are also significant in the case of total spending. This suggests there may have been some improvement to progressiveness in recent years through efforts such as Opportunity Funding. Patterns of spending and funding distribution across schools may also have been disrupted from the COVID-19 pandemic. Therefore, it remains to be seen whether improvements to funding equity continue or are a momentary increase. The state has the opportunity to make intentional decisions to dictate whether the increase in progressiveness will persist and continue to grow in subsequent years. Despite the improvements to equity, the progressiveness of state and local spending remains relatively weak.

This weak relationship between spending and the proportion of low-income enrollment from the regression results contrasts with a fairly strong and positive relationship shown in the unconditional scatterplot results in Exhibit 13. This suggests that at least some of the observed

[26] Some geographic areas are more costly because individuals in those areas demand higher salaries. Certain areas may have a higher cost of living, which may result in a demand for higher salaries. Certain areas may also be more desirable places to live because of the amenities offered, which may decrease the demand for higher salaries. We use an index developed by the U.S. Department of Education, known as the Comparable Wage Index for Teachers (CWIFT) to represent differences in geographic cost. The CWIFT measures regional differences in salaries for college graduates who are not elementary or secondary educators (Cornman et al., 2018). Therefore, for our purposes, higher cost areas are those where non-educators earn more. This may place pressure on schools and districts in those areas to offer higher salaries, which increases the costs of education.

progressiveness in the unconditional results is the result of funding distributed on the basis of other school characteristics that happens to be correlated with low income. In particular, the correlation between the percentage of students from low-income families and the percentage of students with disabilities was moderately strong in 2022 (a correlation of 0.44). Therefore, increased spending for students with disabilities contributes to the observed progressiveness when not also accounting for the share of students with disabilities.

The regression results also show few systematic differences in funding in relation to the percentage of English learners in schools. Across all models, schools with 100% ELs would be expected to spend only 7% to 12% more than schools with no ELs, and none of the coefficients are statistically significantly different from 1 (i.e., approximately equal spending regardless of EL enrollment).

In contrast to patterns for low-income students and ELs, there is a strong and positive relationship between students with disabilities and spending levels. Specifically, the regression coefficients indicate that schools with 100% students with disabilities would be expected to spend 90% more than schools without any students with disabilities. Schools with 100% of students with complex disabilities would spend an additional 350%, on top of the 90% more for all students with disabilities.[27]

Other contextual and geographic characteristics are also associated with differences in spending across schools. In Delaware, small schools tend to spend more as do those in areas with higher population density and higher costs of hiring and retaining staff (Exhibit 14). The finding of higher spending in areas with higher population density is contrary to a study of schooling costs in Vermont, which found population sparsity to be associated with higher costs (Kolbe et al., 2021). However, that may be due to there being few areas with very low population density in Delaware. For example, the study in Vermont defined the most sparsely populated areas as those with fewer than 36 individuals per square mile and found increased costs associated with population densities of fewer than 100 individuals per square mile. In contrast, the ZIP code with the lowest population density in Delaware had 94 individuals per square mile and more than 85% of schools in Delaware were located in ZIP codes with population densities of at least 200 individuals per square mile.

[27] We tested a model that also contained a coefficient for students with disabilities in the intensive category. However, the coefficient for this variable did not indicate higher costs for the intensive category, likely the result of it being strongly related to the overall special education and complex special education categories that are already included in the model. As such, we chose to drop it from our model.

Exhibit 14. Regression Results Examining Equity of Education Spending

	A. Total Spending Per Pupil (2018–2022)	B. State and Local Spending Per Pupil (2018–2022)	C. Total Spending Per Pupil (2021–2022)	D. State and Local Spending Per Pupil (2021–2022)
Student needs				
Low-income proportion	1.105	0.982	1.229**	1.101
Students with disabilities proportion	1.904***	2.020***	1.495*	1.537**
Students with complex disabilities proportion	4.583***	3.950**	8.835***	8.957***
English learner proportion	1.086	1.070	1.121	1.079
Programming/grade range				
Vocational/technical units proportion	5.410***	6.008***	4.386***	5.617***
Middle school enrollment proportion	0.974	0.976	0.970	0.966
High school enrollment proportion	0.973	0.972	0.970	0.960
Population density				
300 to <800	0.989	0.994	0.995	1.004
800 to <2,000	1.075*	1.079*	1.084**	1.091**
2,000 to <5,000	1.128***	1.128***	1.130***	1.125***
>=5,000	1.152*	1.153	1.122	1.127
School enrollment				
<300	1.316**	1.303**	1.289**	1.274*
300 to <450	1.194***	1.181***	1.179***	1.168***
450 to <600	1.103***	1.105***	1.109***	1.118***
600 to <800	1.031	1.033	1.028	1.030
Geographic cost (CWIFT)	2.132***	2.402***	2.145***	2.495***
Constant	11,476.3***	10,384.6***	11,572.6***	10,460.8***
Number of school-by-year observations	836	836	334	334
Number of unique schools	169	169	167	167

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 10.5% more spending per student, on average, holding all other cost factors in the model constant.

Note. Coefficients shown are exponentiated coefficients from a Poisson regression. Standard errors are clustered by school. In Models A and C, total current spending per pupil is the outcome variable. In Models B and C, current spending per pupil from state and local sources is the outcome variable. Models A and B include data for all years between FY 2018 and FY 2022. Models C and D include only the most recent two years: FY 2021 and FY 2022. Models include year-specific indicator variables (where FY 2022 is the reference group). The constant term represents per-pupil spending in FY 2022 with all other coefficients set to 1. Regression models are weighted by enrollment. The reference population density category is schools in zip codes with fewer than 300 people per square mile. The reference enrollment category is schools with more than 800 students. The grade-range proportion coefficients are interpreted relative to enrollment in elementary grades. Data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

To better interpret the relationship between per-pupil spending and student needs, we use the regression estimates from Models A and B (examining total spending and state and local spending per pupil from 2018-2022) to show the differences in predicted spending levels at the 10th and 90th percentiles of the various student characteristics included in the model, holding all other factors constant across schools (Exhibit 15). The table shows that, holding all other factors the same, a school at the 90th percentile of low-income students (a low-income student percentage of 52.4%) would spend $690 per pupil (or 4%) more than a school at the 10th percentile of low-income students (one with 11.9% low-income students). Using the model results where spending is restricted to that supported by state and local funding, the difference between these two hypothetical schools is actually slightly negative, meaning the school with a higher population of low-income students spends *less* from state and local sources than the school with a lower population of low-income students. Increases in spending related to number of ELs is also small. Moving from the 10th to 90th percentile of the percentage of students who are ELs results in an increase in spending of only 2% for both total spending and state and local spending.

Compared to the percentages of low-income students and ELs, the percentages of students with disabilities and complex disabilities have far more influence on expected school spending. Schools in the 90th percentile for the overall percentage of students with disabilities would spend approximately $1,800 more than schools in the 10th percentile in both total spending and state and local spending—increases of 11% and 12%, respectively. Increasing the percentage of students with complex disabilities from the 10th to 90th percentile would result in a 6% ($911) or 7% ($1,136) increase in spending respectively, in addition to any increases in spending resulting from a higher overall percentage of students with disabilities.

The percentage of units assigned on the basis of vocational/technical education is also strongly related to spending.[28] Moving from the 10th to 90th percentile in the percentage of vocation/technical units would result in approximately $2,000 more in spending per student both in total and from state and local sources, which are increases of 13% and 14%, respectively.

[28] Determining the percentage of student time spent in vocational/technical coursework is challenging. As a proxy for amount of vocational/technical coursework provided by schools, we used the percentage of Division I units assigned on the basis of vocational/technical education. This is calculated as the Division I CTE units minus the vocational/technical deduction divided by the total number of assigned Division I units. See Delaware's Unit Count Reports for more details: https://education.delaware.gov/community/data/reports/unitcount/.

Exhibit 15. Regression Predicted Spending Per Pupil at the 10th and 90th Percentiles of School Demographic Measures Based on the 5-Year Total Spending Model (2018–2022)

Student characteristic	Percentile	Student percentage	Average total predicted spending per pupil	Difference in total predicted spending per pupil	Average state and local predicted spending per pupil	Difference in state and local predicted spending per pupil
Low income	10th	11.9%	$16,769	$690 (+4%)	$15,338	-$115 (-1%)
	90th	52.4%	$17,459		$15,223	
Students with disabilities (SWD)	10th	12.9%	$16,464	$1,831 (+11%)	$14,604	$1,783 (+12%)
	90th	29.3%	$18,295		$16,387	
Complex SWD	10th	0.1%	$16,800	$1,136 (+7%)	$14,984	$911 (+6%)
	90th	4.4%	$17,935		$15,895	
ELs	10th	2.1%	$17,024	$375 (+2%)	$15,174	$276 (+2%)
	90th	28.6%	$17,400		$15,450	
Vocational/ technical	10th	0.0%	$16,099	$2,096 (+13%)	$14,260	$1,979 (+14%)
	90th	7.2%	$18,195		$16,239	

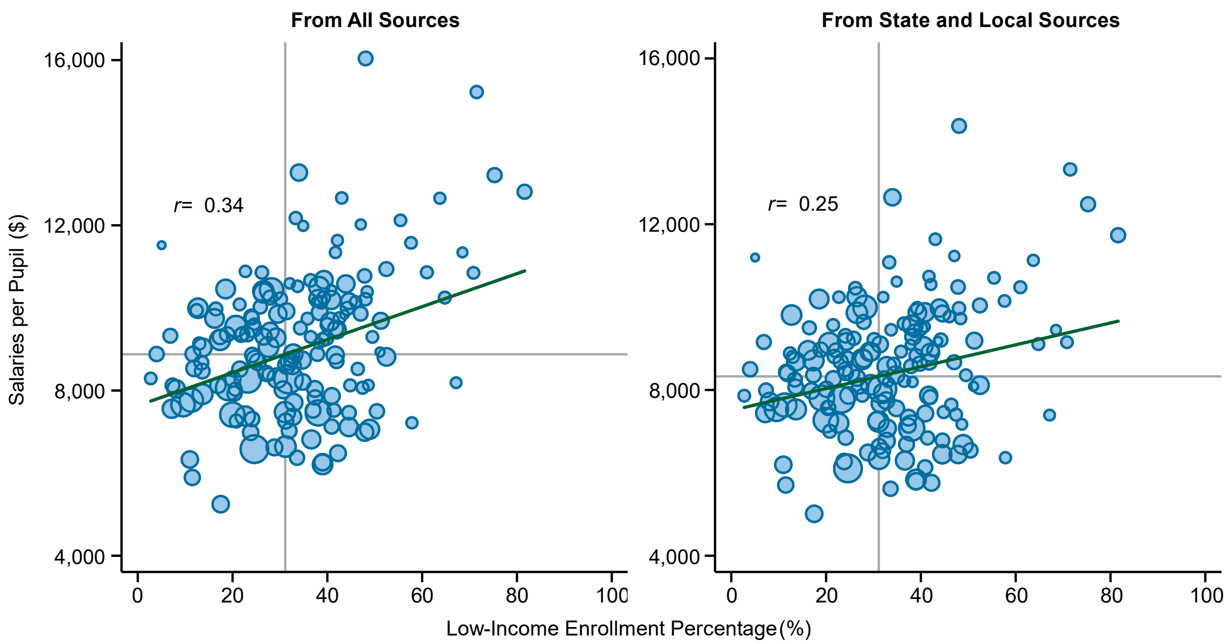
Note. Spending predictions are based on the regression model including data for FY 2018 through FY 2022 with predictions at FY 2022 levels.

Equity of Salaries and Teachers

In this section, we examine equity as it relates specifically to salaries and teachers. Delaware's unit system for funding districts and schools is resource-based and primarily allocates staff positions to districts and schools rather than dollar amounts. Delaware also operates a statewide salary schedule, in which some fixed portion of each staff position allocated through the state's unit system is covered by state funding. Because teacher salaries (and the salaries of other staff) are largely dependent on the person's years of experience and level of education, the dollar value in terms of state funding for a given position is dependent on the experience and other compensation-related qualifications for a given individual. This could pose an equity issue if average staff qualification levels differ drastically across schools and districts.

We start by examining salaries for all staff employed in the public school system, including administrative, instructional, student support, food services, transportation, and operations and maintenance staff. We then take a deeper dive into teachers, specifically. Exhibit 16 shows the salaries per pupil from all sources as well as from state and local sources, excluding federally funded positions, in relation to the proportion of students from low-income families in the schools. When accounting only for students' family income and no other school characteristics, schools with higher percentages of low-income students spend more on salaries per pupil than those with lower percentages of such students (a correlation of 0.34), which on the surface suggests that schools with higher-need students in terms of family resources are receiving more support. This is still true, although to a lesser extent, when restricted to salaries funded through state and local sources (a correlation of 0.25).

Exhibit 16. Relationship Between Total Salaries Per Pupil and Low-Income Enrollment Percentage (2022)



Note. N=167 schools. This analysis does not include charter schools. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average of salaries per pupil in FY 2022 was $8,878 from all sources and $8,328 only from state and local sources. The average low-income enrollment percentage was 31%. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education.

However, as with spending, the progressiveness of the distribution of salaries with respect to low-income students all but disappears when other student and school characteristics are accounted for using regression (Exhibit 17). The patterns of spending on salaries are similar to those using total spending (see Exhibit 14). Salary spending in total both from state and local funding and just from state funding shows little relationship to the proportion of low-income students. Salary spending from local funding is negatively related to the proportion of low-income students— denoted by an estimated coefficient that is less than 1—although the relationship is not statistically significant.

Using total salaries from all sources, salary spending is somewhat positively associated with a school's proportion of ELs. This is largely the result of increased spending from local sources, suggesting that districts tend to provide additional staffing for schools with high percentages of ELs through their local funding to compensate for the lack of additional salary funding for ELs through state sources. As with total spending, salary spending is strongly positively associated with the percentages of students with disabilities, students with complex disabilities, and vocational/technical units.

Exhibit 17. Regression Results Examining Equity of Salary Spending Per Pupil (2018 to 2022)

	A. Total salaries per pupil	B. State and local salaries per pupil	C. State salaries per pupil	D. Local salaries per pupil
Student needs				
Low-income proportion	1.055	0.950	1.056	0.741
Students with disabilities proportion	1.826***	1.986***	2.104***	1.706
Students with complex disabilities proportion	8.104***	6.247***	5.781***	7.776*
English learner proportion	1.149*	1.136	0.991	1.587**
Programming/grade range				
Vocational/technical units proportion	4.854***	4.740***	3.631***	7.780*
Middle school enrollment proportion	0.969	0.976	0.952*	1.043
High school enrollment proportion	0.959	0.972	0.948	1.047
Population density				
300 to <800	0.993	0.990	1.000	0.945
800 to <2,000	1.073*	1.072*	1.025	1.156
2,000 to <5,000	1.120***	1.110***	1.033	1.245
>=5000	1.145*	1.119	1.063	1.226
School enrollment				
<300	1.306***	1.296**	1.333*	1.166
300 to <450	1.200***	1.185***	1.174***	1.216*
450 to <600	1.111***	1.107***	1.091***	1.147
600 to <800	1.033	1.032	1.024	1.051
Geographic cost (CWIFT)	1.932***	2.308***	0.732*	49.45***
Constant	5,993.4***	5,661.5***	4,430.9***	1,246.4***
Number of school-by-year observations	836	836	836	836
Number of unique schools	169	169	169	169

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 5.5% more spending per student, on average, holding all other cost factors in the model constant.

Note. Coefficients shown are exponentiated coefficients from a Poisson regression. Standard errors are clustered by school. Models also include year-specific indicator variables (where FY 2022 serves as the reference group for all models). The constant term represents per-pupil spending in FY 2022 with all other coefficients set to 1.

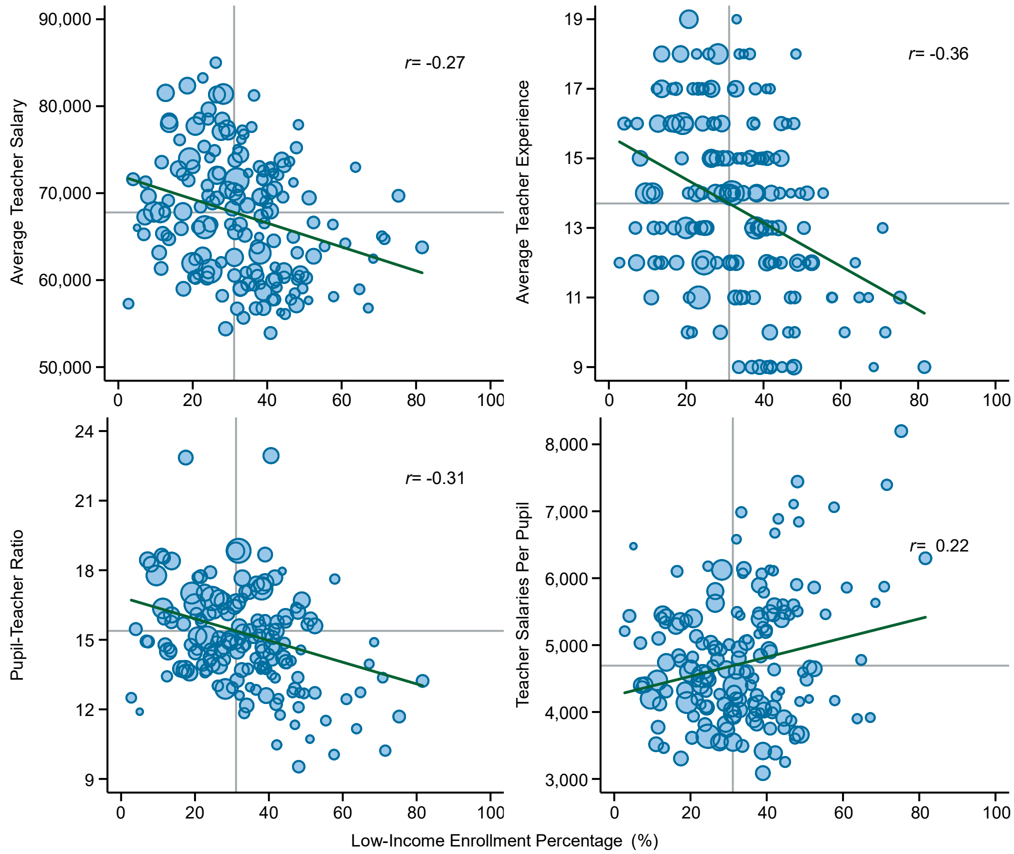
Regression models are weighted by enrollment. The reference population density category is schools in zip codes with fewer than 300 people per square mile. The reference enrollment category is schools with more than 800 students. The programming and grade-range proportion coefficients are interpreted relative to enrollment in elementary grades. Data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

The pattern for teacher salaries is somewhat different from that of all salaries. In Exhibit 18, we show several factors that affect overall teacher pay and their relationship with low-income enrollment: average teacher salaries (top-left quadrant), average teacher experience (top-right quadrant), pupil-teacher ratios (bottom-left quadrant), and teacher salaries per pupil (bottom-right quadrant). Both average teacher salaries and average teacher experience are negatively related to the percentage of low-income students in schools. In other words, schools with higher percentages of low-income students typically have less experienced and lower-paid teachers. However, schools with higher percentages of low-income students also tend to have fewer students per teacher (i.e., smaller class sizes and more teachers for a school of a given size), as signified by the pupil-teacher ratio. On balance, the lower salaries and lower pupil-teacher ratio offset each other, resulting in a weakly positive association between teacher salaries per pupil and a school's percentage of low-income students (a correlation of 0.22).

Once we use regression to condition on other student needs and school contextual variables, we find that negative associations between low-income enrollment percentages and average teacher salary and experience remain (Models A and B of Exhibit 19). However, the association between pupil-teacher ratio and low-income percentage (Model C of Exhibit 19) is substantially weaker than the relationship shown by the unconditional scatter plot in Exhibit 18. This suggests that the lower pupil-teacher ratios observed in higher poverty schools seen in Exhibit 18 is actually a result of smaller class sizes associated with other student or school characteristics that are correlated with the percentage of low-income students. In particular, the regression results show that schools with higher percentages of students with disabilities, especially those with complex disabilities, and English learners have lower pupil-teacher ratios—and these variables are moderately correlated with the percentage of low-income students.[29]

[29] The enrollment-weighted correlation between the percentages of students with disabilities and low-income enrollment percentage is 0.51 pooling data for FYs 2018–22. Similarly calculated, the correlation between low-income and ELs is 0.32.

Exhibit 18. Relationship Between Teacher Salaries and Other Factors Influencing Salaries and Low-Income Enrollment Percentage of Schools (2022)



Note. N=167 schools. This analysis does not include charter schools. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average low-income enrollment percentage in FY 2022 was 31%. The average of average teacher salaries was $67,785. The average of average teacher experience was 13.7 years. The average pupil-teacher ratio was 15:4. The average of teacher salaries per pupil was $4,693. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education.

In addition, after the relationship between spending on teacher salaries and incidence of low-income students is conditioned on other student and school characteristics, a school with all low-income students would be expected to spend approximately 9.5% less on teacher salaries per student than a school with no low-income students, although this association is not statistically significant (Model D of Exhibit 19). When restricted to only state and local funds, the negative association between low-income student percentage and teacher salaries per pupil is strengthened, indicating that a school with all low-income students would spend approximately 21% less on teacher salaries per student from state and local sources compared with a school having no low-income students (Model E of Exhibit 19). By contrast, the proportion of students who have disabilities, complex disabilities, and who are ELs are all strongly and positively associated with teacher salaries per student, largely resulting from lower pupil-teacher ratios as opposed to higher average salaries.

Exhibit 19. Regression Results Examining Equity of Teacher Pay, Experience, and Pupil-Teacher Ratios (2018 to 2022)

	A. Average teacher salary	B. Average teacher experience	C. Pupil-teacher ratio	D. Teacher salaries Per pupil	E. State and local teacher salaries per pupil
Student needs					
Low-income proportion	0.798***	0.579***	0.960	0.905	0.793*
Students with disabilities proportion	0.910	0.891	0.757	1.816***	2.065***
Students with complex disabilities proportion	0.780	0.235**	0.233**	2.611*	1.656
English learner proportion	1.055	0.962	0.874*	1.409***	1.394***
Programming/grade range					
Vocational/technical units proportion	1.526**	1.728	0.288***	5.382***	5.167***
Middle school enrollment proportion	1.000	0.989	1.056**	1.005	1.011
High school enrollment proportion	0.985	0.952	1.094**	0.969	0.978
Population density					
300 to <800	0.984	0.922*	0.992	0.995	0.982
800 to <2,000	1.069***	1.083	0.995	1.110**	1.098**
2,000 to <5,000	1.097***	1.116*	0.955	1.143***	1.126**
>=5000	1.066	0.995	0.913**	1.263*	1.201
School enrollment					
<300	1.020	1.133*	0.826***	1.298***	1.284**
300 to <450	1.018	1.086	0.858***	1.212***	1.188***
450 to <600	1.007	1.026	0.925***	1.108***	1.103***
600 to <800	0.987	0.964	0.968*	1.065**	1.060*
Geographic cost (CWIFT)	1.638***	0.855	1.185	1.517*	1.739**
Constant	67,559.0***	16.76***	17.98***	3,260.8***	3,193.8***
Number of school-by-year observations	836	836	836	836	836
Number of unique schools	169	169	169	169	169

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 20.2% lower teacher salaries, on average, holding all other cost factors in the model constant.

Note. Coefficients shown are exponentiated coefficients from a Poisson regression. Standard errors are clustered by school. Models also include year-specific indicator variables (where FY 2022 serves as the reference group for all models). The constant term represents per-pupil spending in FY 2022 with all other coefficients set to 0. Regression models are weighted by enrollment. The reference population density category is schools in zip codes with fewer than 300 people per square mile. The reference enrollment category is schools with more than 800 students. The programming and grade-range proportion coefficients are interpreted relative to enrollment in elementary grades. Data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

In short, schools serving higher proportions of low-income students systematically have teachers with lower salaries, less experience, and no difference in class sizes on average compared to otherwise similar schools serving a more affluent student population.

Taxpayer Equity

For a system to be equitable for taxpayers, district spending levels should not be systematically related to property wealth, and districts with similar tax rates should be able to raise similar amounts of overall revenue per pupil, inclusive of state and local sources. To examine whether Delaware's education system is equitable to taxpayers, we looked at relationships between district spending per pupil, district property wealth, and district tax rates. The analyses presented in this section are necessarily aggregated to the district level and do not include charter schools or vocational/technical districts.[30]

Exhibit 20 is a series of scatterplots showing the relationships between district spending per student broken out by state and local sources and the property wealth of districts represented by the full valuation per enrolled student. The horizontal and vertical gray lines denote the statewide averages for spending per pupil and property wealth per student, respectively. Property wealth is a measure of local capacity to raise revenue. At similar levels of fiscal effort (tax rates), districts with higher property wealth will be able to raise more revenue locally. Although there is a positive relationship between property wealth and local revenue, the relationship is not very strong (a correlation coefficient of 0.43). For most districts, spending from local sources lies either well below or well above the line of best fit (left panel). This reflects the varying levels of fiscal effort across districts.[31] Also of note with respect to local spending, is the wide variation. Some districts in Delaware spend less than $2,000 per student from local sources whereas others spend almost $8,000 per student.

Spending from state sources is negatively associated with property wealth (a correlation coefficient of -0.49). Through the state's equalization funding, the state provides additional state fundings to districts with less property wealth and lower capacity to raise revenue locally. However, the difference in spending from state sources between high and low wealth districts is rather small. Cape Henlopen, the district with by far the highest property values per student, spends approximately $9,000 per student from state sources. The districts with the lowest property values spend just under $11,000 per student (middle panel of Figure 8). Whereas the

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[30] Exhibits B4–B9 in Appendix B present several exhibits from the main report, but in a larger format and include labels of district names to provide readers additional context. Exhibit B12 in Appendix B provides additional information on the characteristics of the districts named in the figures.

[31] In Baker, Di Carlo, and Weber (2022), they find that in most states local capacity is highly predictive of the amount of local revenue that districts raise. This suggests that in most states local effort is more consistent than in Delaware. Many state funding formulas put boundaries on local effort through minimum required effort levels and/or through tax caps or penalties that limit the extent to which districts exceed tax rate or revenue thresholds.

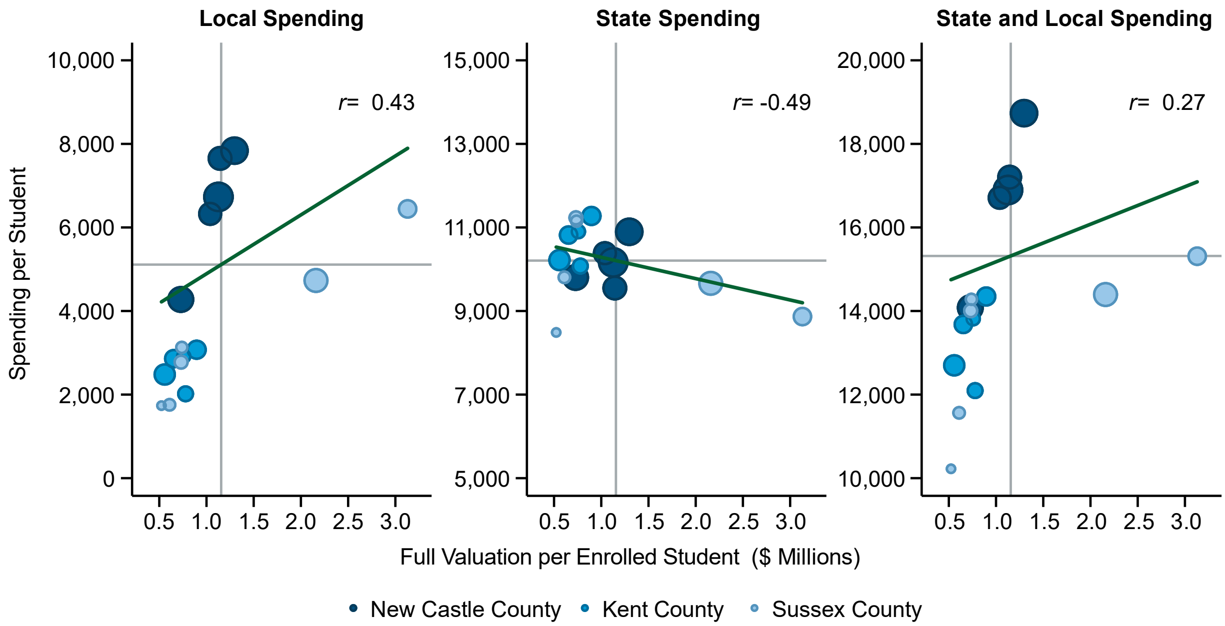
range in local spending was about $6,000 per student, the range in state spending is just over $2,000 per student. In other words, the magnitude of differences in spending from state sources across districts are not large enough to account for differences in local spending.

This is confirmed by examining total state and local spending of districts (the right panel). Districts with higher property values generally spend more per student than those with lower property values. This finding is supported by the positive correlation coefficient of 0.27. Cape Henlopen and Indian River are both outlier districts because they have high property valuations but only average or slightly below average state and local spending. Despite these two outlier districts, the relationship between property values and spending per student is clear.

Within New Castle County, for example, the district with the lowest property valuation (i.e., Appoquinimink) spends approximately $14,000 per student from state and local sources, whereas the district with the highest property valuation (Christina) spends more than $18,000 per student. However, this finding alone is not indicative of taxpayer inequity. The Christina school district also has much higher percentages of students from low-income families, students with disabilities, and English learners as well as lower average student outcomes as compared to Appoquinimink. Therefore, to the extent that higher spending accounts for higher costs of education in Christina, the difference appears equitable.

Laurel is also a district with low property valuations and quite high student needs and low student outcomes. The percentages of students in Laurel who are low-income or ELs far exceed those of Cape Henlopen, and student outcomes in Laurel are substantially lower than those in Cape Henlopen. In this case, Cape Henlopen spends almost $4,000 more per student. To the extent that this difference in spending is a function of differences in property valuation and not tax rates, this is inequitable.

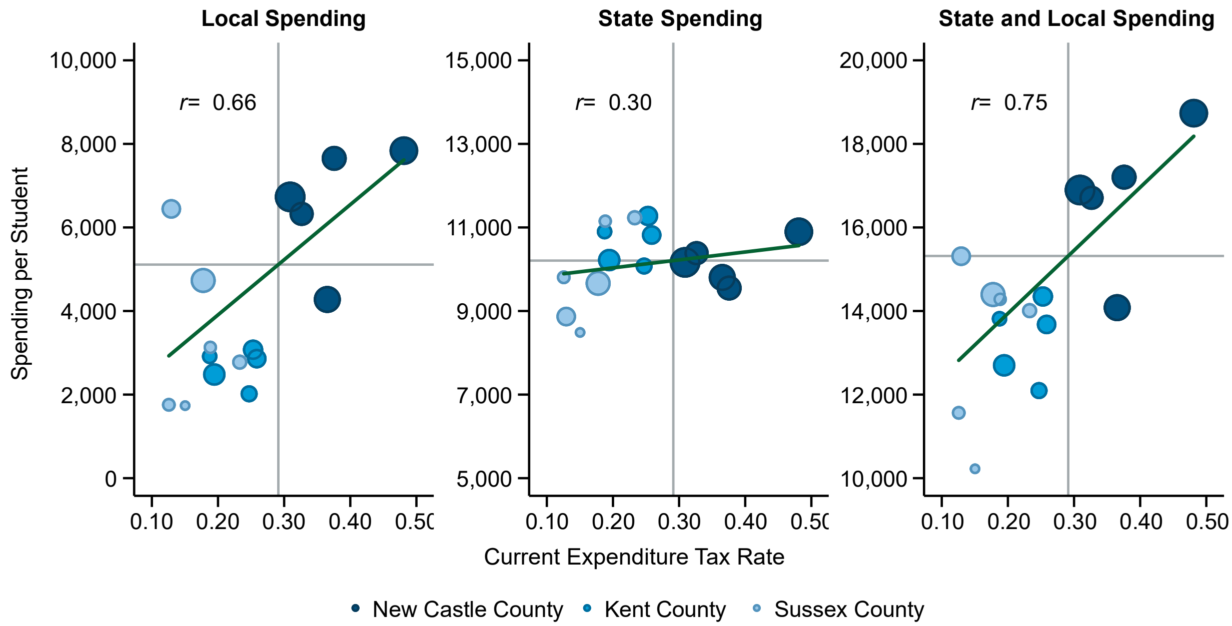
Exhibit 20. Spending per Pupil and District Property Wealth per Pupil (2022)



Note. N=16 districts. This analysis does not include vocational/technical districts. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average full valuation per enrolled student was $1,155,606. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education.

To investigate further, we show the relationship between spending per pupil from state and local sources and current expenditure property tax rates in Exhibit 21. In Exhibit B10 in Appendix B, we show the same exhibit but with a combined tax rate inclusive of tuition and match tax rates. Districts with higher property tax rates do generally achieve higher spending per student as evidenced by the strong correlation between tax rates and state and local spending per pupil (*r* = 0.75). However, there remain some signs of inequity to taxpayers. In particular, Cape Henlopen achieves above average local spending per student and spending per pupil at the statewide average when considering state and local spending even with a tax rate that is among the lowest in the state. By contrast, Capital School District spends approximately $3,500 less from local sources and almost $1,000 less per student from state and local sources than Cape Henlopen but has an effective tax rate that is almost double that of Cape Henlopen. Additionally, Capital has a proportion of low-income students that is more than double that of Cape Henlopen, a higher rate of students with disabilities, a comparable percentage of English learners, and much lower student outcomes. Milford is another district with relatively high student needs, outcomes below the state average, and a moderate tax rate, yet it spends less than some districts with lower needs and lower tax rates.

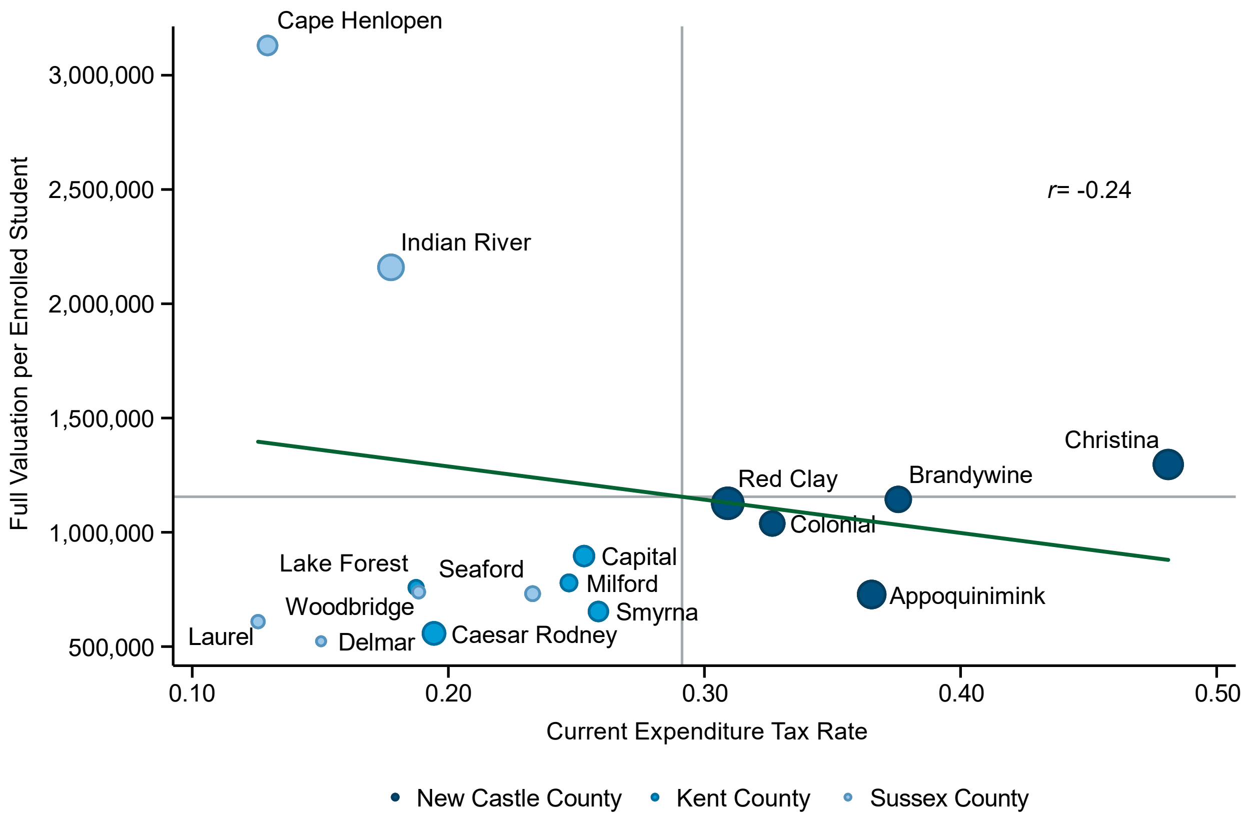
Exhibit 21. Spending Per Pupil and Current Expenditure Property Tax Rates (2022)



Note. N=16 districts. This analysis does not include vocational/technical districts. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average current expenditure tax rate was $0.29 per thousand dollars of full valuation. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education.

The districts with the highest property wealth, such as Cape Henlopen and Indian River, tend to have the lowest tax rates shown by a moderately negative correlation (*r* = -0.24) in Exhibit 22. In Exhibit B11 in Appendix B, we show property valuation compared to tax rates inclusive of match and tuition taxes. Combined, this shows a potential disconnect between the needs of districts and how much they spend, driven by differences in local wealth. If, at reasonable tax rates, certain districts cannot provide equal educational opportunities compared with other districts, that is a tax equity issue. In other words, to meet their educational needs, some districts in Delaware must enact substantially higher local tax rates compared with other districts. This appears to be the case in Christina, which is a district with high student needs, a local tax rate that is almost four times greater than the lowest local tax rates in the state, and relatively high spending as a result. Yet Christina has student outcomes well below the state average.

Exhibit 22. Current Expenditure Property Tax Rates and District Property Wealth (2022)



Note. N=16 districts. This analysis does not include vocational/technical districts. The gray lines show enrollment-weighted statewide averages of both variables. The dark green diagonal line represents the line of best fit. The average full valuation per enrolled student in FY 2022 was $1,155,606. The average current expenditure tax rate was $0.29 per thousand dollars of full valuation. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal and the Delaware Department of Education.

Chapter Summary

Effective systems for funding education should (a) appropriately account for differences across districts in costs, particularly with respect to student needs, and (b) account for differences across districts with respect to local capacity to raise revenue. The results from the equity analyses presented here suggests Delaware's funding system could improve along both of these dimensions.

With regard to student equity, the schools with the highest percentages of low-income students in Delaware do tend to spend more than schools serving students from more affluent families, but this is largely the result of funding driven by special education and other factors as opposed to funding for low-income students. After conditioning for other student characteristics and school contextual factors, otherwise similar schools with higher percentages of low-income students do not systematically spend more. When looking at salaries, and specifically teacher salaries, we see similar patterns. In particular, when comparing otherwise similar schools, we find that those with higher percentages of low-income students spend no more on salaries in total and spend less on teacher salaries, particularly when spending from federal sources is excluded.

In contrast to low-income student percentages, there is a strong, positive relationship between the percentage of students with disabilities in schools and the amount of spending per student. In schools with higher percentages of students with disabilities, more is spent overall on salaries, and on teacher salaries per student. Higher spending on teacher salaries in relation to students with disabilities is largely driven by smaller class sizes and not higher average teacher salaries.

Delaware's system of funding does not sufficiently account for differences in local capacity to raise revenues. Effective tax rates in the state—based on full valuation after accounting for differences in assessment to sales ratios—vary substantially, with some districts having tax rates almost four times that of others. Some districts with low-to-moderate wealth, moderate tax rates, high student needs, and relatively low student outcomes spend less from state and local funds than districts with high wealth, low tax rates, low-to-moderate student needs, and relatively high student outcomes. This suggests that those higher need districts with lower wealth would have to tax themselves at unreasonably high levels to provide educational opportunities equal to those of high wealth districts.

The Referendum Requirement

In Delaware, any increase or decrease in tax rates for school districts (with the exception of a few special taxes) must be voted on in a referendum. It is rare that states require a referendum for any change in property tax rates for education. Many states place limits on how much local revenue or tax rates can increase in a given year, with referendums required only when proposed increases exceed those limits. In other states there are no limits at all, leaving decisions about taxation to elected officials.

In New Jersey, increases to property tax rates are limited to 2% per year, but can be exceeded with a public vote (Bishop-Henchman, 2010). In Pennsylvania, property taxes can be raised annually to keep pace with inflation; however, “extraordinary tax increases” must be approved by voters (Pennsylvania Department of Education, 2023). Virginia limits property tax levies to an increase of 1 percent. However, after conducting a public hearing (not a vote), tax rates can be increased beyond 1 percent (Code of Virginia, 58.1-3321). There are additional stipulations regarding how public hearings must be publicized. In Maryland, there are no limits on property tax rates or levies. Because Maryland’s school districts are aligned with counties, the County Board of Commissioners approves changes to tax rates (Maryland Department of Assessment and Taxation, n.d.).

Districts in Delaware must undertake referendums for both increasing funding for day-to-day operations and for major capital improvements. District administrators described the referendum process as time consuming and requiring substantial investments of both financial resources and human capital to raise public awareness and get out the vote. Despite those investments, administrators noted that the process often results in failure, with 12 administrators noting their concerns about being able to pass referendums on a regular basis. Administrators noted that even when successful, a referendum often provides the necessary level of resources for only a few years, as expenses increase over time.

The substantial investment of resources with no guarantee of success means that undertaking a referendum is risky. In addition, administrators noted that having to go to referendum for both increases to operating revenues and capital projects meant they had to be strategic about when to go to referendum for each, as they thought it unlikely voters would approve both in a short period of time. A number of district administrators advocated for doing away with the requirement for a referendum when it came to operating expenses and only having to go to referendum for capital projects. For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

5. Student Outcomes

Examining the relationship between student outcomes and student needs is important for several reasons. First, demonstrating inequitable outcomes across schools and districts that are related to the types of students they serve justifies targeting more funding to districts with the highest needs. Previously, we examined the equity of Delaware's funding system, particularly with respect to economic disadvantage. We found that schools with higher percentages of low-income students do not have systematically higher spending than otherwise similar schools with lower percentages of low-income students. The prevailing assumption in education finance policy is that to be provided equal opportunities to succeed educationally, low-income students require additional resources, not merely the same level of resources as higher income students. Here we examine the extent to which different types of students are being provided equal opportunities by examining the extent to which student outcomes are related to student need characteristics. In a system that provides equal opportunities, these relationships should be weak or nonexistent.

Second, demonstrating that certain student needs or other district contextual factors are related to student outcomes supports the inclusion of these factors in an education funding formula used to differentiate and distribute funding across districts. In other words, if student poverty results in lower student achievement, then it makes sense to include measures of student poverty within the formula such that schools and districts with higher student poverty rates receive additional funding to provide supplementary academic services and supports for those students.

In this chapter, we describe methods for examining the relationships between student outcomes and student needs and present results demonstrating how student outcomes vary across schools and districts according to the needs of students served in those schools and districts.

Examining Relationships Between Student Outcomes and Student Needs

Our approach to examining the relationship between student outcomes and student needs (i.e., outcome equity) is similar to the approach we took to examine equity of inputs. We started by generating some simple unconditional analyses to discern relationships between a given measure of student outcome and an individual measure of student need; for example, the relationship between student assessment scores and district student poverty rates. To analyze these bivariate relationships, we calculated correlations and visually examined relationships using scatterplots.

Although these simple approaches can be informative and are easy to interpret, they cannot describe a given relationship between a student outcome and a particular student need independent of other needs or characteristics. Thus, if districts with high student poverty rates also tend to have high special education rates, an observed negative relationship between student outcomes and poverty rates could be caused by higher special education rates in high-poverty districts, not poverty itself. Therefore, in addition to the bivariate approaches, we used multiple regression analyses to isolate the relationships between student outcomes and each student need variable independent of other needs or district characteristics.

Student and School Outcome Measures

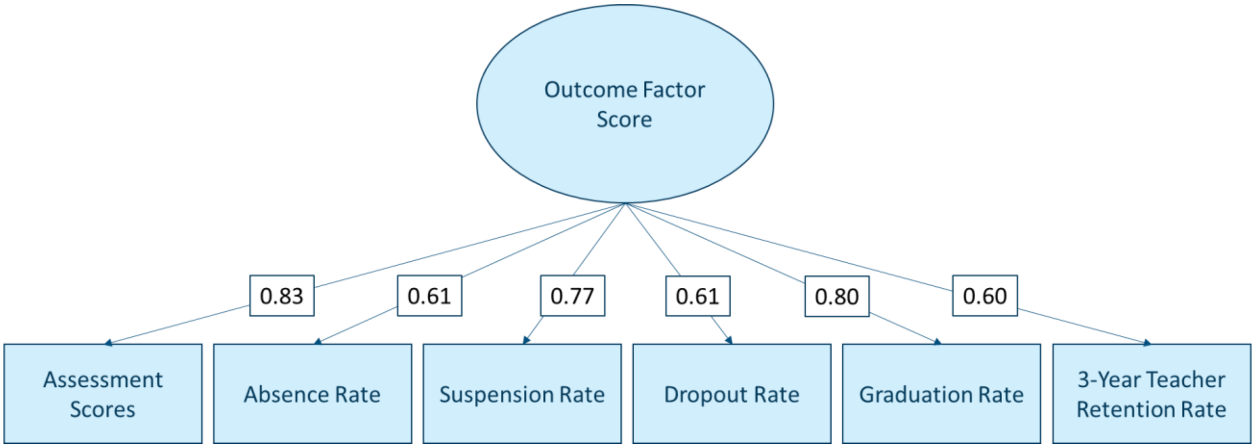
To characterize outcomes of schools holistically, we used six different outcome measures—student assessment scores, absence rates, suspension rates, graduation rates, dropout rates, and teacher retention rates—to construct an aggregate outcome score that is meant to describe overall school performance. The intent behind combining multiple outcome measures into a single score is to create a more robust measure that reflects the broader goals of education better than any single outcome measure.

To construct the outcome score, we conducted confirmatory factor analysis using a structural equation model that treats the overall outcome measure as a latent (i.e., unobserved) variable and estimates the latent variable to best fit the data. Rather than make an arbitrary decision to weight each outcome equally or choose another arbitrary weighting scheme, the model uses the existing variation in outcomes across each measure to identify the relative importance of each measure to the unobserved aggregate outcome score. Another advantage of this approach is that the statistical program used to construct the factor score can appropriately generate a factor score even when measures are missing for some schools. For example, only schools serving Grade 12 students would be expected to have a graduation rate reported.

Exhibit 23 shows the structural equation model used to generate the factor score.[32] The numbers included in the model represent standardized coefficients and describe the change in each individual outcome resulting from a 1 standard deviation (*SD*) increase in the outcome factor score. A 1 *SD* increase in the outcome factor score is associated with a 0.83 *SD* improvement in assessment scores, a 0.61 *SD* improvement in absence rates, a 0.77 *SD* improvement in suspension rates, a 0.61 *SD* improvement in dropout rates, a 0.80 *SD* improvement in graduation rates, and a 0.60 *SD* improvement in teacher retention rates. The resulting factor score has a statewide average of 0 and an *SD* of 1.

[32] Prior to inclusion in the structural equation model, all outcomes were centered by grade level and school year and standardized to have a mean of 0 and a standard deviation of 1. In addition, variables where higher values represent lower outcomes were reverse coded to be consistent with other outcomes (i.e., absence rates, suspension rates, and dropout rates).

Exhibit 23. Structural Equation Model Used to Generate the Factor Score



Note. The model is weighted by enrollment. Calculations based on data for 2014–15 through 2021–22 school years. From the Delaware Open Data Portal.

As shown in Exhibit 24, the resulting outcome factor score is strongly correlated with various individual outcome measures, even though the correlations between the individual outcome measures are far more modest. For example, the correlation between assessment scores and the outcome factor score is 0.90. Other outcomes have correlations with assessment scores with absolute magnitudes between 0.42 and 0.62. As another example, the outcome factor score has a correlation with chronic absenteeism of -0.74. With the exception of absence rates, no other outcome has a correlation with chronic absenteeism that is in absolute terms greater than 0.59.

Exhibit 24. Correlations Between Outcome Measures

	Outcome factor score	Assessment scores	Chronic absenteeism	Absence rate	Susp. rate	4-year grad rate	Drop-out rate	3-year teach. ret. rate
Outcome factor score	1.00							
Assessment scores	0.90	1.00						
Chronic absenteeism	-0.74	-0.60	1.00					
Absence rate	-0.66	-0.53	0.95	1.00				
Suspension rate	-0.83	-0.62	0.53	0.43	1.00			
4-year grad rate	0.85	0.60	-0.59	-0.55	-0.65	1.00		
Dropout rate	-0.64	-0.42	0.42	0.39	0.47	-0.77	1.00	
3-year teach. ret. rate	0.66	0.48	-0.36	-0.32	-0.50	0.41	-0.26	1.00

Note. Correlations are weighted by enrollment. Calculations are based on data for 2014–15 through 2021–22 school years. From the Delaware Open Data Portal.

For national data used in comparing Delaware to other states in the Mid-Atlantic region, we use an outcome index created by researchers at Stanford University as part of the Stanford Education Data Archive (SEDA). The SEDA index uses assessment data from each state along with National Assessment of Education Progress (NAEP) data to create a standardized measure of performance that intends to make performance measures comparable across states.[33]

Student Outcomes and Needs

Exhibit 25 shows the correlations between various measures of student needs and student outcomes. The first three rows of the table show the correlations between three measures of student needs typically measured for schools (i.e., incidence rates of low-income students, ELs, and students with disabilities) and the four student outcome measures. We also included a measure for the percentage of students who are Black as well as an income-to-poverty ratio, which is an alternative neighborhood-based measure of economic disadvantage developed by the U.S. Department of Education.[34]

Compared with the income-to-poverty ratio, Delaware's measure of the percentage of low-income students is much more strongly correlated with student outcomes. The correlation between low-income percentage and the outcome factor score is -0.75, a strong negative correlation. By contrast, the correlation between the income-to-poverty ratio and the outcome factor score has a magnitude of only 0.25, which is a positive value because higher values of the income-to-poverty ratio represent higher income levels.

Rates of students with disabilities and English learners are also negatively associated with student outcomes, although not as strongly as low-income status. The pattern of the association with ELs fluctuates widely across outcomes compared with low-income status. In particular, the percentage of students who are ELs in a school is only weakly associated with absenteeism and suspension rates. However, the percentage of students who are ELs is the school demographic variable most strongly related to dropout rates. Students with disabilities is the strongest correlate to graduation rates.

[33] SEDA is a collection of available national education data sets that includes calibrated and standardized measures of performance so as to be comparable across states. The SEDA data are available at https://cepa.stanford.edu/content/seda-data. NAEP is an assessment administered nationally to a representative sample of students in each state to measure educational progress across time and to compare results across states.

[34] A recent study by Fazlul et al. (2023), suggests that the income-to-poverty ratio is a more accurate measure of student poverty than free and reduced-price meal eligibility. However, Delaware's measure of low-income status is based on direct certification. Their study finds that direct certification is also a better measure of poverty than free and reduced-price meals. One possible downside of the income-to-poverty ratio is that it is a geographically based estimate, and therefore does not necessarily reflect the characteristics of the students who attend any given school.

Exhibit 25. Correlations Between Student-Need Measures and Student-Outcome Measures

	Outcome factor score	Assess-ment scores	Chronic absent-eeism	Absence rates	Susp. rates	4-year grad rate	Dropout rate	3-year teach. ret. rate
Low income %	-0.75	-0.71	0.59	0.51	0.55	-0.73	0.58	-0.47
Students with disabilities %	-0.55	-0.56	0.48	0.41	0.42	-0.76	0.56	-0.27
English learner %	-0.27	-0.35	0.19	0.16	0.11	-0.61	0.64	-0.09
Black %	-0.64	-0.56	0.39	0.35	0.58	-0.44	0.22	-0.52
Neighborhood Income-to-poverty ratio	0.25	0.24	-0.18	-0.14	-0.14	0.06	-0.07	0.26

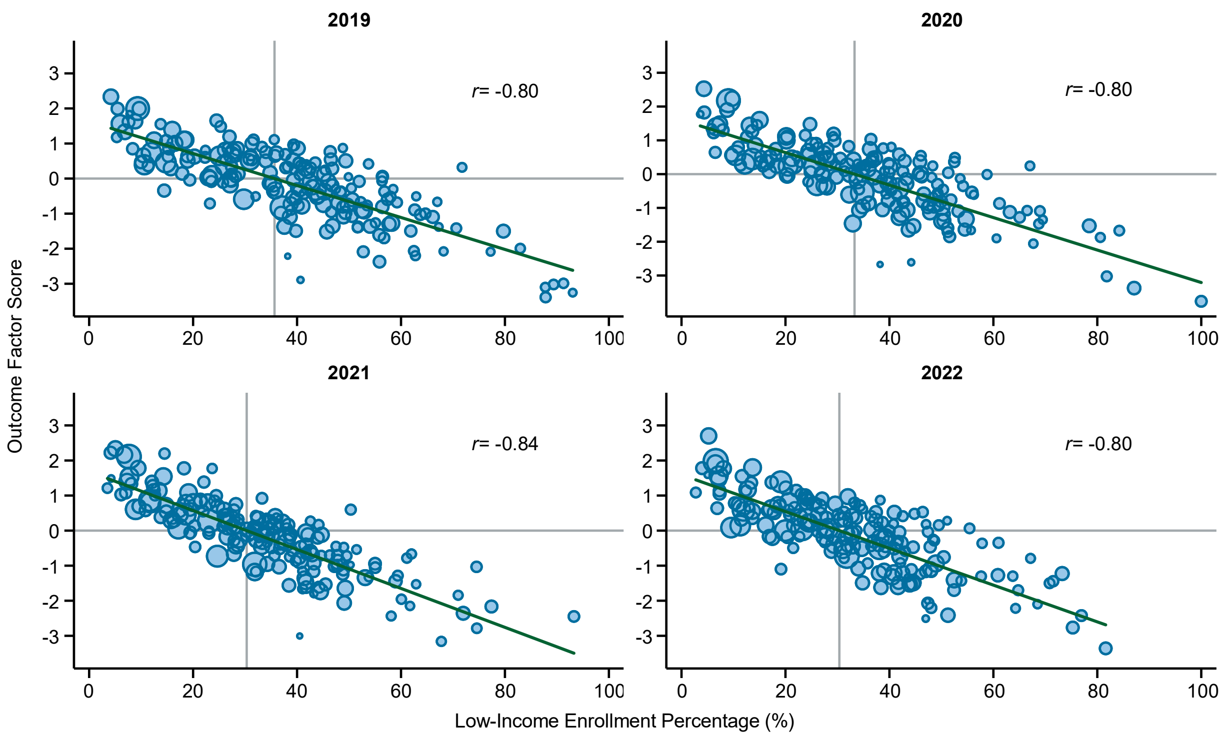
Note. Correlations are weighted by enrollment. Calculations are based on data for 2014–15 through 2021–22 school years. From the Delaware Open Data Portal.

Scatterplots are helpful in examining visually the relationships between student needs and outcomes. As shown in Exhibit 26, there is a clear strong negative linear relationship between student outcomes (as measured by the outcome factor score) and the percentage of low-income students. The exhibit shows the most recent four school years: 2019 through 2022. Note that 2019 was entirely before the pandemic; whereas 2020 through 2022 were all influenced by the pandemic. Despite the pandemic's disruptions, the correlations between student outcomes and low-income percentage have been quite consistent, with three of the four years having the same negative correlation of -0.80.

The schools with the smallest percentages of low-income students typically have student outcomes that are 1 to 2 *SD* above the state average. In contrast, schools with the highest percentages of low-income students typically have student outcomes that are 1 *SD* to 2 *SD* (and occasionally up to 3 *SD*) below the state average. Although the relationship between student outcomes and low-income student percentages at the school level is quite strong in Delaware, the relationship between achievement and poverty at the district level is typical of what is observed in the Mid-Atlantic region. Exhibit C1 in Appendix C shows the relationship between district-level achievement and poverty rates using national data to compare the relationship in Delaware to other Mid-Atlantic states. Exhibit C1 only includes Delaware's 16 geographically defined school districts and does not include vocational/technical districts or charter schools. The small number of districts in Delaware makes it somewhat challenging to observe a clear pattern. Nonetheless, Delaware's districts fall within the broader swath of districts in how they perform in relation to their poverty rates.

Exhibits C2–C5 in Appendix C are scatterplots showing the relationships between student outcomes and both special education rates and EL rates, using Delaware-specific and national data, respectively. Again, patterns observed in Delaware are generally similar to those in the Mid-Atlantic region as a whole.

Exhibit 26. Relationship Between Student Outcomes and Low-Income Enrollment Percentages



Note. The gray lines show enrollment-weighted statewide averages of both variables. The low-income enrollment in FY 2022 was 30%. The enrollment-weighted correlation coefficient is represented by *r*. Data from the Delaware Open Data Portal.

Exhibit 27 shows the relationships between school characteristics and student outcomes using multiple regression. When using the outcome factor score, the coefficients for low income and students with disabilities show strong negative associations with student outcomes.[35] The coefficient for ELs is also negative, but not nearly of the same magnitude and is not statistically significant (Model A of Exhibit 27). However, when the proportion of Black students is also included in the model (Model B), the coefficient for ELs shows a much stronger and statistically significant negative relationship with outcomes and the coefficient for low income becomes somewhat weaker. This suggests that there are distinct relationships of roughly equal

[35] Exhibit 27 shows that there is not a statistically significant relationship between outcomes and the proportion of students with complex disabilities independent of the relationship for all students with disabilities. This might be because students with complex disabilities represent a small share of all students and therefore do not affect outcomes aggregated to the school. It might also be because students with complex disabilities may not be rated on the same outcomes (for example, if they take alternative assessments).

magnitude on outcomes of being low income, an English learner, and being Black. In addition, the proportions of students in schools who are Black and ELs are negatively correlated, meaning that schools with a higher percentage of Black students tend to have lower percentages of English learners. Because of this, when the proportion of Black students is excluded from the model, the model cannot sufficiently distinguish between low-income students, EL students, and Black students. Therefore, the effects of Black students and to a large extent EL students are rolled into the low-income effect when the variable for the percentage of Black students is excluded.

Models C through E of Exhibit 27 show how individual outcomes relate to student needs as opposed to the aggregate outcome factor score. For each of the outcomes shown, the coefficients for low income and students with disabilities show a strong and statistically significant negative relationship.[36] However, the story for English learners varies across outcomes. Higher proportions of ELs are associated not only with lower assessment scores but also lower suspension rates, with little effect on absenteeism.

The models also include population density, indicators of district size, and proportions of enrollment by grade levels. The estimates indicate negative effects for middle and high schools relative to elementary schools. However, this is likely due to the incomparability of outcomes across grade levels as opposed to an actual systematic decline in outcomes as grades increase. For example, high school students take different assessments than grade-level students; absenteeism and suspensions rates vary across grade levels, making them incomparable; and higher grade levels are associated with fewer low-income and English learner students. For all of these reasons, the negative coefficients for middle and high schools are not particularly meaningful in the context of this regression model.

The coefficients for the highest population density category and geographic cost are also negative. This suggests that all else being equal, outcomes in more urban areas and outcomes in higher cost areas—in the case of Delaware, this is New Castle County—tend to be lower.

[36] The outcomes for absenteeism and suspensions have been reverse coded such that higher values represent better outcomes and lower values represent worse outcomes.

Exhibit 27. Regression Results Examining Relationships Between School Characteristics and Student Outcomes (2015 to 2022)

	A. Outcome factor score	B. Outcome factor score	C. Assessment scores	D. Absence rates	E. Suspension rates
Student Needs					
Low-income proportion	-3.950***	-1.991***	-3.267***	-2.179***	-3.122***
Students with disabilities proportion	-4.010***	-4.280***	-3.733***	-3.152***	-3.047***
Students with complex disabilities prop.	1.101	1.591	0.691	-0.136	3.431
English learner proportion	-0.117	-1.877***	-1.303***	-0.152	1.369***
Black student proportion		-2.189***			
Programming/Grade Range					
Vocational/technical units proportion	1.415	1.558	-3.528***	3.337**	2.865*
Middle school enrollment proportion	-0.289**	-0.359***	-0.313**	-0.226*	-0.0102
High school enrollment proportion	-0.790***	-0.745***	-0.385*	-0.752***	-0.543***
Population Density					
300 to <800	0.142	0.285**	0.100	0.115	0.205*
800 to <2,000	0.0382	0.222	0.0808	0.00628	-0.0400
2,000 to <5,000	0.104	0.251*	0.0210	0.0237	0.141
>=5000	-0.379*	-0.313	-0.125	-0.00826	-0.528**
School Enrollment					
<300	-0.177	-0.0670	-0.252	0.478**	-0.165
300 to <450	-0.00891	-0.0380	-0.106	-0.125	0.241
450 to <600	-0.0513	-0.144	-0.157	-0.154	0.175
600 to <800	-0.183*	-0.240**	-0.233*	-0.157*	0.0116
Geographic Cost (CWIFT)	-2.692***	-1.312	-2.422***	0.407	-3.375***
Constant	2.487***	2.619***	2.379***	1.614***	1.659***
Number of school-by-year observations	1,513	1,513	1,472	1,513	1,424
Number of unique schools	193	193	193	193	193
R^2	0.719	0.767	0.704	0.374	0.483

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 3.95 school-level *SD* lower outcomes, on average, holding all other cost factors in the model constant.

Note. All outcomes are standardized to have a mean of 0 and *SD* of 1. Absence rates and suspension rates were reverse coded consistent with other outcomes, such that higher values represent higher outcomes. Standard errors are clustered by school. Models also include year-specific indicator variables (where FY 2022 serves as the reference group for all models). The constant term represents outcomes in FY 2022 with all other coefficients set to 0. Regression models are weighted by enrollment. The reference population density category is schools in zip codes with fewer than 300 people per square mile. The reference enrollment category is schools with more than 800 students. The programming and grade-level proportion coefficients are interpreted relative to enrollment in elementary grades. Data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education, 2021–22. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

Chapter Summary

To examine the relationship between student needs and outcomes, we constructed an aggregate outcome measure at the school level using several student outcome measures encompassing test performance, attendance, discipline, and high school completion. Our analysis demonstrates that student needs as indicated by low-income, disability, and EL rates are negatively related to student outcomes in Delaware. This suggests that districts with higher percentages of students who have additional needs are currently not providing their students equal opportunity to achieve educational success compared with districts serving fewer students with additional needs.

Our prior equity analyses (in Chapter 4) showed that education spending in Delaware is not strongly differentiated across schools and districts according to the percentage of low-income or EL students. The evidence provided here demonstrates that additional resources need to be provided for these students, and these factors should be incorporated into Delaware's funding system in a stronger way. In addition, although Delaware does provide additional resources for students with disabilities, the systematically lower outcomes for this student group suggest that the current level of additional resources is not sufficient to provide students with disabilities equal educational opportunities.

6. Comparison of Spending in District and Charter Schools

Delaware's education system includes 23 charter schools serving more than 17,000 students—approximately 12% of the state's public-school enrollment (as of the 2021–22 school year). Delaware's charter schools operate independently of Delaware's school districts. This means that they receive their state and federal funding directly (as opposed to funds passing through a school district to the charters), are not governed by a district school board, and are not subject to district collective bargaining agreements and contracts. Districts and charter schools in Delaware (with few exceptions) do not share services, and charter schools are responsible for providing all educational services for students they enroll.[37,38]

Delaware's charter schools are funded primarily through the state's unit system and through local funding provided from districts for students attending charter schools who reside in a given district. Charter schools also receive federal funding through the same federal funding streams provided to districts (such as Title I) and through other charter-specific funding provided through the U.S. Department of Education's Charter School Program.

Although charter schools are assigned units on the same basis as districts, the actual resources that are distributed differ between districts and charter schools. For districts, units provided by the state primarily result in the provision of teacher positions, along with some nonpersonnel dollars for operational expenses. In contrast, units for charter schools are converted to dollar amounts so that charter schools are provided funding, which can be used flexibly to hire staff and purchase supplies and services as decided by the charter.

[37] In interviews with district and charter school leaders, we asked whether there were any services provided by districts to charter school students and vice versa. Through those interviews, we did not identify any such service arrangements.
[38] This contrasts with how charter schools operate in some other states. For example, charter schools in Maryland are all authorized by school districts. The staff of charter schools in Maryland are considered district employees and are subject to district collective bargaining unless amendments with the local union are negotiated. Some school districts in Maryland also manage certain services for charter schools centrally, often including the provision of special education services and student transportation (Levin et al., 2016). As another example, in California, charter schools often are provided options for how they want to provide special education services. They could receive funding to provide special education services themselves, receive services in lieu of funding, or some combination of the two (Atchison et al., 2018). These service arrangements are important because they affect the interpretation of reported spending. If, for example, charter schools receive services from school districts, the expenditures for those services may not be reported by the charter school. They may, in fact, be reported by the district providing the services, which would inflate reported expenditures for the district and lower reported expenditures for the charter schools. However, the general lack of service arrangements in Delaware means this is not an issue.

Despite the intent to fund districts and charter schools in the same way, questions remain regarding whether charter schools are fairly funded as compared with schools in districts. To address the fairness of funding for charter schools, we conducted analyses to examine the extent to which charter schools spend similar amounts per pupil as district schools, accounting for differences in student and school characteristics and contexts across schools that may also affect spending levels. The following report brief presents (a) information about the data sources used, (b) descriptive analyses comparing charter and district school characteristics and student outcomes, (c) a comparison of average spending in district and charter schools *without* adjusting for school characteristics and contexts, and (d) a comparison of average spending between district and charter schools *after* adjusting for characteristics and contexts.

Perception of District and Charter School Administrators Related to Charter School Funding

The policy for calculating the local cost determines the amount of money charters schools receive from individual districts in the current year based on district per-pupil expenditures from the prior year and the number of students from that district enrolled in a charter school on September 30 of the current school year. Certain types of spending, such as spending from the tuition and match taxes, are excluded from the calculation.

The local cost per pupil for charters varies according to the sending district as some districts spend more from local revenue than others. In addition, charter school leaders perceive the determination of which expenditures are excluded from the calculation to be not transparent and feel that districts are able to “game the system” by categorizing spending so that it is excluded from the local cost calculations for charter schools. Districts, in contrast, feel that if they are raising revenue for a specific purpose, as in the case of tuition and match taxes, they should be able to use it for that purpose without it affecting their payments to charter schools.

District administrators in districts that lose many students to charter schools, reported the loss of revenue associated with those students to be a challenge.

For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

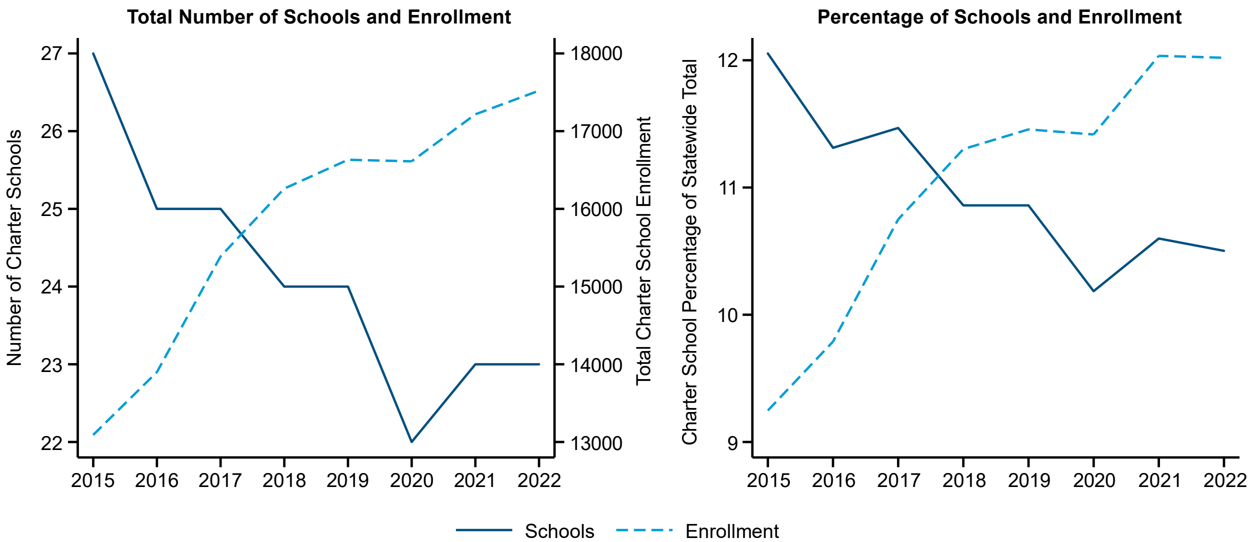
Charter School Characteristics

The following section presents information about Delaware charter schools in relation to district schools in order to provide context around subsequent comparisons of spending between the two. In particular, school spending is often driven by student needs. For example, we would expect schools with higher incidences of students with disabilities to spend more on a per-student basis because programming for these students involves higher levels of resources, which requires more spending.

Enrollment and Student Demographics

Exhibit 28 presents the number of charter schools and charter school enrollment over time from 2015 through 2022. Over this period, the number of charter schools in operation dropped from 27 in 2015 to a low of 22 in 2020, and then increased to 23 in 2021 and 2022. As a percentage of all public schools, charter schools represented approximately 12% of schools in 2015, falling to around 10.5% by 2022. Despite the drop in numbers of schools, charter school enrollment increased fairly steadily over this time period, from approximately 13,000 students in 2015, representing just over 9% of the total public school enrollment, to approximately 17,500 students in 2022, representing approximately 12% of total public school enrollment.

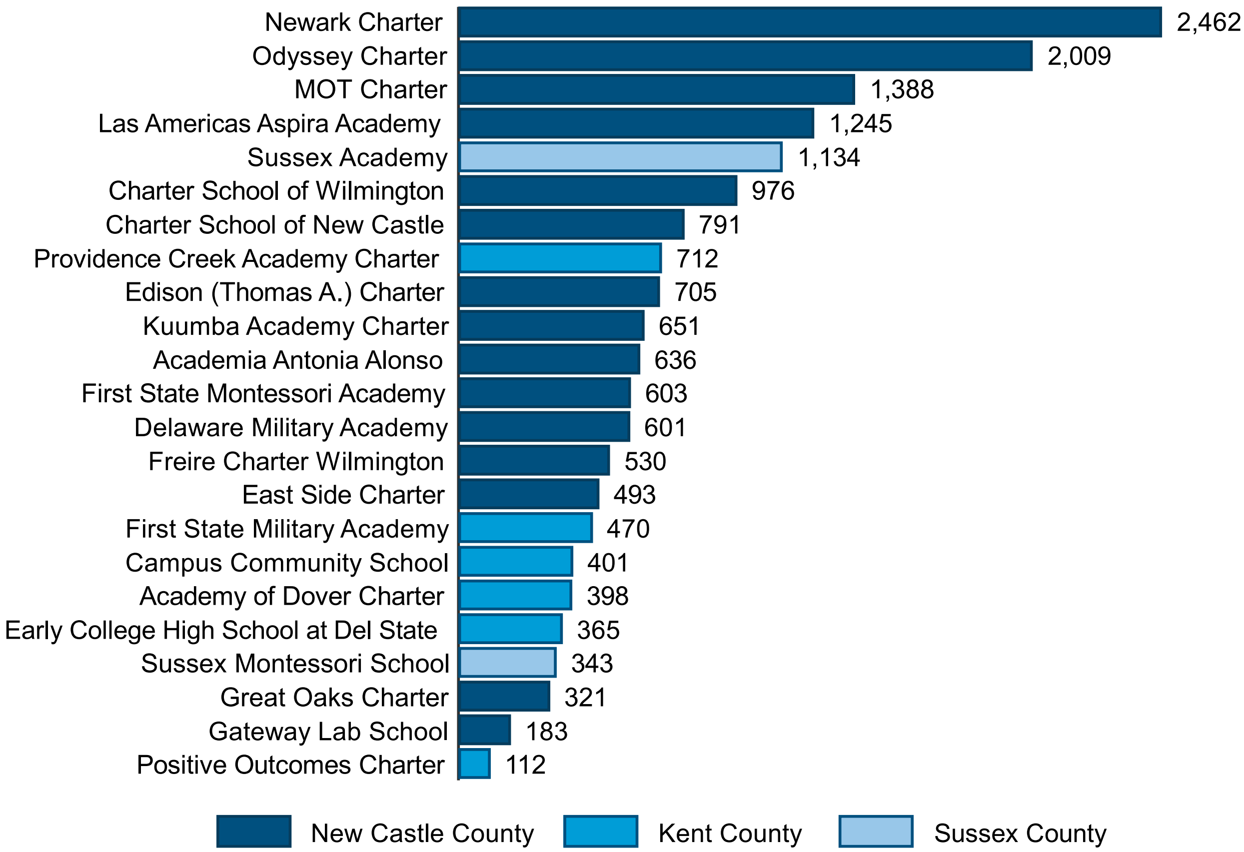
Exhibit 28. Number of Charter Schools and Enrollment in Charter Schools in Total and as a Percentage



Source: Authors' calculations from Delaware Open Data Portal student enrollment and directory files.

Geographically, the bulk of Delaware's charter schools were in New Castle County in 2022 (15 of 23); another six charter schools were in Kent County; and only two were in Sussex County. The distribution of charter schools across counties is not altogether surprising, given that approximately 56% of the state's public school enrollment is from New Castle County, with the other two counties accounting for just over 20% apiece. Delaware's charter schools vary greatly in enrollment, with the largest serving more than 2,000 students (Newark Charter and Odyssey Charter) and the smallest having enrollments of fewer than 200 students (Gateway Lab School and Positive Outcomes Charter) (see Exhibit 29).

Exhibit 29. Charter School Enrollment by School (2022)



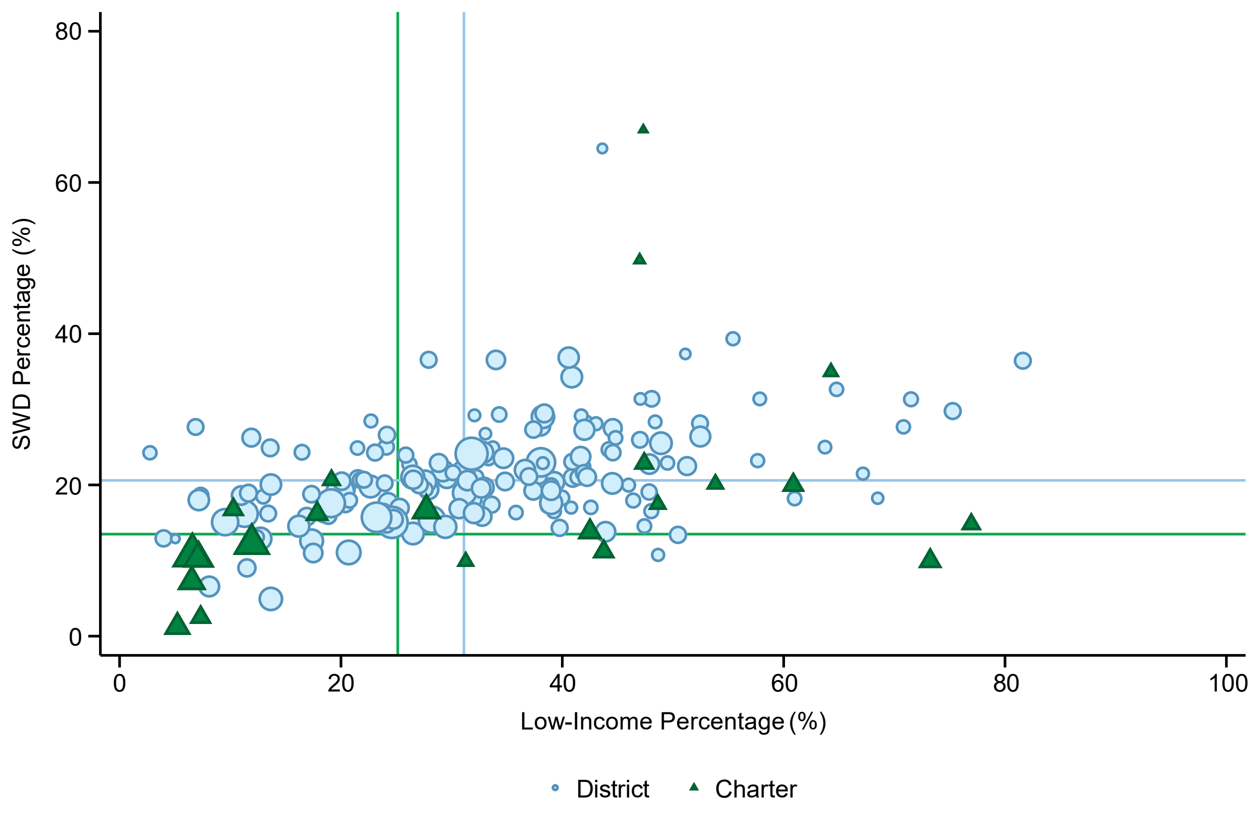
Source: Delaware Open Data Portal student enrollment file.

Across the state there is sizable variation in both the percentage of students with disabilities and those from low-income families. Exhibit 30 plots each charter school and district school based on the percentages of students in the school with disabilities and who are from low-income families. In addition, the overall averages for each school type are shown using horizontal and vertical lines.

For both district and charter schools, the school-level percentage of students from low-income families ranges from about 3% to 80%. Several large charter schools have particularly low percentages of students from low-income families, driving the overall average for charter schools down. As a result, the overall average percentage of charter school students who are from low-income families is lower than that for district schools (25% in charters compared to 31% in district schools).

A similar pattern is true for the percentage of students with disabilities (SWDs). Although there are several charter schools that serve very high percentages of SWDs and many that serve typical shares of SWDs, several of the larger charter schools serve very few SWDs (with two that serve almost no SWDs). On average, 13% of charter school students have disabilities, compared with 21% of district school students.

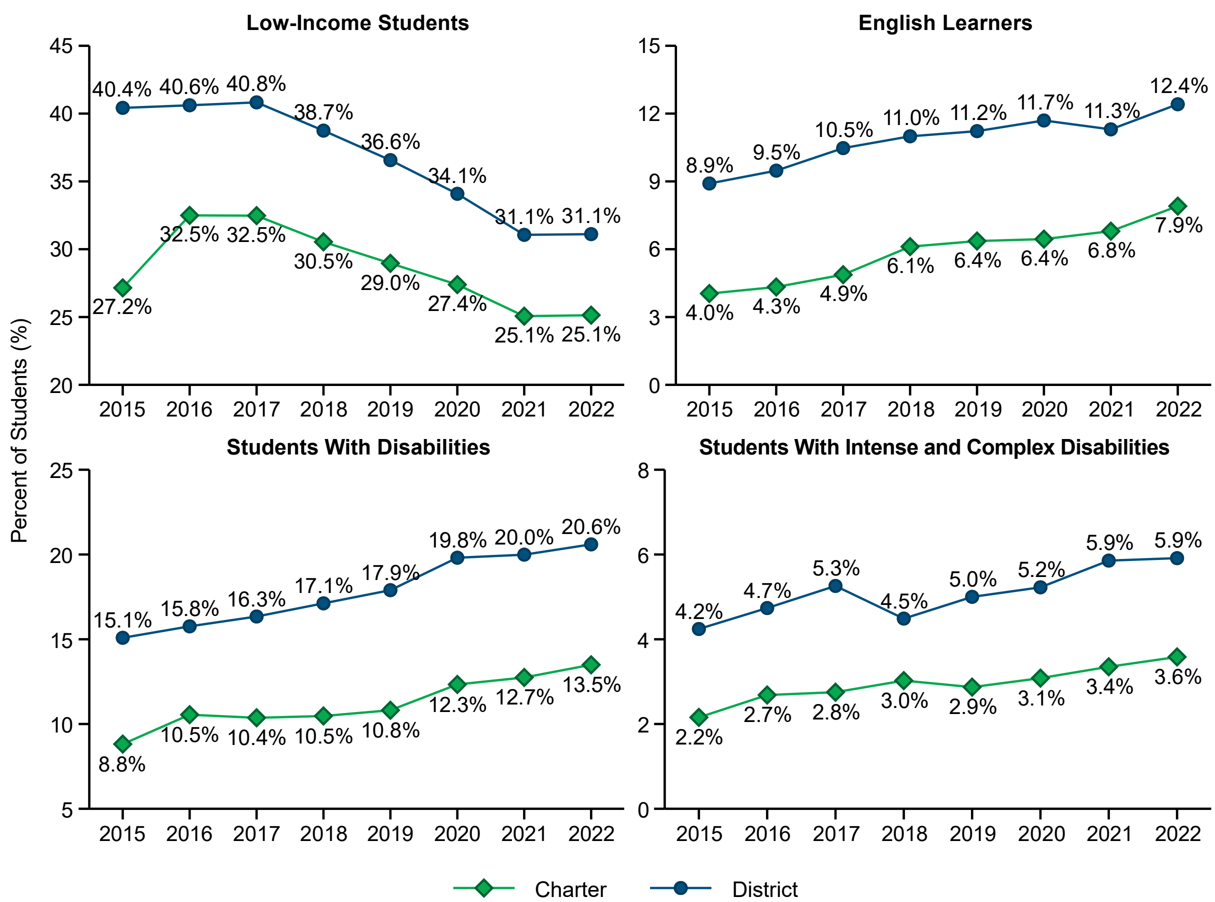
Exhibit 30. Low-Income and Students With Disabilities Percentages of District Schools and Charter Schools (2022)



Note: Vertical and horizontal lines represent the overall enrollment-weighted averages for district schools (light blue) and charter schools (green). District and charter school markers are weighted by enrollment such that larger markers represent schools with larger enrollments.
Source: Authors' calculations from Delaware Open Data Portal student enrollment file.

Exhibit 31 compares the percentages of students with particular needs over time between 2015 and 2022. Over this time, the differences in percentage of low-income students have somewhat narrowed. Whereas in 2016 and 2017, the percentage of students from low-income families was more than 8 percentage points higher in district schools than in charter schools, in 2021 and 2022 the difference was 6 percentage points. Differences in the percentage of ELs has also narrowed slightly from a difference of over 5 percentage points in 2016 and 2017 to a difference of 4.5 percentage points. Differences in the percentage of SWDs, however, have grown over time from a low of 5.3 percentage points in 2016 to more than 7 percentage points in 2021 and 2022. District schools have also consistently had higher shares of students with intense and complex disabilities.

Exhibit 31. Characteristics of District Schools and Charter Schools Over Time (2015–2022)



Notes: Averages are weighted by enrollment of each school.
Source: Authors' calculations from Delaware Open Data Portal student enrollment file.

In addition to differences in student characteristics, charter schools tend to have higher enrollment compared to their district counterparts (Exhibit 32). Students in district and charter schools are spread similarly across grade levels, with 44% to 45% in elementary grades (K–5), 23% to 24% in middle grades (6–8) and 32% to 33% in high grades (9–12).

Exhibit 32. Additional Average Characteristics of District Schools and Charter Schools (2022)

Characteristic	District schools	Charter schools
Enrollment	927	1,183
Elementary %	44%	45%
Middle %	24%	23%
High %	32%	33%

Notes: Averages are weighted by enrollment of each school.
Source: Authors' calculations from Delaware Open Data Portal student enrollment file.

Student Outcomes

The following section compares student outcomes in district and charter schools. Exhibit 33 shows the average student outcomes in district and charter schools across a variety of measures, including proficiency rates on the Smarter Balanced Assessment Consortium (SBAC) and Scholastic Aptitude Test (SAT) English language arts (ELA) and math assessments, absenteeism, suspensions, graduation, and dropouts. Across all measures, charter schools perform better than district schools. However, these comparisons do not account for differences in student population and context across the two sets of schools.

Exhibit 33. Student Outcomes in District Schools and Charter Schools (Pooled 2015–2022)

	District		Charter	
	Mean	Number of schools	Mean	Number of schools
ELA SBAC proficiency rate	50.4%	975	57.1%	122
Math SBAC proficiency rate	39.6%	971	48.3%	114
ELA SAT proficiency rate	47.2%	224	74.1%	57
Math SAT proficiency rate	25.6%	219	52.7%	56
Absence rate	6.2%	1,333	5.0%	183
Chronically absent percentage	16.4%	999	10.0%	139
Suspension rate	7.0%	1,259	5.7%	165
4-year graduation rate	87.5%	224	95.7%	41
Dropout rate	1.7%	176	1.0%	27

Notes: Averages are weighted by enrollment of each school. Number of schools represents the total number of school-by-year observations across the 8-year period from 2015 to 2022. Not all measures were included in the data across all years (e.g., tests were not administered in 2020 due to the Covid-19 pandemic). Certain outcomes only apply to schools with relevant grade ranges (e.g., graduation and dropout rates only include high schools).
Source: Authors' calculations from Delaware Open Data Portal student enrollment file.

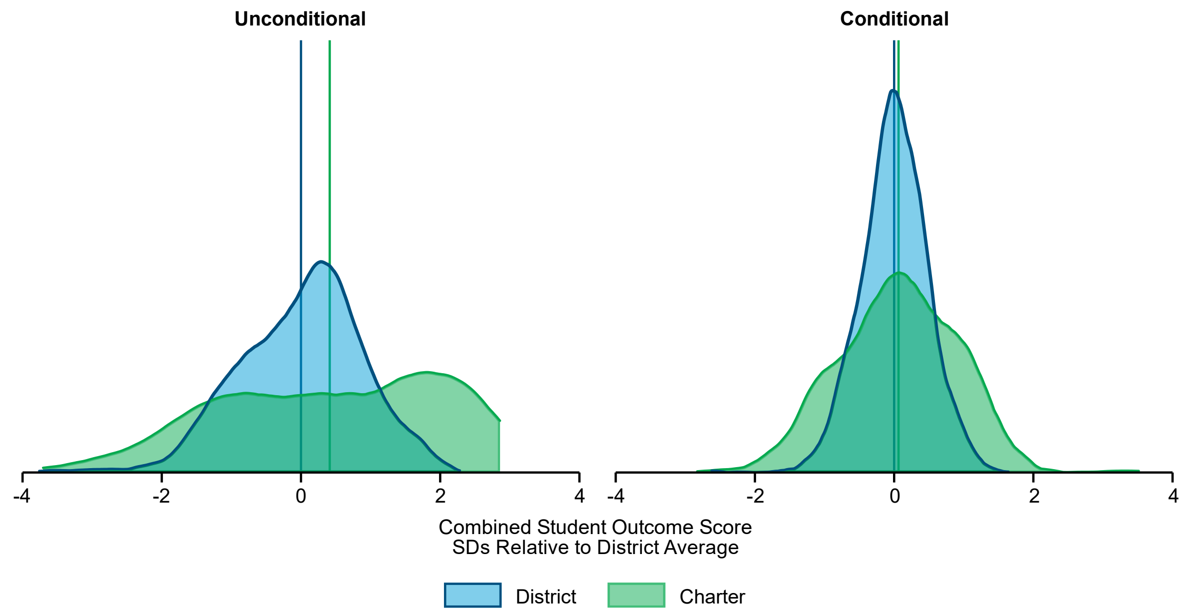
In Exhibit 34, we compare district and charter performance on an aggregate outcome measure that represents overall performance across a variety of outcomes.[39] As shown in the exhibit, when examined unconditionally (i.e., not accounting for differences in school characteristics, contexts, and student demographics), charter schools perform approximately 0.4 standard deviations above the district school average. Notably, there is a mass of students in charter schools performing approximately two standard deviations above average. However, there are also a substantial number of students in charter schools that are performing more than two standard deviations below average. Compared to the charter school distribution, that of district schools is narrower, with almost all schools performing within two standard deviations of the overall average.

Once conditioned on school characteristics and student needs, the overall averages of district and charter schools are almost identical (charter schools perform 0.06 standard deviations above the district school average), indicating that much of the difference in average outcomes between charter and district schools can be explained by differences in student demographics and other school contextual factors.[40] For both district schools and charter schools, the distributions become narrower when models control for student characteristics and needs, suggesting that much of the more extreme variation in the unconditional outcomes for both school types is also explained by student makeup and context. However, as with the unconditional scores, charter schools still show more variation. Some charter schools outperform the highest performing district schools, whereas other charter schools perform worse than the lowest performing district schools.

[39] See Chapter 5 for an explanation of how the aggregate outcome measure was calculated.

[40] To condition outcomes on school and student characteristics, we estimated a regression model for district schools with the outcome score as the outcome variable and student and school characteristics as predictor variables. We then predicted an outcome for all schools based on their school characteristics and subtracted the predicted outcome score from the actual outcome score. The regression model used for this analysis is presented in Exhibit D1 in Appendix D.

Exhibit 34. Aggregate Outcome Score in District Schools and Charter Schools (Pooled 2015–2022)



Notes: The vertical blue line represents the district school average. By the design of the analysis, this is precisely zero. The vertical green line represents the charter school average. Averages and distributions are weighted by enrollment of each school. Conditional student outcome scores represent the difference from predicted outcomes generated by an estimated regression run on only district schools using the outcome score as the outcome variable and student demographics and school characteristics as predictor variables.

Average Unadjusted Spending in District and Charter Schools

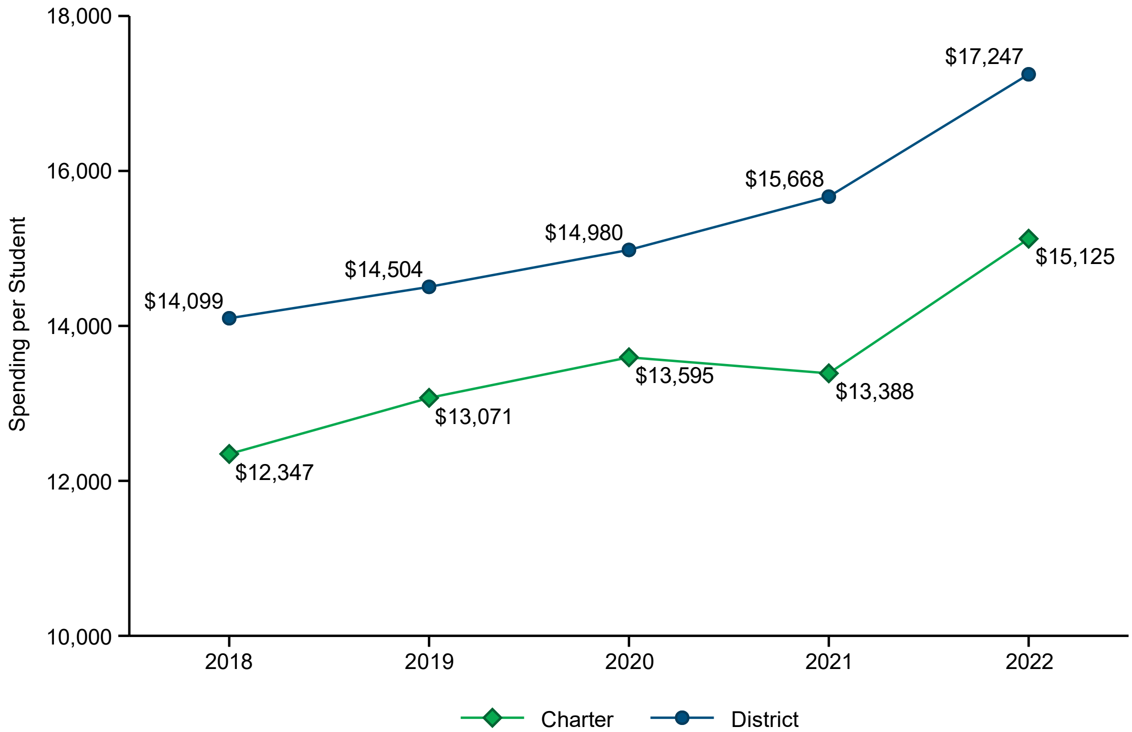
In this section, we present unadjusted spending levels for district schools and charter schools. Unadjusted spending is the average spending for each set of schools, weighted by enrollment. It does not account for differences in school needs, characteristics, and contexts that may affect spending levels across schools (e.g., percentage of students with disabilities or geographic location). Because schools in vocational districts are unique and because vocational districts receive additional vocational funding and have separate local funding through their own property taxes, we did not include vocational schools in the results for this section.

In Exhibit 35, we present spending per pupil from 2018 to 2022 for district schools and charter schools. For both sets of schools, spending increased over this period.[41] However, charter schools consistently spent less per student, on average, than district schools. In the most recent year in the analysis period (2022), district schools spent $17,247 per student, on average, compared with $15,125 per student in charter schools—a difference of over $2,000 per

[41] This analysis did not adjust for inflation.

student. Expressed in relative terms, average per-pupil spending in district schools was about 14% more than average spending in charter schools. In the preceding school year this difference was even larger.

Exhibit 35. Average Spending Per Student in District and Charter Schools Over Time (2018–2022)



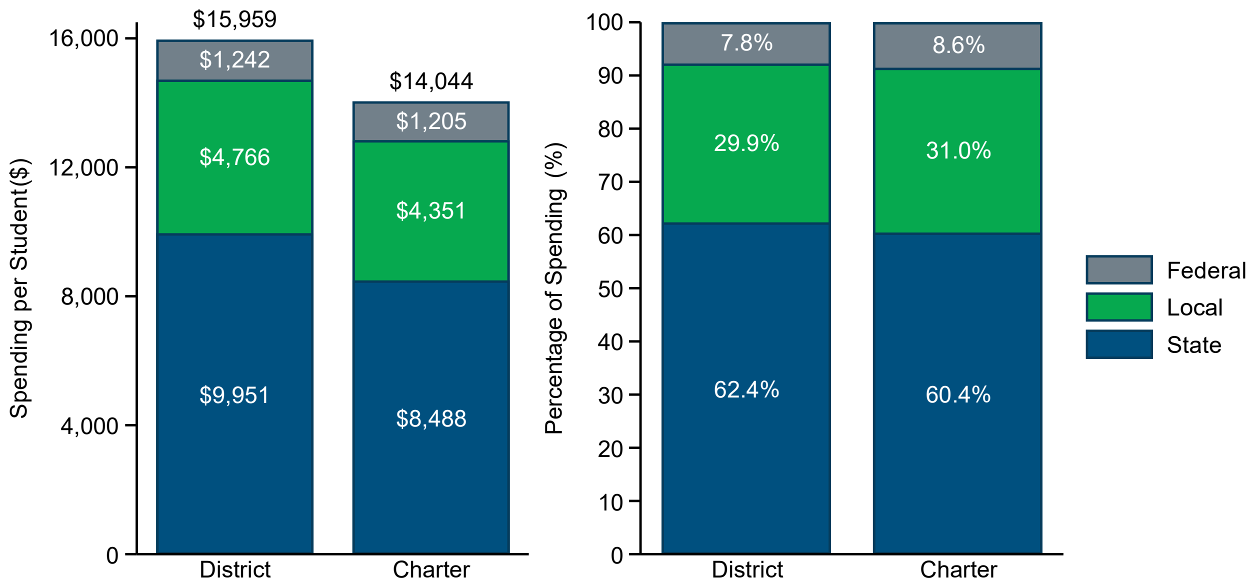
Notes: The district school category does not include schools in vocational districts. Averages are weighted by enrollment.
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Exhibit 36 shows per-student spending averaged over the last 3 years of the analysis period (2020, 2021, and 2022) in district and charter schools, disaggregated by funding source.[42] Over those 3 years, average spending in charter schools was almost $2,000 less per pupil than that in district schools. By source, charter schools spent almost $1,500 less per student from state sources and approximately $400 less from local sources. Differences in spending from federal sources were negligible. When converted to percentages of total spending, patterns of spending by source for district schools and charter schools were quite similar. Charter schools

[42] Here we chose to present spending in the most recent 3 years to not overemphasize patterns of spending in any single year, which may not be typical of historical or future spending patterns, but to also reflect recent trends in spending.

spent a slightly higher share from federal and local sources and a slightly lower share from state sources.

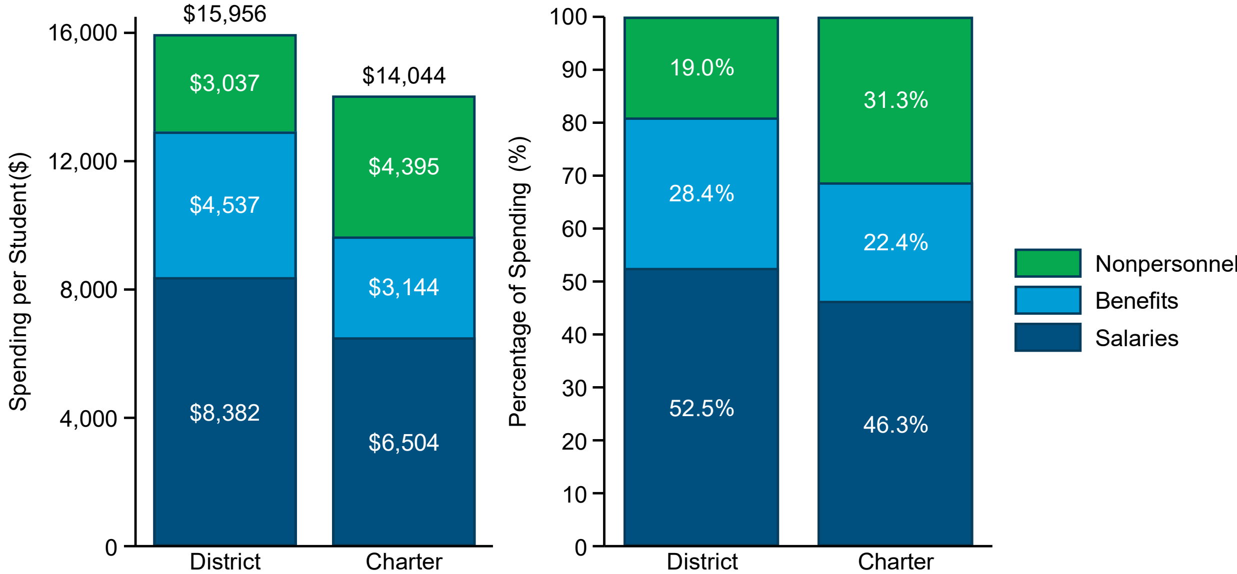
Exhibit 36. Average Spending per Student and as a Percentage of Total Spending by Funding Source (3-Year Average, 2020–2022)



Notes: The district category does not include schools in vocational districts. Averages are weighted by enrollment.
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Exhibit 37 further shows 3-year averages of per-student spending in district and charter schools, but disaggregated by object of spending. Here we present three broad object categories—salaries, benefits, and all nonpersonnel. In both dollars per student and percentages of spending, charter schools spent less than district schools on salaries and benefits but more on nonpersonnel—including supplies and materials, equipment, minor capital spending, and contracted services. As a share of total spending, charters spent more than 30% on nonpersonnel, whereas districts spent less than 20% on nonpersonnel.

Exhibit 37. Average Spending per Student and as a Percentage of Total Spending by Spending Object (3-Year Average, 2020–2022)



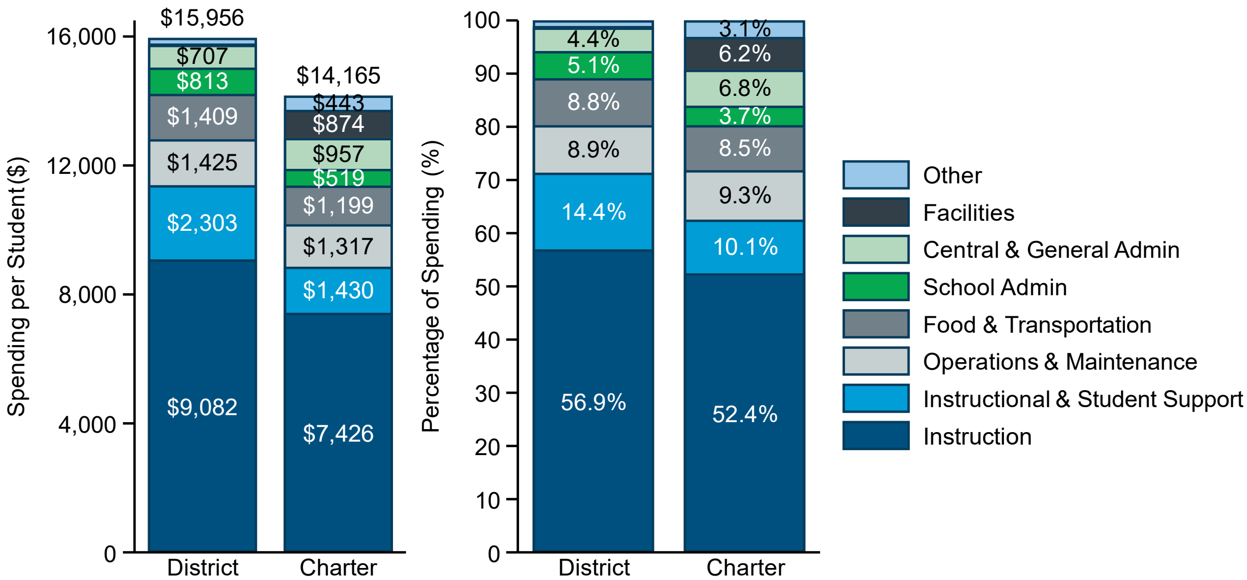
Notes: The district category does not include schools in vocational districts. Averages are weighted by enrollment.
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Lastly, Exhibit 38 shows how per-student spending of district and charter schools breaks down according to function categories. As opposed to objects, which describe what was purchased, functions describe the educational programmatic component supported by the expenditure. Charter schools spent less as a percentage on instruction and instructional and pupil support and spent more on operations and maintenance, central and general administration, facilities, and other miscellaneous expenditures that could not be assigned to a single function.

The largest difference in percentage terms is in spending on facilities. As shown, districts spent almost nothing on facilities from their operational budgets, whereas charter schools spent more than 6% on facilities. Districts have separate funding for facilities, which is why there is almost no spending on facilities included as current spending. Charter schools also can raise bonds to pay for facilities; when this is the case, facilities expenditures are also not included in their current expenditure figures. However, charter schools may pay for rent, pay for minor facilities improvements, or make mortgage payments using their unit funding or local funding. It is those instances where spending on facilities is made through general state or local funding that account for the 6.2% of spending on facilities by charter schools.[43]

[43] We have chosen to include this spending on facilities by charter schools in the analysis given that it is funded through sources intended to support current spending. Because of this intent, we believe the comparisons including such funding to be more appropriate than if we had chosen to exclude this funding.

Exhibit 38. Average Spending per Student and as a Percentage of Total Spending by Spending Function (3-Year Average, 2020–2022)



Notes: The district category does not include schools in vocational districts. Averages are weighted by enrollment. The overall charter school average does not equal that in Exhibits 36 and 37 because the data for one charter school did not allow for disaggregation by function.
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Adjusted Comparisons of Spending in District and Charter Schools

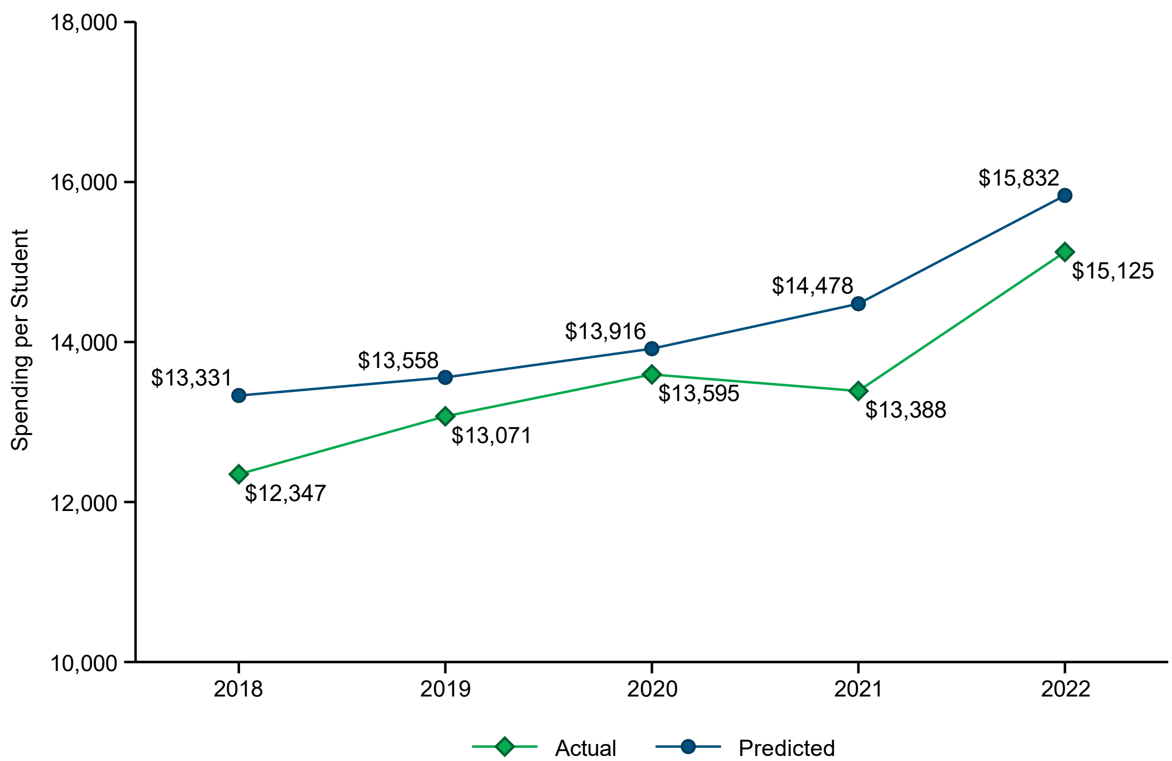
In this section, we present adjusted comparisons of per-student spending in district schools and charter schools. The adjusted comparisons of spending account for differences across schools in the types of students served, school characteristics (grades served and school size), and other contextual factors (geographic location). We make these adjustments by first using a regression model that includes only district schools. This regression model is used to estimate how spending in district schools varies according to the factors included in the model. We then use the regression results to predict what spending would be in each charter school if it were treated as a district school but retaining the characteristics of the particular charter school.[44] This predicted spending amount represents the spending in district schools with otherwise similar student populations, characteristics, and context to the charter schools. Exhibit D2 in Appendix D shows the regression results used to predict this "as if district" spending.

[44] As one exception to retaining the characteristics of charter schools, for charters with less than typical enrollment we predicted charter school spending as if those charter schools were the average size of district schools given the grades served by the charter school. This is because, unlike district schools, which may not have a choice regarding the size of their schools, the size of charter schools is at least, in part, a function of the charter school choosing to be a given size. Therefore, we chose to set school size for small charters at a value typical to that of district schools.

Exhibit 39 shows the average actual and predicted as-if-district spending per student in charter schools over the same 5-year analysis period as presented above in Exhibit 35. The predicted as-if-district spending levels are higher than actual spending in charter schools. However, the difference between the two is smaller than the difference between actual charter and actual district school spending. In 2022, the predicted as-if-district spending was $15,832, compared to $15,125 of actual spending in charter schools. This is a difference of just over $700, or approximately 5%. Recall that the difference in average actual spending between charter schools and district schools was over $2,000 (14%).

One factor contributing to lower predicted as-if-district spending compared to actual district school spending is the difference in student populations between charter and district schools. As described earlier, charter schools, on average, serve lower percentages of students with disabilities, English learners, and low-income students. Among district schools, each of these student groups is associated with higher spending, on average. As a result, predicted spending for charter schools with lower percentages of these students is less than average actual district school spending.

Exhibit 39. Average Actual and Predicted As-if-District Spending per Student in Charter Schools Over Time (2018–2022)

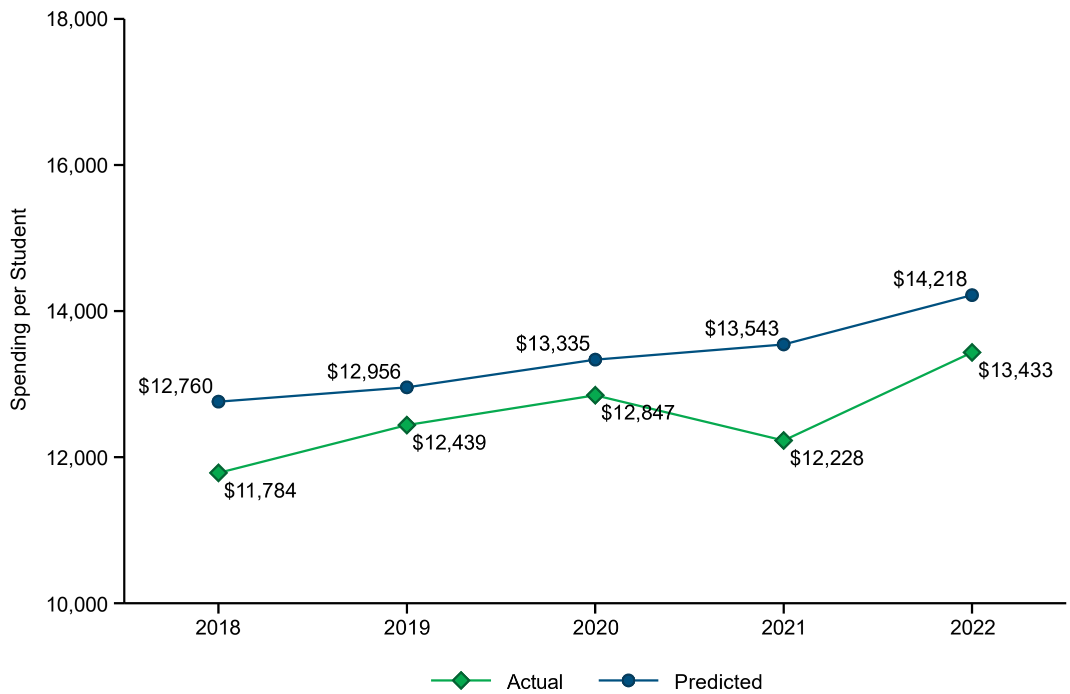


Notes: Averages are weighted by enrollment.

Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Exhibit 40 shows only spending from state and local sources. State and local funds are the portion that is governed by state policy. Federal funding, such as from Title I, is intended to "supplement, and … not supplant" funding from state and local sources. Therefore, examination of equity across schools within states should primarily focus on funds from state and local sources. When isolated to state and local funds, the gaps between actual charter spending per student and predicted as-if-district spending are exacerbated, with charter schools still spending less than they would have if they were treated as district schools. In 2022, charter schools' actual average per-student spending from state and local sources was $13,433, compared with predicted as-if-district spending of $14,218—a difference of almost $800.

Exhibit 40. Average Actual and Predicted As-if-District State and Local Spending per Student in Charter Schools Over Time (2018–2022)



Notes: Averages are weighted by enrollment.

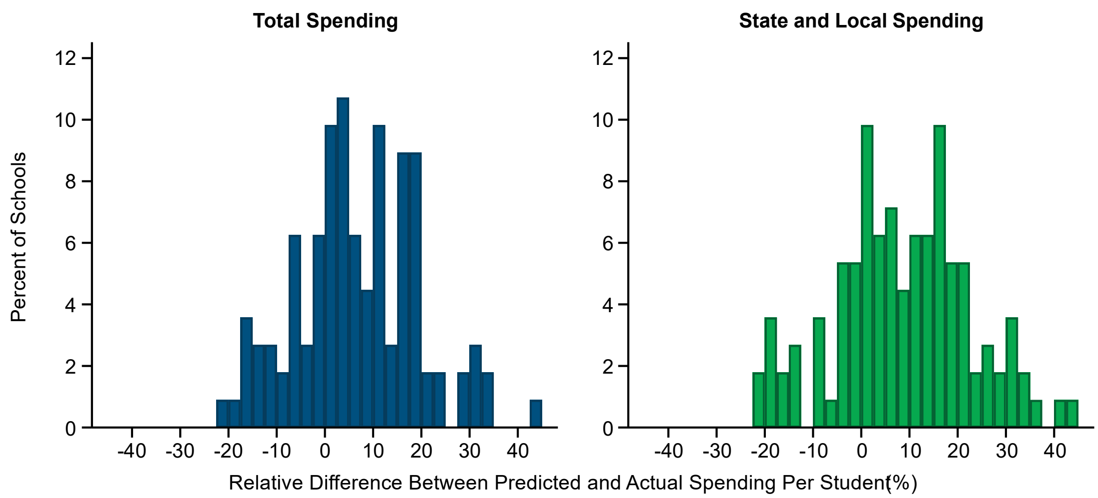
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

Finally, Exhibit 41 shows a histogram of the differences between as-if-district predicted and actual spending per student for each charter school across all years in the analysis period. The left panel shows the trends for total spending and the right panel shows the trends for state and local spending. A value of zero in this figure means that predicted and actual spending were the same. Values greater than zero mean that predicted spending was higher than actual spending. In contrast, values less than zero mean that predicated spending was less than actual.

Based on total spending, just under 30% of charter schools have a difference of ±5%, meaning these charter schools have similar levels of spending per pupil to district schools. For approximately 50% of charter schools, predicted spending exceeds actual spending by more than 5%, with the bulk of these having a difference between 5% and 20%. On the other end, about 20% of charter schools have actual spending that exceeds predicted spending by more than 5%.

The patterns for state and local spending are similar. However, in a slightly higher percentage of charter schools predicted spending exceeds actual spending by more than 5%. Furthermore, a higher proportion of schools have differences between predicted and actual spending that exceed 20%, reflecting a shift toward higher spending differences.

Exhibit 41. Differences Between As-if-District Predicted and Actual Spending in Charter Schools (Pooled 2018–2022)



Notes: This figure pools data between 2018 and 2022. Therefore, each charter school is represented up to five times. Positive differences mean that predicted spending was greater than actual spending. Negative differences mean that actual spending was greater than predicted spending.
Source: Authors' calculations from Delaware fiscal data and Delaware Open Data Portal student enrollment file.

We further examined these spending gaps between as-if-district predicted and actual spending to see if the size of the gaps was associated with the student demographics or characteristics of the schools. This analysis indicates that—all else equal—charter schools serving higher percentages of low-income students, schools providing more vocational and technical programming, and schools located in more urban/population-dense areas have larger gaps between predicted and actual spending. Factors associated with smaller (or negative) differences between predicted and actual spending are having higher percentages of students with disabilities and English learners and having higher enrollment (see Exhibit D3 in Appendix D).

Chapter Summary

Charter schools represent a sizable and growing share of public-school enrollment in Delaware. Delaware's school funding system intends to fund charter schools comparably for their operational expenses as school districts. Despite the intent, there are questions as to how charter school funding plays out in practice.

Within Delaware's current system of funding, districts and schools receive different amounts of funding for different types of students. Under the state's unit system, special education students accrue units at a higher rate than regular students, meaning that districts and schools with higher proportions of special education students receive more funding per student. In addition, in recent years schools have been provided additional funding for their low-income and English learner students though the Opportunity Funding program, whereby $55 million (amount to be effective in July 2024) is divided up according to the sum of low-income students and ELs in each district or charter school.

Because of these funding adjustments based on student needs, when comparing per-pupil spending (as a proxy for funding) in charter schools and district schools, it is important to recognize that charter and district schools often enroll students with different characteristics. Indeed, charter schools, on average, enrolled lower proportions of students with disabilities, English learners, and low-income students compared with district schools in 2022.

Unconditional comparisons of spending in district and charter schools—not accounting for differences in student composition across the two school types—show that district schools spent more per student on average than charter schools (approximately $2,000, or 14%, more in 2022). A large portion of that difference—but not all of it—can be attributed to differences in student needs. After accounting for differences in student characteristics and school contextual factors, the difference in spending was less than half of the unconditional difference (approximately $700, or 5%, in 2022). Furthermore, approximately half of charter schools spent at least 5% less than what they would be expected to spend if they were district schools.

This analysis compares spending per pupil in district schools with charter schools under the current distribution of funding. The results of the analysis suggest that charter schools may be somewhat underfunded compared to district schools within the current system. However, the analysis of outcomes shows that charter schools perform as well as (if not slightly better than) district schools, even when accounting for differences in student populations of the schools, suggesting that spending levels for charter schools may be appropriate, even if slightly lower than for district schools.

To the extent that the current distribution of funding does not provide equal educational opportunity for all students by allocating sufficiently more funding for students with particular needs, this analysis is limited. In other words, the comparisons of district and charter school spending presented here do not provide information on how much funding these schools *should* receive to provide students an adequate education. In order to do so, outcomes, and the cost necessary to achieve a specified outcome goal, must be accounted for. Subsequent analyses using the cost function and professional judgment panel approaches (presented in Chapters 7, 8, and 9) more fully address the question of adequacy.

Capital Funding

Capital funding is dedicated to building new school facilities or renovating existing facilities. The nature of capital funding is very different from the funding of current expenses, which cover the day-to-day provision of education services and operations. Whereas current expenses typically occur at regular intervals and at similar rates from year-to-year, expenses related to major construction projects are not constant over time. When a major construction project is actively occurring, the costs are high. But once a new school is built or a major renovation completed, that school will not require any new construction for many years. Because of the uneven nature of spending on school construction projects, the mechanisms used to fund them are very different from those used to fund current or operational spending in schools. The analyses conducted for this study largely focus on current spending and the funding of current spending. Here we take a moment to discuss capital funding.

Large school construction projects are generally financed through bonds. Bonds are a type of long-term borrowing that allows the state to spread the payment of high cost of facilities construction projects out over multiple years, similar to a home mortgage. The state sells bonds to investors (typically banks) to be able to pay the immediate costs of the construction projects. In return, the state repays the investors over time, with interest, using tax dollars. The state typically funds at least 60% of major capital projects. Districts are also able to sell bonds to raise funds to support the local share of facilities costs.

In order to receive state funding for major capital projects, districts must develop and submit documentation describing the districts need for such a project and a plan for carrying out the project called the “Certificate of Need” application. Upon receiving these applications from each district, the state ranks them according to priorities, where Priority 1 is addressing documented patterns of growth in enrollment, Priority 2 is addressing serious health, safety, and/or code violations, and Priority 3 is addressing facility aesthetics or other issues not related to the prior priorities. Once approved by the state, the district holds a referendum to approve local funding of the project.

Although the state funds a generous portion of approved projects, district administrators were often frustrated that major capital projects they felt were critical were not approved. Several administrators noted that they apply and reapply for funding year after year and are frequently denied leading to a growing cost of deferred maintenance. For a comprehensive reporting of the analysis of interviews with district and charter school leaders see Appendix A in the Technical Appendix.

7. The Education Cost Model Approach to Estimating Adequacy

Determining the funding necessary to provide equal opportunities for an adequate education requires that we first determine desired levels of outcomes and then estimate the levels of spending associated with providing equal opportunities for all students in the state to reach those outcomes, regardless of their needs or setting in which they attend school. "Adequacy targets" must be established that represent the spending levels estimated to support opportunities for students to reach the target outcomes that are unique to each district or school, and then current spending levels must be compared to these targets to assess whether the current system of funding achieves adequacy.

The evaluation of equity in Chapter 4 presented the existing distribution of spending or resources across districts and schools with respect to student needs or other structural or geographic differences. It did not, however, address the level of resources that would be needed to provide opportunities for all students to meet target levels of achievement. To examine adequacy—or the estimated funding levels needed to provide equal opportunity—we use a cost-function approach (i.e., a cost model) that incorporates student outcomes along with common cost factors (e.g., student needs, district or school enrollment size) as predictors of spending within a regression model. This cost function model estimates the levels of spending needed to achieve the desired student outcome level across all schools and districts, while retaining each school or district's current observed level of other cost factors (such as percentage of low-income students or district size). The cost model indicates how spending should be distributed across schools or districts to achieve common desired levels of student outcomes, while also accounting for differences across schools and districts in student needs and other structural and geographic differences that drive costs. We use the cost model to estimate funding weights that inform the development of an adequate and equitable funding formula.[45]

The remainder of this chapter is organized as follows. First, we describe the cost model methodology in more detail to provide a foundation for our cost modeling application to Delaware. Next, we present the results of the cost model and the subsequent estimation of funding formula weights. Finally, we show how the funding formula derived from the cost

[45] For additional information on alternative approaches to estimating the cost of an adequate education, see Baker, Levin, et al., 2020).

model and weight estimation would be used to distribute funding equitably and adequately to Delaware's schools and districts, providing equal opportunity for all students to achieve.

Estimating Costs Through Cost Modeling

The study team applied a three-step process for using education cost models to inform the design, redesign, or recalibration of state school finance formulas. This process was recently used in Vermont (Kolbe et al., 2019) and New Hampshire (Atchison et al., 2020):

- **Step 1:** Estimate an education cost model (ECM) with school-level data spanning several prior school years using rigorous statistical methods. This model determines the predicted cost of meeting defined student outcome targets, accounting for differences in a host of factors related to student needs and district characteristics that drive educational costs (i.e., cost factors).
- **Step 2:** Generate a set of formula weights derived from the ECM that reflect the relative importance of different cost factors in a potential funding formula. These weights are generated by fitting a statistical model of the relationship between the predicted costs from the cost model in Step 1 (discussed in the next section) and cost factors commonly found in state aid formulas (e.g., measures of student need, school or district enrollment size, and degree of geographic remoteness).
- **Step 3:** Apply the weights generated in Step 2 (discussed next) in a formula simulation to generate school- and district-level adequacy projections and compare those projections to actual spending levels of schools.

Applying the Cost Modeling Steps

In Step 1, the study team estimated an ECM using data on operational education spending,[46] outcomes such as student achievement, and a variety of factors influencing the cost of achieving these outcomes. The ECM allowed us to generate the predicted cost per pupil of achieving a predetermined outcome for districts for which we have complete data for the years included in the model.

The ECM included some necessary complexities as well as basic elements. The dependent measure in the cost model is a measure of per-pupil spending. Also included are factors that affect the differential cost of achieving a given level of outcome and assumed to be outside the control of districts: (a) variation in student needs, (b) geographic variation in the price levels of

[46] Operational spending refers to expenditures devoted to the ongoing operation of schools and districts and generally excludes large-scale capital investments in buildings and land, which regularly require long-term financing. This is also frequently referred to as current spending.

educational inputs (e.g., teacher salaries), and (c) structural or geographic factors such as district size and population density.

The goal of the ECM is to determine the relationship between spending and student outcomes across districts while accounting for the various cost factors. Therefore, the cost-function model must include measured student outcomes. The relationship between spending and student outcomes is circular, meaning that increased spending can drive student outcomes, but higher outcomes also may drive increased spending; for example, by making the district more attractive, leading to increased property values and higher amounts of locally raised revenue. The ECM uses appropriate statistical techniques to account for this circular relationship between outcomes and spending.

Education spending includes expenditures that contribute to those observed student outcomes that have been included in the model—thought of as the cost portion of spending—and expenditures not related to student outcomes—thought of as inefficiency. Specifically, districts may make investments that do not necessarily contribute to the outcomes under consideration. This can include significant investments in music or arts programming, athletics, or other extracurricular activities that may not directly affect student outcomes included in the models, such as those measured by standardized tests of student achievement. The ECM accounts for this potential inefficiency by including efficiency controls that predict increased spending behavior but do not contribute to higher outcomes. After accounting for these statistical complexities, we used our model to predict per-pupil spending levels needed (i.e., costs) for each school to achieve specific outcome targets. More technical detail regarding cost modeling is included in Appendix E.

In Step 2, we took the school- or district-level predicted cost estimates corresponding to a level of outcome that is considered adequate (defined later in this chapter) and identified a smaller set of cost factors to be used as weights in a simulated funding formula. We then fit a weight estimation model that relates these factors to the predicted costs, with the purpose of generating a set of weights that can simulate per-pupil costs for schools and districts in future years, using updated school or district data and an assumed inflation rate. The weight estimation model produces a base per-pupil cost, which represents the predicted cost per pupil for a district that faces none of the factors that put upward pressure on cost. An example is a large district in a low-cost area with no students who are economically disadvantaged, with no EL students or students with disabilities. Formula weights are calculated as the differential cost per pupil for a given cost factor divided by the base per-pupil cost. Formula weights have a simple interpretation as the percentage increase in the cost of providing opportunities for an adequate education when the associated cost factor is present (e.g., when a student is an English learner). For this report we have modeled multiplicative weights that are centered on a value of 1. For example, a calculated formula weight for low-income students of 1.65 would indicate that it costs 65% more to provide a low-income student an opportunity to achieve at the adequate outcome standard compared with an otherwise similar higher income student.

In Step 3, the study team used the formula weights estimated in Step 2 to simulate per-pupil funding projections for all schools and districts. The difference between these simulated funding projections based on costs and the most recent available data on actual spending determines current spending gaps: the change in spending (and assumed funding) needed to achieve target outcomes. This type of simulation, which is based on a formula derived from an empirically estimated ECM, can be translated directly into legislation and incorporated into state finance systems. Many state school finance formulas take a similar form to the formulas used to simulate the distribution of dollars in our simulations, including New Jersey's School Funding Reform Act and Kansas's School District Finance Act (see prior state vignette briefs on New Jersey and Kansas [Baker, Atchison, et al., 2020; Baker, Kearns, et al., 2020]). Separate from the report, we also provide a simulator tool, which can be used to model how the funding weights and funding levels derived from the analysis would affect the funding of schools and districts in Delaware or explore how custom weights and funding levels would affect funding for schools and districts. We also provide documentation describing how to use the simulator tool.

Application to Delaware

Using this process, we estimated two cost models. The first is a regional cost model that uses national data aggregated at the district level and includes Delaware as well as nearby states. The second model is Delaware-specific and uses school-level data collected mostly from the Delaware Department of Education and Delaware Open Data Portal. The regional model has the advantage of using a large number of districts from multiple states. For statistical analyses underlying cost modeling, a larger number of observations (districts, in this case) can help produce more precise estimates of costs. However, the regional model relies on national data, which means that the measures used might not exactly match Delaware's own data. Furthermore, because of the time it takes to collect and process national data, the most recent school year represented in the national data is 2018–19.

The Delaware-specific model has the advantage of using Delaware's data, which local stakeholders are familiar with and is more current. In addition, we could incorporate multiple student outcomes with Delaware's data, whereas the regional model uses only a measure of student assessments. Because Delaware has a small number of districts, we performed a school-level analysis with the Delaware-specific model.

Setting Outcome Targets

Prior to estimating the cost model, we determined an appropriate target outcome level to represent an adequate education. The two models just described rely on two separate sets of data, including different measures of student outcomes. Our regional model uses data from state assessments of reading and mathematics, which have been equated to a common national scale by researchers at Stanford University. Our Delaware-specific model uses an aggregate outcome measure based on several different individual outcome measures.

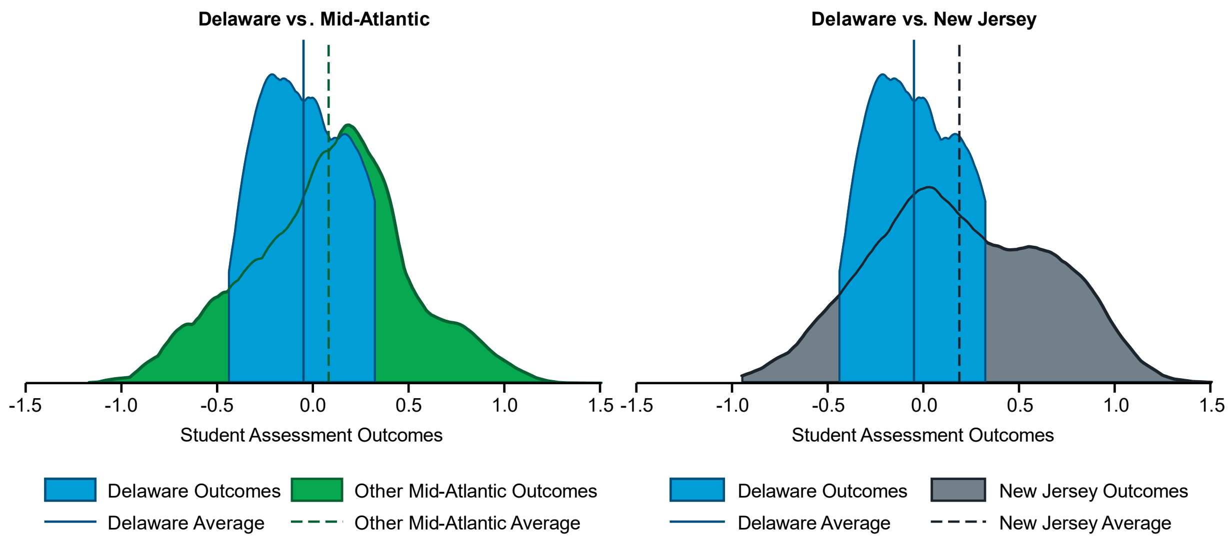
A common approach in education cost modeling is to predict per-pupil costs of achieving existing average outcomes. That is, where about half of the students perform below and about half perform above the average outcome. One advantage of this approach is that the average outcome requires little extrapolation to predict costs associated with achieving that outcome. However, in the context of an adequacy study, estimating costs based on average outcomes may not be appropriate if current outcome levels are clearly less than the state's educational goals. To provide context on current performance levels, we compared performance in Delaware to that of nearby states.

In Chapter 3, we included an analysis of NAEP performance in Delaware and other Mid-Atlantic states. That analysis showed that NAEP performance in Delaware is below that of Maryland, New Jersey, Pennsylvania, and Virginia. Furthermore, average performance in Delaware was well below levels considered proficient according to the Smarter Balanced Assessment Consortium, of which Delaware is a member. In Exhibit 42, we examine Delaware's student assessment performance in a slightly different way. This exhibit compares outcomes in Delaware to other Mid-Atlantic states according to an index created by researchers at Stanford University as part of SEDA. The outcome index is based on assessment data from each state along with NAEP data to create a standardized measure of performance that intends to make performance measures comparable across states. A value of 0 on the outcome index represents the national average.

The results of these comparisons show that as of 2019, Delaware's student assessment outcomes, on average, were slightly below the national average and even farther behind the average of students in other Mid-Atlantic states. New Jersey is among the highest performing Mid-Atlantic states, and thus outpaces Delaware's average student achievement by a substantial margin. However, the distribution of achievement in Delaware does overlap the New Jersey average, showing that at least some districts in Delaware perform at the level of New Jersey's average.

The regional model uses the SEDA outcome index shown in Exhibit 42 as the outcome variable. Because Delaware's current outcome levels are not adequate, as suggested by both the NAEP and SEDA outcome comparative analyses, we chose to set an outcome target above that of Delaware's current outcomes and used New Jersey's existing outcomes as the target outcome level for the regional model.

Exhibit 42. Distribution of Performance in Delaware Districts Relative to Other Mid-Atlantic States and New Jersey (2019)

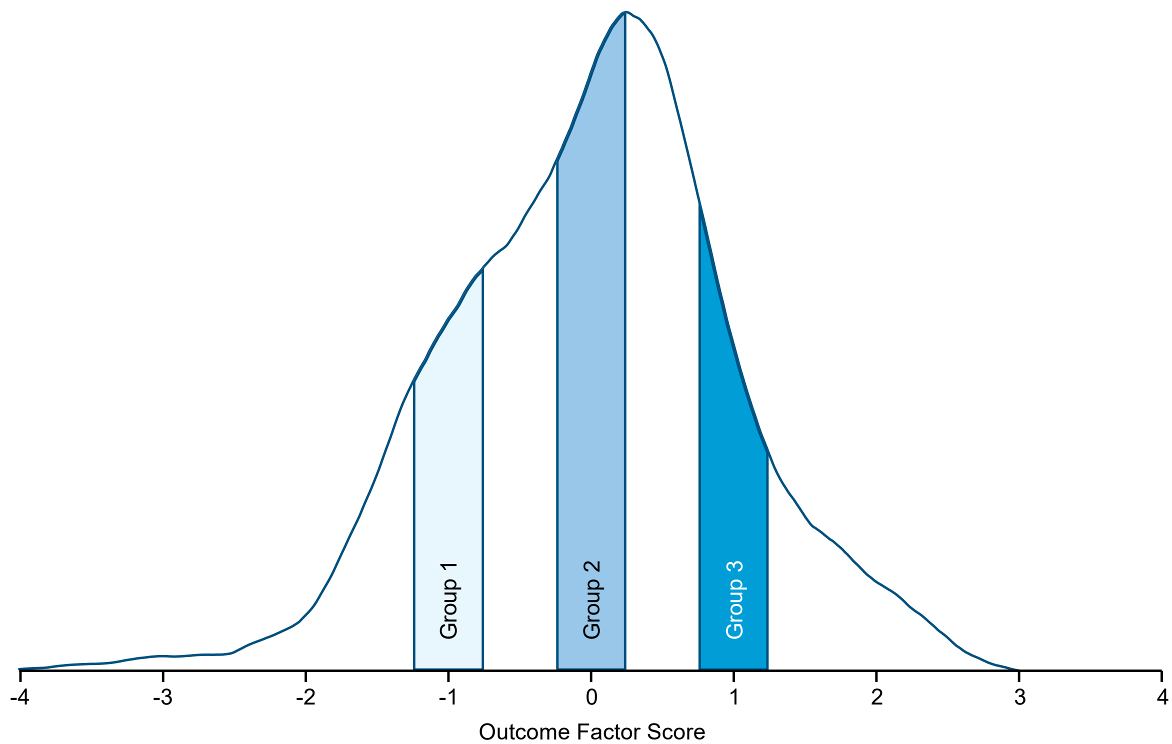


Note. The set of states in the Mid-Atlantic includes Maryland, New Jersey, Pennsylvania, Virginia, and West Virginia. Student assessment outcomes are based on an outcome index calculated from the Stanford Education Data Archive. A value of 0 represents national average outcomes. The vertical solid blue line represents the enrollment-weighted average outcome index for Delaware school districts. The vertical dashed lines represent the enrollment-weighted average outcome index for other Mid-Atlantic states and New Jersey, respectively.

Exhibit 43 shows the distribution of the outcome factor score we developed using Delaware's outcome data on several outcomes for Delaware schools (described in Chapter 5). Note that the mean of the outcome factor score is 0 and the standard deviation of the outcome factor score is 1. Three areas of the distribution are shaded and labeled Group 1, Group 2, and Group 3. Group 1 represents somewhat low-performing schools within a plus or minus 0.25 point bandwidth around an outcome score of -1 (i.e., -1.25 to -.75). Likewise, Group 2 represents schools around the average, or an outcome factor score of 0 (i.e., -0.25 to 0.25). Group 3 represents relatively high-performing schools with an outcome factor score close to 1 (i.e., 0.75 to 1.25). A table in Exhibit 43 describes outcomes for schools in those groups. These outcomes are pooled across an 8-year period—from FY 2015 to FY 2022—and the school count represents the number of schools across those years. Therefore, the 170 schools in Group 3 represent an average of about 21 schools per year. Not all outcome measures apply to all schools, so the number of schools for which a given outcome applies in the data is represented in the "count" column.

Describing how outcomes vary across these three school groups helps with both the interpretation of the outcome factor score and how to set an outcome target. As a validation that the outcome factor score is working as it should, one observation is that outcomes across all outcome variables included improve across groups as the outcome factor score increases. To set an outcome target, our comparison across states suggests that current average outcomes in Delaware are not adequate. With the exception of the SAT Math, at least half of the students in Group 3 are performing above proficient on state assessments. In addition, 97% of Group 3 high school students graduate high school in four years, a rate that is higher than the state's goal for 4-year graduation rate as stated in its Every Student Succeeds Act plan (Delaware Department of Education, 2022). Setting an outcome goal for all schools to achieve at a similar or higher level as the Group 3 schools seems appropriately ambitious yet realistic, as a nontrivial number of schools already perform at such a level. Therefore, our preferred specification for the Delaware-specific model is with a target outcome factor score of 1.

Exhibit 43. Distribution of Performance in Delaware Schools Using the Outcome Factor Score (2015 to 2022)



Outcome measure	Group 1		Group 2		Group 3	
	Mean	Count	Mean	Count	Mean	Count
SBAC* ELA proficiency rate	36.2	125	49.8	222	66.3	125
SBAC math proficiency rate	25.8	121	40.4	222	58.0	125
SAT ELA proficiency rate	34.1	36	49.2	46	60.8	29
SAT math proficiency rate	15.4	33	26.7	45	32.6	29
Chronic absenteeism rate	21.3	135	13.5	227	9.4	128
Absence rate	7.3	179	5.6	302	4.7	170
Suspension rate	10.0	171	5.2	288	2.2	158
4-year graduation rate	81.0	36	89.0	38	97.0	28
Dropout rate	2.7	30	1.3	32	0.6	21
3-year teacher retention rate	58.2	173	68.6	294	75.8	165
N	179		302		170	

Note. Counts represent the numbers of school observations between the 2014–15 and 2021–22 school years. Data come from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education. *SBAC = Smarter Balanced Assessment Consortium.

The Cost of Providing Opportunities for an Adequate Education

As mentioned above, to estimate the cost of providing opportunities for adequate education, we estimated a Delaware-specific model and a regional model that included districts from nearby states (i.e., Maryland, Pennsylvania, New Jersey, Virginia, and West Virginia). Exhibit 44 summarizes the Delaware-specific model and regional cost model results in terms of the direction with which each characteristic or factor influences cost. Exhibits E4 and E5 in Appendix E show the detailed cost model results.

The results of the two models were quite similar. In general, and consistent with expectations, both models indicated that achieving higher student outcomes would cost more than what is currently spent, and both models indicated that districts with higher shares of low-income students, students with disabilities, and EL students have higher costs to achieve a common outcome level compared with districts with lower incidences of these student needs. Furthermore, both models indicated that small schools or districts have higher per-pupil costs compared with larger schools or districts.

There were some differences across models, however. Our Delaware model found that students in vocational/technical settings have higher costs, but we were unable to include such a measure in our regional model, as comparable data on students in vocational/technical settings does not exist across states. Differences in costs by grade range were not significant in the Delaware model, whereas the regional model found that higher shares of students in high school grades increases costs. Last, the Delaware and regional models had opposite results for population density, with costs being higher in higher density areas in our Delaware model but higher in areas of lower density in our regional model.[47] This may be attributed to higher student needs in Delaware's urban areas that are not being picked up by other student-need variables.

[47] As noted previously, in prior state analyses conducted by our team, such as in Vermont, we found that lower-density areas had higher costs (Kolbe et al., 2019). However, Delaware has relatively few areas with very low population density.

Exhibit 44. Summary of Relationship Between Cost Factors and Costs in the Delaware and Regional Cost Models

Cost factor characteristic	Delaware model	Regional model
Student outcomes	↑	↑
Low income (or Census Poverty)	↑	↑
Special education	↑	↑
English learners	↑	↑
Small schools or districts	↑	↑
Sparsely populated areas	↓	↑
Upper-grade levels	↔	↑
Geographic price differences	↔	↑

Note. Arrows represent the relationship of the given cost factor characteristic with costs. Arrows pointing up (↑) represent a statistically significant increase in cost with an increase in the given characteristic. Double-headed horizontal arrows (↔) represent no significant relationship. Arrows pointing down (↓) represent a statistically significant decrease in cost with an increase in the given characteristic. Calculations for the Delaware model based on data from the Delaware Department of Education and calculations for the regional model based on data from the U.S. Department of Education and the U.S. Census Bureau.

Comparison of Findings Between Delaware and Regional Models

While the general findings of our models are quite consistent, there are some significant differences in the measures included in the models and source data underlying the models. Specifically, these differences include the following:

- The Delaware model uses school-level data on spending, outcomes, and other school and student characteristics, whereas the regional model uses district-level data.
- The regional model uses data from FYs 2009 through 2019, whereas the state model includes data for FYs 2018 through 2022.
- The Delaware model uses a more comprehensive index of student outcomes inclusive of assessment scores, absenteeism, graduation rates, and suspension rates, whereas the regional model includes only assessment outcomes.
- The Delaware model uses additional measures of populations of students with disabilities, including the severity and complexity of disabilities that may substantially affect costs.
- The two models use different measures to capture family income of students in schools, with the Delaware model using Delaware’s low-income measure based on direct certification of students, and the regional model using a geographically based estimate of

the share of students from families below the federally defined poverty threshold, with a regional adjustment applied (Baker et al., 2013).

- The Delaware model includes shares of students in vocational settings.
- The regional model accounts for economies of scale at the district level, based on district size; the Delaware model accounts for economies of scale at the school level, based on school size.
- The two models use different versions of regional labor cost indices produced by the National Center for Education Statistics.[48]
- The two models include different mixes of indirect predictors of inefficient spending and for “instruments” in the first-stage model.

Exhibit 45 provides a checklist of similarities and differences across the two models.[49]

[48] The NCES Comparable Wage Index (CWI) stopped updating information in 2005, although Dr. Lori Taylor (Texas A&M University) used her original methodology to bring the data up to 2013. See *Extending the NCES CWI*, https://bush.tamu.edu/research/taylor-cwi/. More recently NCES developed the Comparable Wage Index for Teachers (CWIFT) using different census data.

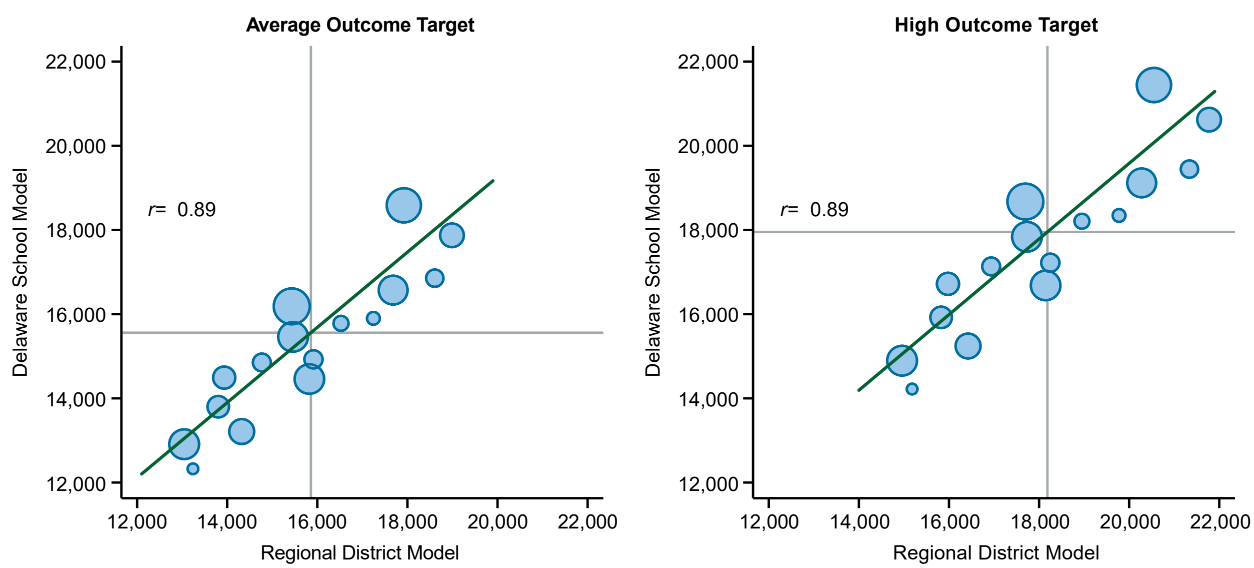
[49] In addition to the differences in data sources and variables in the two models, the regional model integrates variation in spending and outcomes in states where the organizational structures of schools differ from Delaware and each other. Delaware sits at the intersection of the Northeastern state school district organization. This includes highly fragmented, somewhat municipally aligned school districts in Pennsylvania and New Jersey and the highly aggregated county district structures in Maryland and Virginia.

Exhibit 45. Data Elements Included in the Regional and Delaware Models

Measure category	Measure	Regional	Delaware
Outcomes	Standardized assessments (Grades 3–8, mathematics and reading)	✓	✓
	Graduation rates		✓
	Absence rates		✓
	Suspension rates		✓
	Dropout rates		✓
	3-year teacher retention (school environment)		✓
Student needs	Census poverty rate	✓	
	Low-income rate based on direct certification		✓
	English learner rate	✓	✓
	Special education rate	✓	✓
	Students with disabilities		✓
	Black student enrollment share	✓	✓
Scale	Small district size	✓	
	Small school size		✓
	Population density	✓	✓
Grade ranges	Percentage of vocational/technical units		✓
	Percentage of students in prekindergarten	✓	
	Percentage of students in middle school grades	✓	✓
	Percentage of students in high school grades	✓	✓
Price of inputs (geographic cost)	Comparable Wage Index for Teachers (CWIFT)		✓
	Education Comparable Wage Index (ECWI)	✓	
Efficiency controls	Herfindahl Index (sum of squared district shares of enrollment within the labor market)	✓	
	Percentage of population between 5 and 17 years old	✓	
	Ratio of median housing values to labor market neighbors	✓	
	Median age by 2027 by zip code		✓
	Share of revenue from state sources		✓
Instruments	Percentage female		✓
	Population percentage between 0 and 4 years old		✓
	Labor market neighbors’ percentage of Black or Hispanic populations	✓	
	Labor market neighbors’ income-to-poverty ratio	✓	

Based on the many differences between the two models, we might expect substantial variations in cost predictions. To the contrary, we find that the cost predictions between the two models are strikingly similar. Exhibit 46 compares the cost predictions between the two models in which costs are predicted at average and high-target outcome levels, respectively. The two models predict similar costs and are strongly correlated (a correlation coefficient of 0.89). The districts predicted to have higher per-pupil costs to achieve regional outcome targets in the regional model are, for the most part, the same districts predicted to have higher costs to achieve Delaware outcome targets in the Delaware model. The consistency of findings across these two models that use different data and variables serves as a point of validation that the costs projected from the models are reasonable. In addition, the increase in costs between the average-outcome and high-outcome targets is approximately the same for the Delaware and regional models, validating the choice of high-outcome targets for both models.

Exhibit 46. Consistency of Cost Estimates from the Delaware and Regional Models (2019)



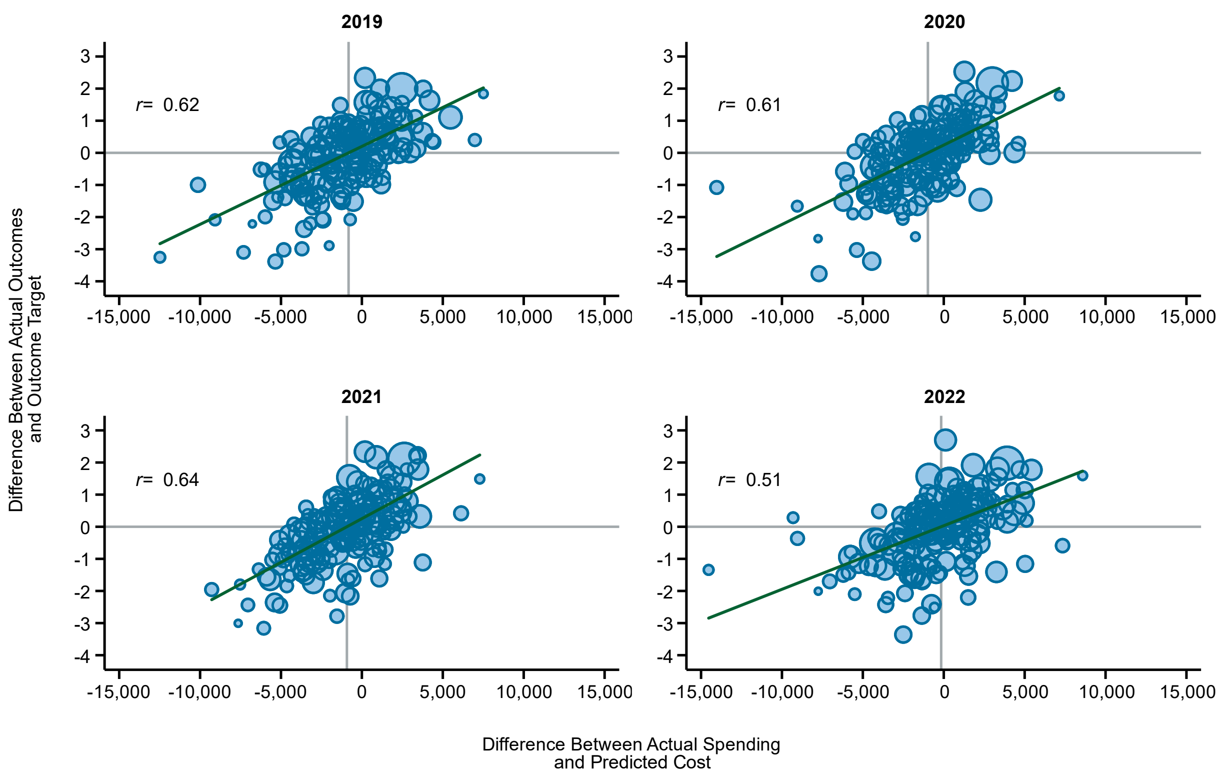
Note. For the Delaware model, we aggregate the school-level cost estimates to their districts to compare district average costs from the school-level Delaware-specific model (vertical axis) to district costs predicted by the regional model (horizontal axis). Figures and correlations include only the 16 geographically defined districts in Delaware. The enrollment-weighted correlation coefficient is represented by *r*. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, U.S. Department of Education, and SEDA.

Delaware School Model

When our models produce such robust and consistent findings, we prefer to use the state-specific model, which is reliant on data sourced from the state and a broader set of outcomes to guide our policy recommendations. As such, we focus next on the findings of our state model.

Exhibit 47 provides another validity check on our model by comparing estimated funding deficits to actual outcomes. If the model works as expected, we should see that schools with spending levels above their predicted costs should have outcomes that are above the target outcome level, on average. Likewise, schools with spending levels below their predicted costs should, on average, have outcomes below the outcome target.[50] Exhibit 47 shows that this is indeed the case. Generally, schools that spend less than needed to achieve the target outcome level (i.e., those on the left side of each plot) have lower-than-average outcomes. Schools that generally spend more than the model deems is necessary to reach the target tend to have above-average outcomes. For each of the last 4 years, the correlation between spending adequacy and actual outcomes is reasonably strong at between 0.51 and 0.64, providing further validation of our model.

Exhibit 47. Outcome Gaps Versus Funding Gaps

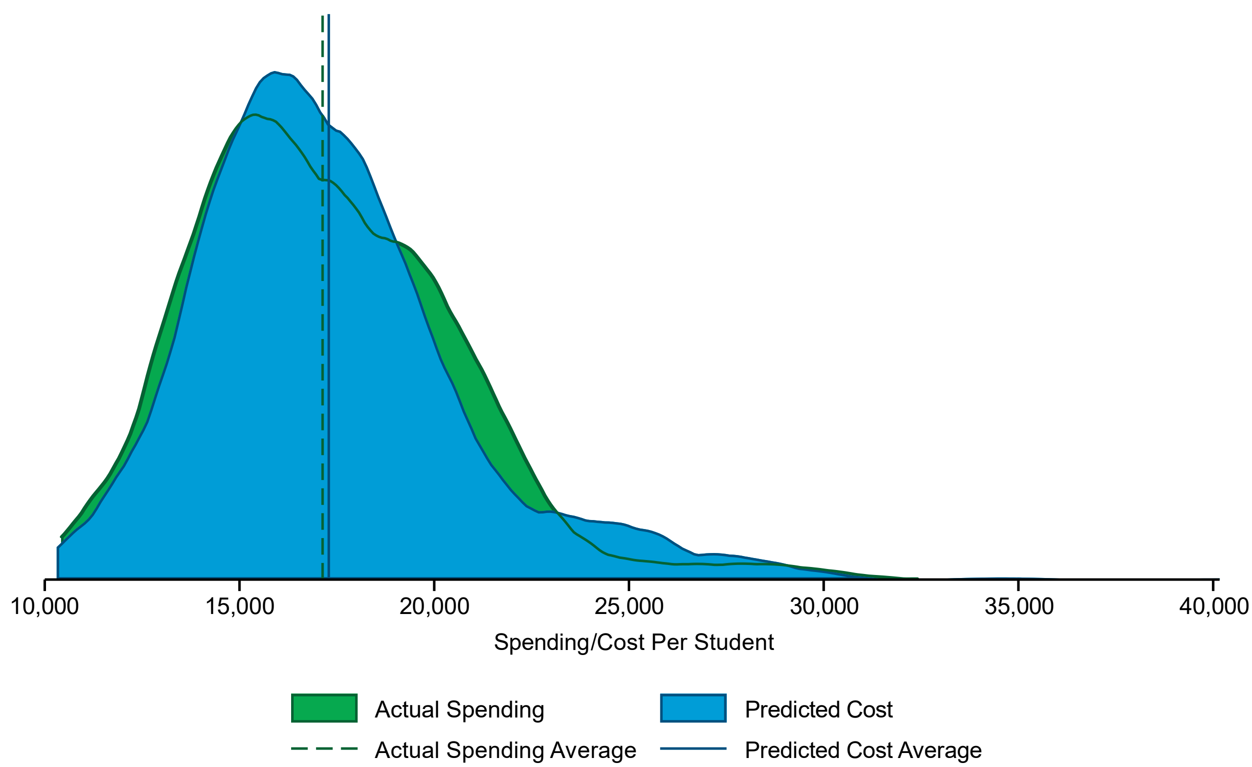


Note. The gray lines show statewide averages of both variables. The enrollment-weighted correlation coefficient is represented by *r*. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

[50] For this analysis, the target level has been set at the state average, which is an outcome factor level of 0. Using an outcome target of 1 would shift the plotted schools down and to the left, meaning that more schools would be performing below the target and would have spending levels below the cost of achieving the target outcome.

Exhibits 48 and 49 show the distributions of estimated costs from the Delaware model. Exhibit 48 shows the distribution of costs estimated using a target outcome defined as the statewide average compared with the distribution of actual spending. This is an additional validation exercise because estimated costs necessary to achieve average outcomes should be approximately the same as actual spending, given that the state is currently achieving average outcomes. Indeed, the exhibits illustrate this validation by showing that the statewide distribution of predicted costs across schools as well as the overall average are quite similar to the spending distribution—and overall average spending—that currently exists. The overall averages of both spending and predicted costs are around $17,000 per pupil. The lowest levels of predicted costs are just over $10,000 per pupil, which is in line with the lowest levels of actual spending. The highest levels of predicted costs are just upwards of $30,000 per student, which is also in line with the highest levels of actual spending. The majority of schools have predicted costs between $12,000 and $20,000 per pupil. Thus, when compared with the variations in actual spending, the amount of variation in predicted costs across schools is reasonable.

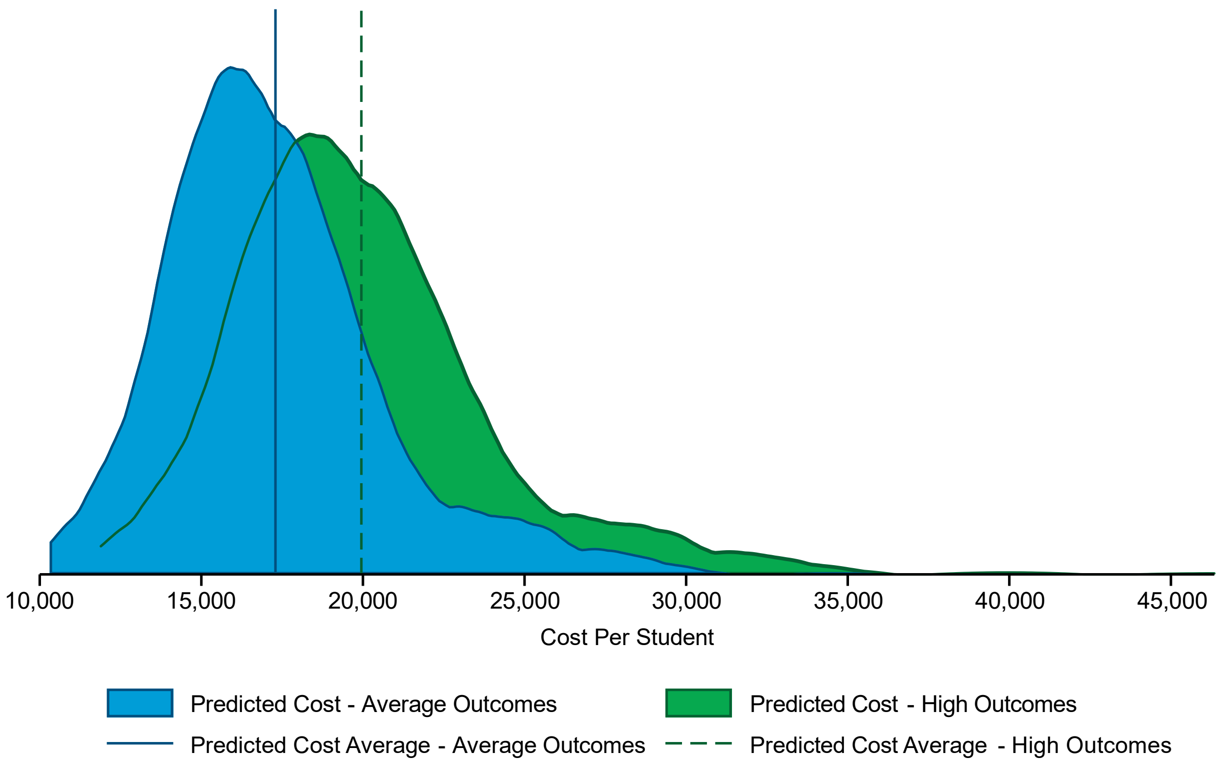
Exhibit 48. Cost Estimates Using a Target of Average Outcomes Compared With Actual Spending (2022)



Note. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

However, as discussed in the section on setting outcome targets, defining an adequate target outcome as the current state average is not consistent with the state's educational goals. When we raise the outcome target, as in Exhibit 49, the costs to achieve the outcome target increases. Specifically, the average cost increases from about $17,000 to about $20,000 per student, and the distribution shifts to the right when we raise the outcome goal from the state average to 1 *SD* above that average. In 2022, the total difference in spending needed to achieve the higher outcome, rather than the lower outcome, was almost $400 million.

Exhibit 49. Cost Estimates Using a High-Outcome Versus Average-Outcome Target (2022)



Note. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Modeling Weights and Simulating a Funding Formula

To convert the cost predictions into a set of weights that can be incorporated into a funding formula, we first selected a set of variables that proved to be significant predictors of cost or would commonly be included in funding formulas and easily incorporated into a funding formula. These variables included the following:

- proportion of low-income students,
- proportion of EL students,

- proportion of students with disabilities or with complex disabilities,[51]
- indicators of district size and population density, and
- percentages of students by grade level.

We next isolated the portion of the cost targets that would be allocated through a state funding system by excluded federal funding from the cost predictions stemming from the ECM. Federal funding is typically targeted to districts through established federal formulas and would, therefore, not be accounted for in a state-level education funding formula.[52]

We used the selected set of variables that are generally accessible and easily updated along with the cost predictions excluding federal funding and used them to estimate a second set of models for the purpose of estimating funding weights. That is, we used a smaller set of variables to approximate the cost estimates generated from the full ECMs after subtracting federal funding. In the Delaware model, the variables included in the weight estimation models explain almost 98% of the variations in the cost estimates. That is, the weight estimation models closely replicate the cost estimates.

Exhibit 50 shows the results of the Delaware-specific weight estimation models: the first estimated at average Delaware outcomes and the second estimated at the higher target outcome level (i.e., an outcome factor score of 1).[53] The weights in the model are multiplicative and centered on 1. This means a weight of 1 represents no difference in funding for the given category. Weights higher than 1 represent higher funding levels, and those below than 1 represent lower funding levels. Although these can be thought of as weights for individual students, it is important to remember that projected funding levels based on these weights are affected both by the proportion of students in a given category and the weight.

Comparing both models, we see that the weights are almost identical. The main difference between the average-outcome model and high-outcome model is the base funding amount. For the average-outcome model, this amount is $8,670 per student; for the high-outcome model,

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[51] We also examined a model that included the proportion of students with complex disabilities. The proportion of these students was not indicative of higher costs, so we did not include it.

[52] To exclude federal funding, we used regression analysis to generate a predicted amount of spending from federal sources for each school based on years prior to 2020. We used predictions from the pre-2020 time period because federal education funding has increased drastically in response to the Covid-19 pandemic. Our assumption is that federal funding will return to pre-Covid-19 levels in the near future. When that happens, state and local funding will have to increase to avoid reductions in spending.

[53] We also estimated a model that excludes transportation spending from state sources. Many states choose to fund transportation separately from the main funding formula. Therefore, the results of this model represent the weights that would be used if transportation were funded separately. The results from this model can be found in Exhibit E7 in Appendix E. The equivalent pseudo R^2 values between the original model and the model excluding state transportation suggest that either approach (including transportation as part of the main formula or excluding transportation and funding it separately through the state's existing allocation) would result in similar overall funding levels.

the base amount is $10,074 per student (see *base funding* in Exhibit 50). This is a difference of just over $1,400 per student. The base amount represents the amount of funding provided when all additional needs and contextual variables are at zero. Thus, the base represents the per-student amount for a school defined as follows:

- has only students in the elementary grades,
- has an enrollment greater than 800 students,
- has no students with additional needs,
- is located in a ZIP code area with fewer than 300 individuals per square mile, and
- is located in the lowest cost geographic area of the state.

The weights represent multipliers and can be interpreted individually as student weights. For example, a weight of 1.81 for low-income proportion means that each low-income student costs 1.81 times (or 81% more than) the base, for an amount equal to $18,234. Although weights can be interpreted at the student level, in practice they apply to school- and district-level funding. At both levels, each student's need category applies to only a fraction of students. Therefore, to calculate a target per-pupil funding amount, weights must be adjusted downward according to the fraction of students in a given category. These weights, once adjusted for the fraction of students, are the *effective weights*.

Exhibit 50. Weight Estimation Regression Models

Weight categories	A. Average outcomes	B. High outcomes
Student needs		
Low-income proportion	1.79	1.81
Students with disabilities proportion	3.40	3.34
Students with complex disabilities proportion	3.66	3.75
English learner proportion	1.15	1.15
Programming/grade range		
Vocational/technical units proportion	4.58	4.58
Middle school enrollment proportion	0.99	0.99
High school enrollment proportion	1.05	1.04
Population density		
300 to <800	1.03	1.03
800 to <2,000	1.05	1.05
2,000 to <5,000	1.06	1.06
>=5000	1.08	1.08
School enrollment		
<300	1.29	1.29
300 to <450	1.12	1.12
450 to <600	1.07	1.07
600 to <800	1.04	1.04
Geographic cost (CWIFT)	1.38	1.38
Base funding	8,670	10,074
Number of school-by-year observations	948	948
Number of unique schools	192	192
Pseudo R^2	0.976	0.979

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 79% higher target funding levels, on average, when using an average-outcome target.

Note. Weights shown are exponentiated coefficients from a Poisson regression. Models also include year-specific indicator variables (where FY 2022 serves as the reference group for all models). The base funding represents target funding per pupil in FY 2022 with all other weights set to 1. Regression models are weighted by enrollment. The reference population density category is schools in zip codes with fewer than 300 people per square mile. The reference enrollment category is schools with more than 800 students. The programming and grade-range proportion coefficients are interpreted relative to enrollment in elementary grades. Data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

To calculate the effective weight for a school or district in which some proportion of students is represented in a given category, the weight is exponentiated according to the student proportion as follows:

$$Effective\ Weight = \ Weight^{Student\ Proportion}$$

Exponentiating by the proportion of students for which a weight applies appropriately discounts the weight accordingly. At the extremes, a proportion of 1 means that the full weight is applied, and a proportion of 0 discounts the weight to a value of 1. For example, if 20% of students in a school have disabilities, the effective weight for students with disabilities would be:

$$3.34^{0.2} = 1.27$$

meaning that this school would receive 27% more funding than a school with otherwise similar characteristics but with no students with disabilities.

Exhibit 51 provides an example of how funding would be projected using all of the weight categories for a high school with somewhat typical needs. In the example, each weight in Column 1 is converted to the effective weight based on the proportion of students in a given category listed in Column 2. Note that for some of the weight categories that are school characteristics (e.g., total enrollment or population density), the student proportion will likely be 1 or 0, because the school will fall into only one enrollment or population density category. This example school is located in an area with a population density between 2,000 and 5,000 people per square mile and more than 800 students (i.e., none of the population size categories applied). Geographic cost is not a student proportion but ranges between 0 and 0.143, in which the lowest cost areas in the state have a value of 0 and the highest cost areas have a value of 0.143.

After all effective weights are calculated, a needs index is then calculated, which is the product of all the effective weights. In this case, the needs index is 2.07, meaning that the cost for this school is 2.07 higher than the base per-pupil cost. The needs index is a useful metric because it describes the relative differences in student needs and required funding across schools accounting for all weight categories. To calculate the needed per-pupil funding for the school, we multiply the base per-pupil amount by the needs index. In this example, we use the high-outcomes base amount of $10,074, resulting in a target per-pupil funding amount of $20,870.

Exhibit 51. Example Application of a Weighted Student Formula

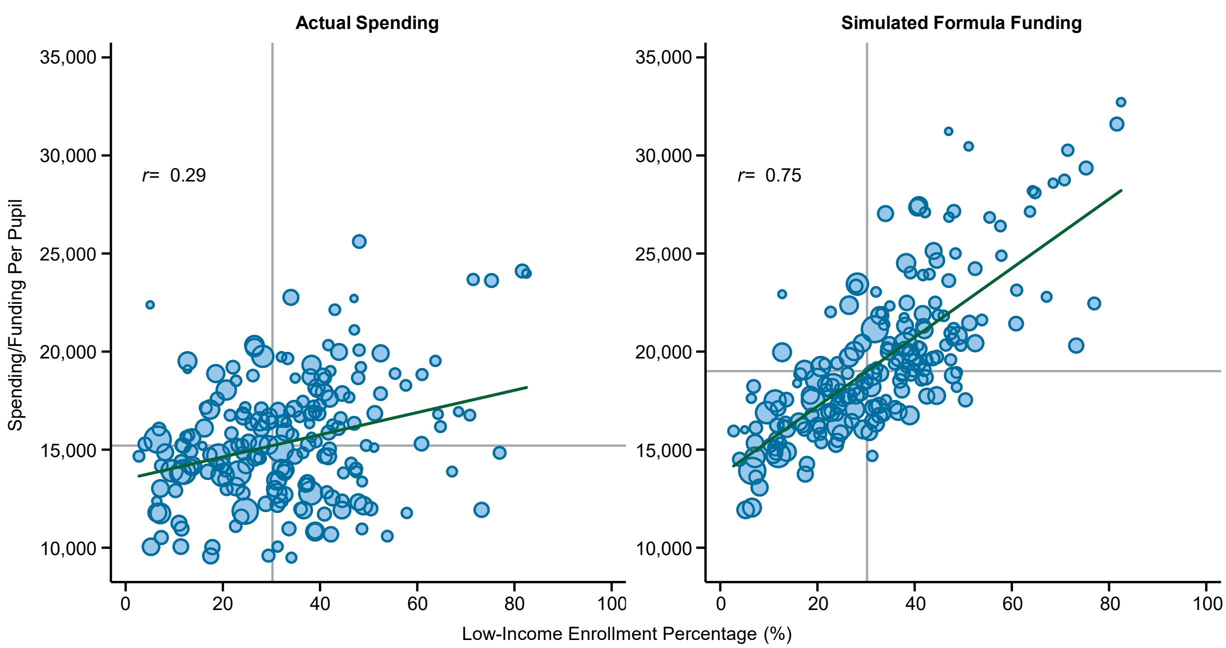
Weight categories	Weight	Student proportion	Effective weight
Student needs			
Low-income proportion	1.81	0.31	1.20
Students with disabilities proportion	3.34	0.19	1.26
Students with complex disabilities proportion	3.75	0.015	1.02
English learner proportion	1.15	0.11	1.02
Programming/grade range			
Vocational/technical units proportion	4.56	0.09	1.15
High school enrollment proportion	1.04	1	1.04
Population density			
2,000 to <5,000	1.06	1	1.06
School enrollment			
<300	1.29	0	1.00
300 to <450	1.12	0	1.00
450 to <600	1.07	0	1.00
600 to <800	1.04	0	1.00
Geographic cost (CWIFT)	1.38	0.143	1.05
Needs index (product of all effective weights)			2.07
Per-pupil funding (base × needs index)		$10,074 × 2.07 =	$20,870

Formula Simulation Results

In this section we use the results from the high-outcome Delaware-specific model to simulate how state and local funding would be distributed across schools when applying the weights specified above. We then compare those funding levels to actual spending levels excluding spending from federal sources.

In Exhibit 52, we compare the distribution of actual spending per pupil with respect to the shares of students from low-income families to the distribution of simulated funding according to weights. Overall, there is not a clear relationship between actual spending and shares of students from low-income families. The correlation coefficient of 0.29 indicates that while there is a progressive distribution of spending with respect to low-income student percentage, the relationship between actual spending and incidence of low-income students is neither clear nor strong. If, however, funding was distributed according to the simulated weighted funding formula—which reflects the costs necessary to achieve the high-outcome target—it would look like the pattern on the right side. That is, schools with higher concentrations of students from low-income families would spend systematically more than schools with lower concentrations of students from low-income families. The relationship between cost-driven funding specifically designed to provide equal educational opportunities and shares of low-income students is much stronger with a correlation of 0.75. The cost of providing equal opportunities to achieve a high-outcome target in schools with larger shares of students from low-income families is substantially greater than in schools with much lower shares of students from low-income families. Notably, when using a high-outcome target, schools with the lowest percentages of low-income students would receive simulated funding amounts similar to their current spending levels: approximately $14,000 per student, on average. In contrast, schools with higher percentages of low-income students receive commensurately more than their current spending levels to provide equal opportunities for an adequate education.

Exhibit 52. Comparing Distributions of Actual State and Local Spending and Simulated Formula Funding With Respect to Low-Income Enrollment Percentages (2022)



Note. The gray lines show statewide averages of both variables. The enrollment-weighted correlation coefficient is represented by *r*. This analysis omits six schools where more than 50% of students have disabilities. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

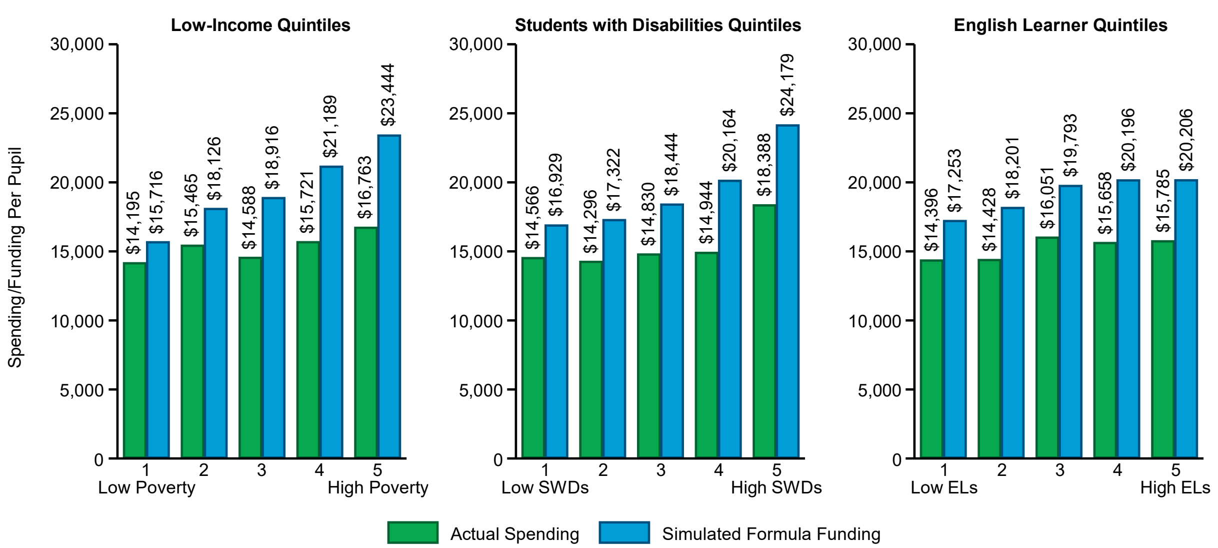
Exhibit 53 compares actual spending and costs for schools grouped into quintiles from low to high shares of students from low-income families, students with disabilities, and EL students.

Each bar represents approximately 20% of the 196 schools included in our analytic data set for the 2022 school year.

The left-most panel shows schools grouped by low-income quintile. It shows that the simulated funding amounts exceed actual spending for all quintiles of schools. Importantly, the difference between the simulated funding and actual spending steadily increases moving from the quintile with the lowest percentages of students from low-income families to the quintile representing the schools with the highest percentages of students from low-income families. Specifically, for Quintile 1, the difference is just over $1,500 per student, or about 11% above existing levels of spending. For Quintile 5, the difference is approximately $6,700 per student, which represents an increase of almost 40% compared with actual spending.

An alternative way to interpret this finding is that presently the typical school in the highest poverty quintile spends $2,568 per student, or about 18%, more per pupil than the typical school in the lowest poverty quintile. Although this represents a relatively progressive relationship between spending and poverty, to achieve equal educational opportunities this contrast should be far stronger. Specifically, the typical highest poverty school should be spending $7,728 per student, or 49% more, than the typical school in the lowest poverty quintile.

Exhibit 53. Comparing Actual State and Local Spending and Simulated Formula Funding Across Student-Need Quintiles (2022)



Note. This analysis omits six schools where more than 50% of students have disabilities. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

The middle panel provides a similar analysis by organizing schools by their shares of students with disabilities. Here, in Quintile 1, the average simulated cost per student is about $2,363 more (16%) than the average actual spending per pupil in those same schools. In schools with the largest shares of students with disabilities (Quintile 5), average current spending falls short by almost $5,800 (31%) per pupil. Again, the overall differences in actual spending trend in a progressive direction, with schools with the highest shares of students with disabilities spending $3,822 (26%) more, on average, than schools with the lowest shares of students with disabilities. Yet, the cost-based formula would provide those schools with $7,250 (43%) more funding, on average.

Finally, the right-most panel shows the distribution of actual spending and formula funding for schools with lower and higher shares of students who are English learners. Again, the gaps between the cost-based formula funding and current spending are larger when there are more children in need of additional supports to achieve desired outcomes. Schools with the smallest shares of ELs presently spend 2,857 (20%) less, on average, than our formula funding would provide, and schools with the largest shares of ELs spend 4,421 (28%) less, on average, than our formula would provide. As we showed with other student needs, current spending is marginally higher in schools serving the greatest shares of ELs compared with those serving the smallest shares of ELs by $1,389 (10%). However, our formula funding would provide, on average $2,953 (17%) more.

Across all three student-need dimensions (low income, students with disabilities, and English learners), Delaware schools with greater needs spend more, on average, than those schools with fewer needs, but the margins of difference in actual spending between the lowest and highest need schools tend to be no more than half of the difference required to provide equal educational opportunities. Schools serving larger shares of students from low-income families, students with disabilities, or students who are English learners would receive the most substantial increases in funding suggested by the cost-based model.

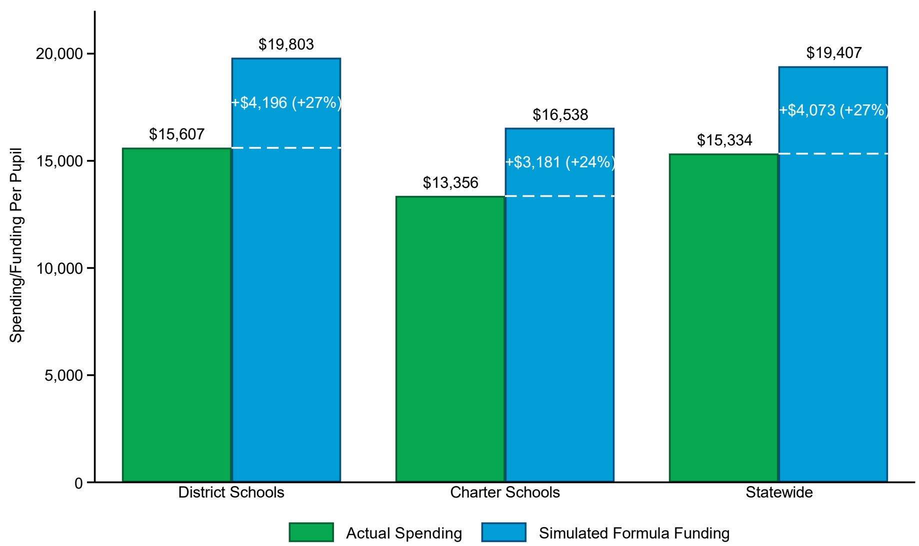
As a final point of comparison, we examined the funding weights compared with what we call the *implicit weights*, which describe how spending is currently distributed across schools. These are the regression coefficients using state and local spending as the outcome (see Model B of Exhibit 14 in Chapter 4). We present these comparisons in Exhibit E8 of Appendix E. The regression results cohere with both the analyses of scatterplot trends and spending by quintile of student need. Compared to the cost-based weights, actual spending is not sufficiently differentiated according to students with low income, students with disabilities, or students who are ELs. However, the comparison of weights reveals some additional findings:

- The constant term (or base per-pupil amount) is higher for actual spending compared with the high-outcome weights model. This indicates that for schools with very low needs, current spending levels are sufficient.
- The cost-based weight for vocational/technical units is lower than that for actual spending. This indicates that the differential funding for these schools may currently be too high.
- The cost-based weights for high population density and geographic cost are lower than for actual spending. The areas with highest geographic cost and highest population density tend to be around the city of Wilmington, in New Castle County. This suggests that the cost-based geographic differences between New Castle County and Kent and Sussex Counties are lower than how spending is currently distributed.

Comparing Target Funding to Actual State and Local Spending by Sector

For district schools the statewide average target funding per student is $19,803 compared to actual spending of $15,607 per student, representing a gap of $4,196 or 27% of actual funding. For charter schools, the statewide average target funding per student is $16,538 and the average actual spending per pupil is $13,356. Lower target funding levels for charter schools relative to district schools is a reflection of lower student needs in charter schools, on average (see Chapter 6). The gap between target funding and actual spending, equal to 24% of average actual spending, is similar to that of all public schools (Exhibit 54).

Exhibit 54. Comparing Actual State and Local Spending and Simulated Formula Funding for District and Charter Schools (2022)



Note. White text above the dashed line in the simulated formula funding bar represent the additional amount per pupil compared to actual spending. Calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Chapter Summary

To examine the adequacy of Delaware's current system of school funding, we used the cost-function approach to estimate two education cost models: a Delaware-specific school-level model and a regional district-level model that included data from other Mid-Atlantic states. The two models portray a similar picture with respect to the cost of achieving equal educational opportunities across Delaware's school districts. This consistency serves as a validation of our approach.

The results of the Delaware-specific school-level model indicate that Delaware currently does not sufficiently differentiate funding levels across schools according to student needs so as to support equal opportunities for all students to achieve adequate outcomes. Schools and districts serving higher proportions of low-income students, students with disabilities, and students who are English learners need substantially more funding than schools and districts with smaller populations of these types of students. In addition, schools with high rates of student needs require larger increases in funding compared with what they are currently receiving.

Using weights estimated to achieve target levels of funding, we show that statewide charter schools need approximately 27% more in funding compared with what they are currently spending in order to provide an adequate education to students across the state.

8. The Professional Judgment Approach to Estimating Adequacy

This chapter provides the results of the professional judgment approach to estimating adequacy. This approach leveraged the knowledge and expertise of expert educators throughout the State of Delaware, who were convened into groups called professional judgment panels (PJPs). Panelists were expected to collaboratively develop programs for hypothetical public elementary, middle, and high schools of varied levels of student needs and sizes that will deliver an *adequate* education at a minimum cost.[54]

The process required the PJPs to first draft a program design document that included detailed descriptions of the school-level programs that would deliver an adequate education. The PJPs then had to specify the types and quantities of personnel and nonpersonnel resources necessary to support the adequate educational programs at a minimum cost. The AIR study team used a Resource Cost Model (RCM) to organize the information gathered from the PJPs on staff and nonpersonnel resources and calculate corresponding costs.[55] We then extrapolated those costs to Delaware's actual schools and added spending estimates of district-level supports to determine the cost of providing an adequate public education to all Grades K–12 students in Delaware.

The remainder of the chapter first summarizes the PJP process, including the hypothetical school-level exercises (tasks) that were completed. It then presents some of the key programmatic themes that arose from the panel program designs along with the resulting costs. Next, it explains how the information generated by the PJPs was used to project the statewide cost of providing educational adequacy. Last, the chapter presents results of the PJP adequacy calculations and compares estimated adequate costs to actual spending in the state. In addition, the results sections also include a comparison of adequate costs calculated through the PJP approach to those calculated through the education cost model approach as calculated in an earlier chapter. Similarly to the ECM analysis, using the PJP results we derived a base funding amount as well as a set of weights. Separate from this report, we provide a simulator tool, which can be used to model how the target funding levels and weights derived from this analysis would affect funding for schools and district in Delaware.

[54] The approach defines educational adequacy using a formal goals statement that lists student outcomes based on Delaware's public education academic and content standards (see below).
[55] The RCM is a framework developed by AIR staff (Chambers and Parrish, 1994) that has been used for decades to perform educational cost analysis similar to that performed for this study including: Chambers et al. (2004); Chambers, Levin, and Delancey (2006); Chambers, Levin, Delancey, and Manship (2008); and Levin et al. (2018). The RCM for this study was developed in MS Excel.

The Professional Judgment Process and Convening of Panels

Overview of the Professional Judgment Process

AIR convened a total of six 3-day PJP workshops, with two each on March 2–4, 2023 (New Castle County), March 9–11, 2023 (Sussex County), and March 16–18, 2023 (Kent County). In total, 51 expert educators from Delaware participated in these panels. Appendix F provides details about the process for recruiting and selecting panelists as well as panelist bios. The six panels convened separately and operated independently from one another. Panelists were instructed not to communicate with individuals outside their panels until the PJP process was complete.

The panels were expected to develop model school program designs that could achieve Delaware's outcome goals at a minimum cost for a set of hypothetical schools that varied with respect to schooling level, various student needs, and school size. Panelists were charged with developing programs that would produce the outcomes laid out in the Goals Statement (see next section) at a minimal cost. Moreover, panelists were asked to draw on research evidence in their deliberations and to make sure that their program designs could realistically be implemented. Specifically, the panels were instructed to refer to the following questions as they deliberated:

- **Goals**: Will your program design achieve the outcomes listed in the Goals Statement?
- **Evidence**: Is there any evidence supporting your program designs and resource specifications?
- **Efficient**: Are your program designs and resource specifications efficient (i.e., will they achieve the intended outcomes at a minimum cost)?
- **Realistic**: Could your program designs and resource specifications realistically be implemented by competent staff if sufficient funding were made available?

As a first step, each panel developed a base model program design for elementary, middle, and high schools that reflect Delaware schools with average enrollments and relatively low levels of student needs (i.e., defined as having percentages of students who are low-income, students with disabilities, and students who are English learners (ELs) at the 25th percentile of the statewide distribution within each schooling level). As part of the program design process, panelists were asked to determine the various types of programming and resources necessary to provide educational adequacy in terms of core general education instruction, instruction for students who are ELs and students with disabilities, additional academic and pupil supports, professional development, extended day and year programming, and school administration.

After completing the program design for the base model (i.e., low-need schools), each panel was asked to make modifications for schools with varying demographic compositions (i.e., higher percentages of students living in poverty, students classified as ELs, and students classified by severity of their disability needs), as well as schools with low enrollment. For these modified tasks, school characteristics were adjusted one demographic factor at a time, and panelists were asked to consider how the change would affect the instructional programming necessary to achieve the outcome goals. For example, in Task 2, the percentage of students from low-income families increased to the 75th percentile from the 25th percentile in the base task.

Exhibit 55 provides an overview of the organization of the series of tasks completed at each schooling level (elementary, middle, and high) by the PJPs. Task 1 is a base model that, as described above, represents a typical school with low student needs and typical enrollment. Task 2 builds on Task 1 and denotes a school with high-poverty incidence, where the only difference from Task 1 is in the percentage of students who are low-income. Task 3 then builds on Task 2 and represents a school with increased incidences of both students living with high poverty and students who are ELs; the only difference between Tasks 3 and 2 is in the percentage of English learners. Task 4 builds on the Task 1 base model and represents a school with a high incidence of students with disabilities with basic needs, with the only difference from Task 1 being in the percentage of students with disabilities with basic needs. Task 5 builds on Task 4 and represents a school with high incidences of not only students with disabilities with basic needs but also students with intensive and complex needs. Finally, Task 6 builds on Task 1 and represents a school with similar demographics as Task 1 base model but with lower enrollment.

Exhibit 55. Professional Judgment Panel Tasks

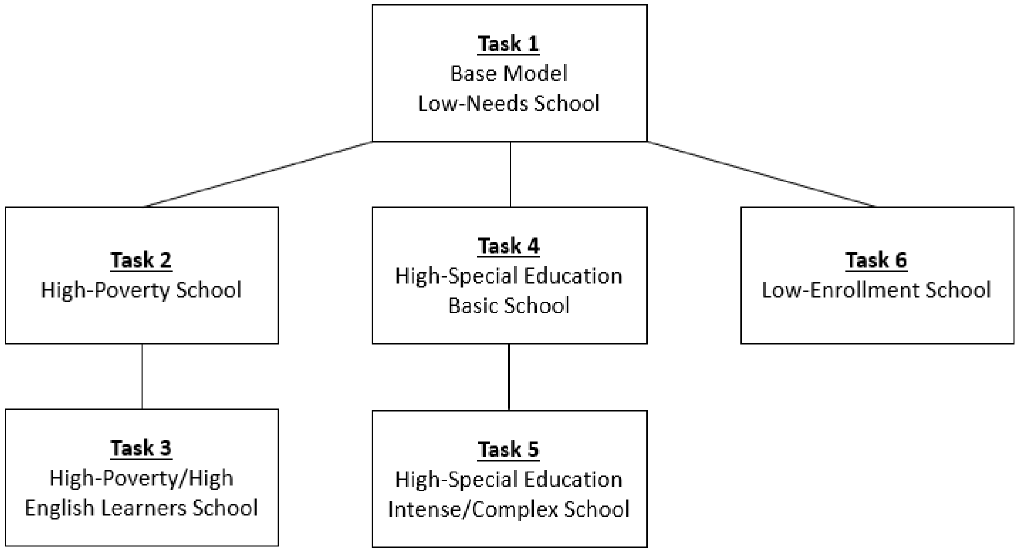


Exhibit 56 presents the specific demographics defining each hypothetical school (task) for which panelists were required to design a program.[56]

After completing the program designs for all of the tasks, the panels were asked to specify the personnel and nonpersonnel resources necessary to support each of their designs at a minimum cost. Panelists also specified the composition of teaching staff with respect to the number of early career teachers and number of experienced teachers.[57] Resource quantities were entered into a system of Microsoft Excel worksheets known as a Resource Cost Model (RCM). For example, a panel's program design might emphasize the importance of providing core subject teachers with a daily planning period and/or time for collaboration with their colleagues. The panel might then include additional staff to ensure core teachers had sufficient time for planning and collaboration. As panelists entered resources into the RCM, with assistance from AIR staff facilitating the panels, the overall cost and cost per student was calculated by formulas in the RCM. As such, panelists could see in real time how the quantities of resources translated into costs.

[56] The demographics used to define each schooling-level specific Base Model (Task 1) represents the typical low-needs school at the 25th percentiles for students who are low-income, who are ELs, or who require special education and at the statewide average enrollment within each schooling level. Demographics used to define the High Poverty and High Poverty/High EL models (Tasks 2 and 3) represent the within-schooling level 75th percentile for low-income for Task 2 and the 75th percentile for both populations of students who are low-income or ELs for Task 3. Demographics used to define the High Special Education models (Tasks 4 and 5) represent a 50% increase in special education enrollments for students with basic needs for Task 4 and for students across all special needs categories (basic, intensive, and complex) for Task 5. The school enrollments used to define the Low Enrollment model (Task 6) represent the 10th percentile of enrollment within each schooling level.
[57] Early career teachers are defined as having 0-4 years of experience and experienced teachers are defined as having more than 4 years of experience. In Delaware, more experienced teachers are paid more than less experienced teachers of the same job type. Therefore, a school with more experienced teachers would cost more than a school with fewer experienced teachers.

Exhibit 56. School Enrollment Demographics for Each PJP Task by Schooling Level

School characteristics	Task 1		Task 2		Task 3		Task 4		Task 5		Task 6	
	Base model		High poverty		High poverty and high EL		High special education: Basic		High special education: Intensive and complex		Low enrollment	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Elementary												
K–5 Enrollment	573		573		573		573		573		374	
Low income	138	24%	241	42%	241	42%	138	24%	138	24%	90	24%
English learner	40	7%	40	7%	132	23%	40	7%	40	7%	26	7%
Special education	103	18%	103	18%	103	18%	133	23%	154	27%	67	18%
Basic	61	59%	61	59%	61	59%	91	68%	91	59%	40	59%
Intensive	29	28%	29	28%	29	28%	29	22%	43	28%	19	28%
Complex	13	13%	13	13%	13	13%	13	10%	20	13%	9	13%
Middle												
6–8 Enrollment	860		860		860		860		860		680	
Low income	215	25%	361	42%	361	42%	215	25%	215	25%	170	25%
English learner	43	5%	43	5%	129	15%	43	5%	43	5%	34	5%
Special education	155	18%	155	18%	155	18%	207	24%	233	27%	122	18%
Basic	104	67%	104	67%	104	67%	156	75%	156	67%	82	67%
Intensive	37	24%	37	24%	37	24%	37	18%	56	24%	29	24%
Complex	14	9%	14	9%	14	9%	14	7%	21	9%	11	9%
High												
9–12 Enrollment	1,448		1,448		1,448		1,448		1,448		890	
Low income	275	19%	478	33%	478	33%	275	19%	275	19%	169	19%
English learner	29	2%	29	2%	174	12%	29	2%	29	2%	18	2%
Special education	217	15%	217	15%	217	15%	288	20%	326	23%	134	15%
Basic	141	65%	141	65%	141	65%	212	74%	212	65%	87	65%
Intensive	59	27%	59	27%	59	27%	59	20%	88	27%	36	27%
Complex	17	8%	17	8%	17	8%	17	6%	26	8%	11	8%

Note. EL = English learner. Light green cells denote school characteristics that differ from the base model (Task 1).

Source. Authors' calculations based on data from the Delaware Open Data Portal.

Goals Statement and Pre-Workshop Materials

To determine what constitutes an adequate education, it was important to define the educational goals for students in Delaware in a formal Goals Statement. Educational goals generally include a set of academic competencies that every student is expected to achieve as well as content standards that describe the subject matter that should be made available. For this study, we used the Delaware School Success Framework (DSSF) (Delaware Department of Education, 2018) and referred to the State's content standards and instructional program requirements to define our educational goals for each school type (see Appendix F). The DSSF includes measures of academic achievement, academic progress, student success, and graduation rates for students by grade level. The educational goals used for this study specify future performance targets for measures of English language arts (ELA)/math proficiency and high school graduation rates based on the State's plans submitted to the federal government under the Every Student Succeeds Act (ESSA; see Delaware Department of Education, 2022). For example, in the 2020–21 school year, students in Delaware in Grades 3–5 had proficiency rates of 38.5% in ELA and 27.7% in math. The ESSA plan set an ELA proficiency goal of 77.0% by the 2029–30 school year. For math, the proficiency target is 74.4% by 2029–30. The study team used data on current and target performance from the Delaware Open Data Portal and ESSA Plan to calculate short-term 2024–25 goals that were also included in the Goals Statement.

Prior to convening the PJP meetings, each panelist was provided a full set of PJP instructions, which included the Goals Statement; three research briefs on effective educational practices for rural, at-risk, English learner, and special education student populations; and a practitioner brief on effective school leadership. The research briefs were authored by nationally known experts in their respective fields, and they provide a national overview of what effective schools do to improve student outcomes for their respective populations.[58] Panelists were also provided with school resource profiles—showing recent staffing patterns for Delaware elementary, middle, and high schools of similar size and demographics as the base tasks—to serve as reference points in their panel deliberations. The instructions and materials provided to the panelists are included in the Appendix F of the Technical Appendix.

[58] The research briefs were drafted by Professors Henry Levin (Columbia University), Kenji Hakuta (Stanford University), Anthony Cavanna (Fordham University). and Margaret McLaughlin (University of Maryland).

Task Assumptions

The panels were given a set of assumptions to work with during their deliberations. These assumptions were intended to make the exercise as realistic as possible, within the constraints of available participant time and expertise. Panelists were instructed to assume that specifying resources for facilities, district administration, food services, and transportation were not part of their charge. Panelists were also instructed to assume that the hypothetical schools defined in each task were already in existence, which meant that they were not responsible for specifying resources that would already be in place, such as desks and chairs.

Program Designs, Resources, and Resulting Programmatic Costs

Each of the six professional judgment panel (PJP) workshops generated a series of six school program designs associated with the hypothetical schools (i.e., tasks) at each schooling level (i.e., elementary, middle, and high school), which varied with respect to levels of pupil need and school size, providing 108 data points in total.[59] Using the collection of staff and nonpersonnel resources specified for each program design, the study team estimated a cost associated with the program design developed for each hypothetical school task which was completed by the panels. The cost estimates reflect the per-pupil dollar values of those resources deemed necessary for the hypothetical elementary, middle, and high schools to achieve the specified goals for each combination of pupil needs and school size they represented. These data were then used to generate an equation that describes how adequate per-pupil cost varies by schooling level, size, and student demographics. This section explores the key themes from the programmatic designs and patterns of resource allocation specified by the panels, including variations in adequate program costs by school size and student needs.

Key Themes From School Program Designs

From the six PJPs, common themes emerged with respect to classroom conditions, teacher professional learning, and school-level resources necessary to support student well-being and academic success.

Classroom Conditions

In all six panels, multiple adults were specified for elementary and high school classes. Panelists noted that the current overreliance on dual certification of a single classroom teacher or floating special education teachers rotating with special education students clustered into course sections was insufficient for supporting students' academic needs.

[59] A total of 108 specific hypothetical school tasks were completed by the panels, equal to six panels, each performing six tasks for each of three schooling levels (6 × 6 × 3 = 108).

Across all six panels, ideal class sizes were indicated as an essential component for supporting the academic growth of all students. On average, panelists indicated the following target class sizes by grade in core instructional classes:

- Kindergarten: 14 students
- Grades 1 and 2: 16 students
- Grades 3 to 5: 18 students
- Grades 6 to 8: 21 students
- Grades 9 to 12: 25 students

These average class sizes were indicated as necessary for building positive classroom relationships and supporting the ability of educators to proximally monitor and respond to the academic needs of individual students in their classrooms.

Teacher Professional Learning

To improve teacher knowledge and skills to support increasingly diverse student populations, school program designs included sustained, ongoing professional learning during the regular school day on topics such as restorative practices and trauma-informed instruction, implicit bias and antiracism in schools, students' social-emotional learning, the science of reading, as well as ongoing training and in-classroom support for implementing high-quality instructional materials. To enhance teacher collaboration, support and deepen new learning, and collaborate with instructional support staff to overcome challenges or barriers to implementation, all panels noted the need for a significant increase in professional learning time during the school day compared with what is currently offered. The approaches to providing increased professional learning time varied by panel. For example, one panel suggested two districtwide professional learning days per month, while another suggested one half-day of instruction each week so that the other half of the day could be devoted to teacher professional learning, planning and collaboration.

School Staffing and Resources

Panelists noted the need for full-time nurses in all school buildings, increasing the number of nursing staff based on students' needs. For instance, in buildings with a large number of students with disabilities, more than one nurse may be needed to conduct screenings while also attending to the day-to-day health needs of students. In addition, full-time (not contracted) occupational therapists, speech language pathologists, and school psychologists were recommended to better support the needs of students and be embedded in the culture of the school.

Every panel noted the need for technology staff dedicated to school buildings, rather than deployed from the district office or rotating among buildings. Panelists noted a critical need for technology staff to efficiently respond to technology support requests to ensure classroom instruction is not interrupted or diminished by malfunctioning or inoperable equipment. Full-time technology staff who are dedicated to particular buildings would also be essential for supporting teachers in the use of assistive technologies for special education students.

Panelists indicated that school ratios of support staff to students should be no greater than those indicated by related professional organizations: school psychologists, 500:1 (National Association of School Psychologists, 2021); school counselors, 250:1 (American School Counselor Association, 2023); social workers, 250:1 (National Association of Social Workers, 2012).

Panelists also felt the need for full-time special education coordinators in school buildings to schedule and facilitate Individualized Education Program (IEP) and 504 meetings, write IEP and 504 reports, and oversee progress monitoring. They additionally specified multi-tiered systems of support (MTSS) coordinators for each school building in order to plan, organize, and develop MTSS under all domains, including academic supports, attendance and intervention monitoring, family and student engagement, social-emotional learning, and positive behavioral supports. These MTSS coordinators would work in a collaborative and coordinated fashion with behavioral interventionists, family liaisons, and other school support staff to ensure the proximal needs of students in each building were being met. Panelists also unanimously agreed that family liaisons in each school building were necessary for coordinated and consistent communication with parents and caregivers. In turn, these family liaisons should be both familiar with the community at large and preferably speak the home languages of the students with whom they interact.

For middle and high schools, panelists noted a need for transition coordinators. The middle school transition coordinator would support students’ transition from middle to high school. The high school transition coordinator would support high school students transition planning from high school to postgraduation careers and/or postsecondary education. In both cases, these transition coordinators could also support homebound students who are transitioning back to full-time education in the school building.

Universal Prekindergarten (PK) Education

Although not an explicit part of the school program design templates or the RCM used to specify resources and estimate program design costs, four of the six panels indicated that universal PK education was a necessary component for supporting Grades K–12 student achievement. Panelists noted that universal PK education would minimize gaps in school readiness as children transitioned to elementary school. In the results reported below, it is important to keep in mind that the costs of providing universal PK were not included.

Descriptive Presentation of School Program Costs

Adequate per-pupil costs for each school program design were derived from resource specifications generated by the six PJPs, which operated independently from one another. The figures presented in the following exhibits reflect overall adequate school-level program costs per pupil, excluding all costs associated with central or district administration, maintenance and operations of buildings, food services, and student transportation. Converting resource specifications to cost involved applying prices to resources. In most cases, prices consisted of average compensation rates (inclusive of salaries and benefits) for the various types of school personnel specified by panelists.[60]

General Trends

Exhibit 57 shows the projected adequate per-pupil costs for different program designs across the three schooling levels for each panel, allowing us to see how the costs generated from high poverty, high poverty/high EL, high special education, and low-enrollment program designs compare to the costs generated in the base models and across panels. In general, the panelists specified additional resources (beyond those specified in the base models) in program designs for schools with additional needs or smaller enrollments. Common program design modifications were reducing class sizes and building stronger special education and EL instruction programs by increasing the number of staff devoted to special education/EL instruction, administration, and support.

[60] Data on average salaries for various staff types were obtained through the Delaware Open Data Portal.

Exhibit 57. Comparison of Adequate Projected Costs by Model, Schooling Level, and Panel

Level	County/Panel	Base (Task 1)	High poverty (Task 2)	High poverty/ EL (Task 3)	High SWD: Basic (Task 4)	High SWD: Intensive and Complex (Task 5)	Low enrollment (Task 6)
Elementary	Kent A	16,224	17,746	18,950	17,577	19,518	16,648
	Kent B	19,294	23,381	25,362	21,730	25,646	23,218
	New Castle A	16,537	21,030	21,905	19,899	22,181	17,131
	New Castle B	18,201	20,671	21,722	19,635	21,133	19,138
	Sussex A	14,400	17,467	19,098	17,507	23,004	15,718
	Sussex B	17,119	19,625	20,414	18,543	21,629	19,455
	Average	**16,962**	**19,987**	**21,242**	**19,149**	**22,185**	**18,551**
Middle	Kent A	15,233	16,209	17,206	16,688	18,179	16,288
	Kent B	17,817	21,933	23,685	20,569	23,837	21,538
	New Castle A	14,922	16,558	18,654	16,074	16,854	15,276
	New Castle B	15,495	17,574	18,491	16,559	17,801	15,795
	Sussex A	13,217	15,827	17,999	15,717	18,311	15,549
	Sussex B	14,165	15,606	16,310	15,448	18,059	15,326
	Average	**15,142**	**17,284**	**18,724**	**16,843**	**18,840**	**16,629**
High	Kent A	18,023	19,934	21,131	19,663	20,609	17,619
	Kent B	18,074	20,075	21,444	20,085	24,655	22,346
	New Castle A	14,266	15,729	17,808	15,242	15,904	14,532
	New Castle B	13,224	14,317	15,095	14,013	15,181	13,428
	Sussex A	16,160	18,017	19,936	17,944	20,986	17,714
	Sussex B	13,247	14,126	14,981	15,056	16,873	15,001
	Average	**15,499**	**17,033**	**18,399**	**17,001**	**19,035**	**16,773**

Note. EL = English learner; SWD = students with disabilities.

As a result of specifying additional resources for schools with higher levels of need, the cost of providing adequate educational opportunities increased in schools with higher percentages of students living in poverty; students classified as ELs; and students with disabilities, and by the severity of their disability. At the elementary, middle, and high school levels, the models with high percentages of students with disabilities with intensive and complex needs (Task 5) had the highest adequate costs per pupil, which were, on average, $5,223, $3,698 and $3,536 above that of the corresponding base models (Task 1), respectively.

To provide a richer description of the patterns of resource allocation resulting from the PJP specifications, we grouped the costs associated with each hypothetical school task into the following categories:

- Core instruction: Costs of teachers and educational assistants for core instructional classes.
- EL instruction: Costs associated with English learner instructional staff.
- Students with disabilities instruction: Costs associated with special education instruction and services.
- Other student support services: Costs of instructional and pupil support services (such as guidance counselors, school psychologists, social workers, and other support staff) and the costs of substitute teachers.
- School administration: Costs of principals, vice principals, clerical and office staff, and any other school administrative staff.
- Nonpersonnel: Costs of books and curriculum; supplies/materials; equipment/technology; contracted services; communications services; and any rentals, leases, or repairs. This also includes those costs other than personnel time, which are associated with staff participation in professional development (e.g., tuition and fees, travel, lodging, etc.).
- Extended time: Costs of school athletic programs, extended day programs, extracurricular activities, and extended year (summer) programs.

The following sections examine the category-specific costs corresponding to the elementary, middle, and high school program designs developed for the base model (Task 1), as well as the modified models made in response to changes in student needs (Tasks 2 through 5) and school size (Task 6). We stress that although the panels specified particular combinations of resources (e.g., core classroom teachers, instructional assistants, pupil support personnel, etc.), none of these specifications are intended to be prescriptive. Districts and schools make different choices in how they use their resources to respond to their specific contexts and to feedback from their staff, students and families, and community. The resource specifications serve as a method to estimate the cost of providing an adequate education to students under different circumstances and are not meant to replace local decision making concerning resource allocation.

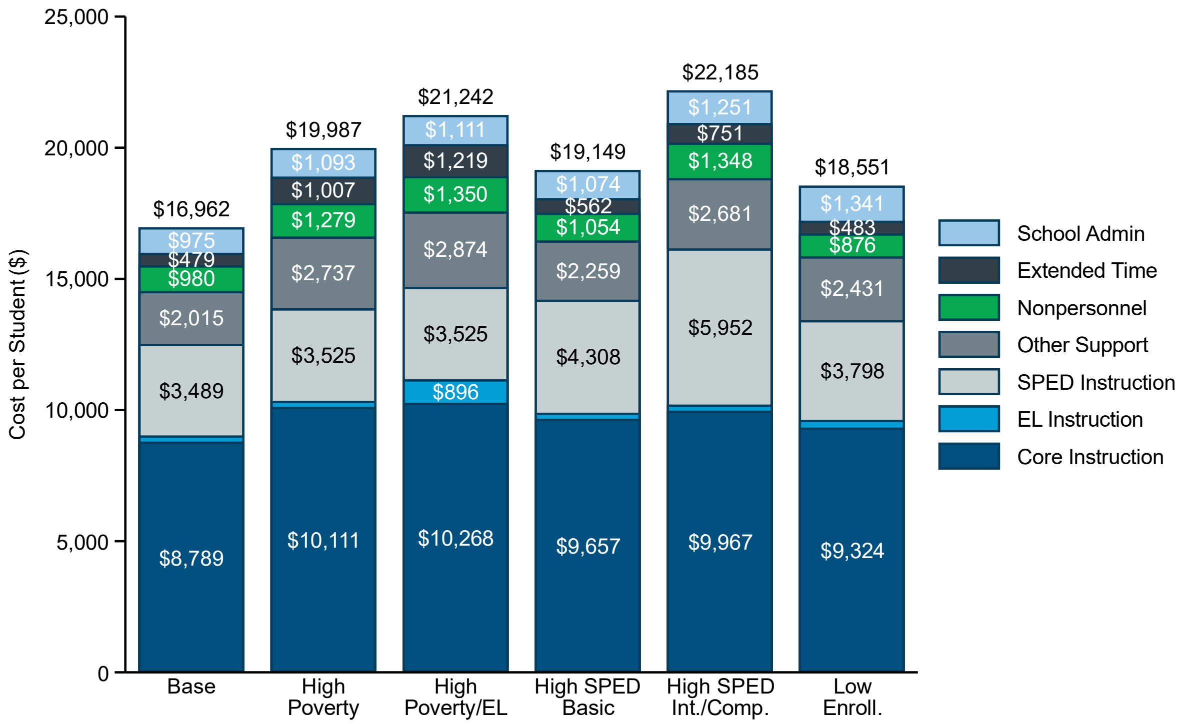
Elementary School Program Designs

Elementary school base model. The panels independently designed instructional programs that were similar in scope and nature, but somewhat different in the intensity of their resource needs. The panelists indicated that two adults should be in all core instructional classes. Depending on the needs of students in those classes, two adults might consist of one certified teacher and one paraprofessional or one elementary certified teacher and one special education teacher. Across every panel, panelists also noted the need for dedicated school-level support staff, including school counselor(s), school psychologist(s), nurse(s), and social worker(s). Panelists mentioned the need for paraprofessional staff that could support general instruction and take on some of the duties related to monitoring or supervising students outside of class (e.g., cafeteria and hallway monitoring, dismissal coordination) regularly assigned to teachers, which panelists reported as a burden when balancing instructional priorities such as lesson planning, grading, communicating with parents/caregivers, and attending IEP meetings.

As seen in Exhibit 58, the elementary base model specifications resulted in an average per-pupil cost across the PJPs of about $16,962. The core instruction component accounted for over half of the overall average per-pupil cost, while the special education instruction component accounted for more than a fifth of the overall predicted cost.

Elementary school high-poverty program design modifications. The panels decided that educational support must be more targeted for schools with higher percentages of students living in poverty. In general, the panels suggested schools should provide access to resources that students may lack at home so that students can prepare for and engage successfully at school. Specifications made by panelists were intended to make students feel valued and to nurture their ability to successfully learn. To implement this approach, panels made substantial modifications to their base instructional designs and resource specifications.

Exhibit 58. Average Elementary School Projected Adequate Costs by Cost Component and School Task



Note. EL = English learner; SPED = special education. Unlabeled bar segments are less than $300 per student.

Specifically, for high poverty schools, panelists noted the need for additional supports beyond those indicated in the base school program design. Examples of essential supports for students from low-income families included the following: school food and clothing pantry, backpack program for meals beyond the regular school day, and nutritionists to support the backpack programs. For both academic remediation and enrichment, panelists noted the need for extended school-day and school-year programs beyond that which is typically offered. These extended academic programs would serve to support students in developing grade-level knowledge and skills and mitigating learning loss due to summer break or the COVID-19 pandemic. Panelists noted the need for additional funds to support field trips and other out-of-school enrichment, transportation for field trips, wellness centers, and dedicated mental health specialists to support trauma issues.

The resources specified for the high-poverty elementary school program design resulted in an average increase in adequate costs of about $3,024 per pupil above that of the average base model, resulting in an overall per-pupil cost of $19,987. While the average per-pupil cost of each component in the high-poverty program design was higher than in the average base model, the component that saw the largest average increase was core instruction, which rose by $1,322 per pupil, followed by other student support services and extended time that increased by $722 and $528 per pupil, respectively (see Exhibit 58).

Elementary school high-poverty/high-EL program design modifications. For schools with higher percentages of both students living in poverty and students classified as ELs, panelists made several modifications to the high-poverty model. All panels increased the number of bilingual resource teachers, EL specialists, and paraprofessional to either assist current teachers or teach core subject classes, resulting in a cost attributed to EL instruction that is almost four times that found in the base model. Nearly all panels suggested there should be sufficient numbers of EL specialists who could push into classrooms to support students during content-area instruction rather than pulling them out for individualized instruction. In addition, panelists noted the need for EL coaches who could support teacher professional learning and provide classroom coaching to support effective classroom instruction for EL students. Panelists also allocated additional professional development funding dedicated to EL topics, the costs of which were captured in the EL instruction and other support services cost categories. Moreover, all panels emphasized that a significant share of student support staff should be bilingual.

The resources specified for the high-poverty/high-EL program design resulted in the second-highest average per-pupil cost to support adequacy across the six models. In this case, the average overall adequate per-pupil cost was $21,242—an increase of $4,279 above the elementary school base model. As seen in Exhibit 58, the cost categories in the high-poverty/high-EL model with the largest increases above the base model were core instruction ($1,479), EL instruction ($661), and student and other support ($859).

Elementary school high special education program (basic needs) design modifications. For elementary schools with higher percentages of students identified as having basic special education needs, the panelists were aligned in terms of the types of services they believed students enrolled in special education should receive. Modifications were made mostly to the special education and extended time programmatic components. All panels suggested there be an increase in the number of special education teachers and paraprofessionals assigned to assist certified instructional personnel. To meet the needs of students enrolled in special education, the panels specified more staff in the form of school psychologists, social workers, nurses, and counselors. This resulted in an average increase in costs associated with other student support services equal to $244 per pupil, on average.

Panelists also noted the need for dedicated special education teams in schools with high numbers of special education students. These special education teams would include, at a minimum, a coordinator, a data analyst (or a caseload staff), and one or more specialists who would schedule and facilitate IEP meetings, write IEP/504 plans and associated documentation, conduct follow-ups, and formulate transition plans for special education students. The data analyst would collect and analyze student data to assess progress monitoring, gauge program effectiveness, and support instructional staff in making evidence-based decisions. Data analysts would serve to reduce the burden of data entry by teaching staff so they could more effectively focus on instruction.

The resources specified for the elementary high special education program designs resulted in an average overall adequate per-pupil cost of about $19,149—$2,187 more than the average cost of the base model specifications. As seen in Exhibit 58, the per-pupil amounts for each cost component were increased above base model levels, with the largest increases occurring in the core instruction ($868) and special education instruction ($819) cost categories.

Elementary school high special education program (intensive and complex needs) design modifications. In addition to the specifications made to the elementary high special education (basic) model, panelists specified additional special education teachers and paraprofessionals to ensure caseloads aligned to best practices, increasing special education instruction costs by $1,644 more than what was specified in the high special education program (basic needs) model. Moreover, panels explicitly indicated the need for additional resources to provide assistive technology for working one on one with students enrolled in special education, especially those with hearing impairments, and supplying dedicated in-house technology personnel who could support teachers in learning how to use and immediately troubleshoot issues with those assistive technologies. This resulted in substantial increases in nonpersonnel costs of $368 per pupil above those in the base model.

The resources specified for the elementary high intensive and complex special education program design resulted in the highest average per-pupil cost to support adequacy across the six models, with an average overall adequate per-pupil cost of about $22,185—$5,223 more than the average cost of the elementary base model specifications. As seen in Exhibit 58, the per-pupil amounts for each cost component were increased above base model levels, with the largest increase ($2,463) occurring in the special education instruction component.

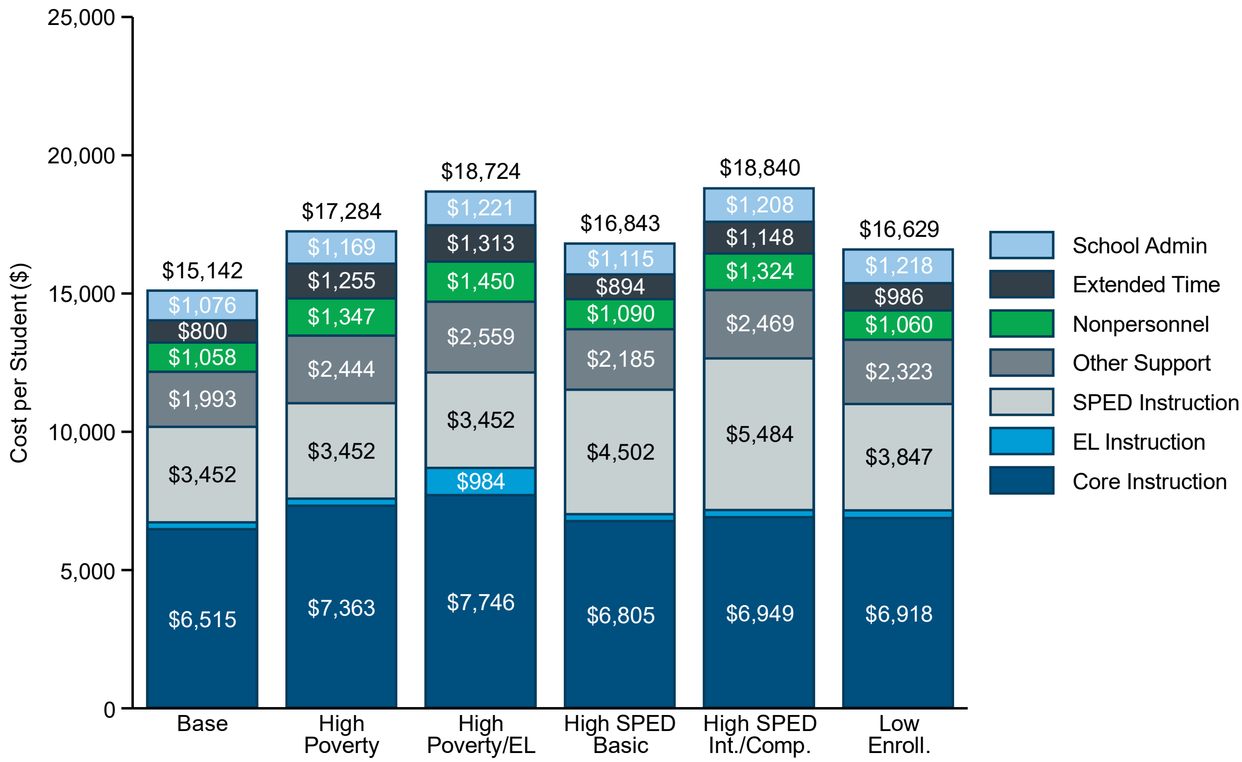
Elementary school low-enrollment program design modifications. To address the decrease in student enrollment that defines this model, the panels used a variety of strategies to modify their program designs, including adjusting downward the resource specifications proportional to the smaller school size, combining two or more roles into one staff position, or specifying part-time versus full-time positions for support staff. However, panelists also noted that although total student population was substantially smaller in the elementary low-enrollment school model compared to the base model, many positions—including principals, assistant principals, administrative assistants, and technology staff—were necessary as dedicated full-time positions whose utilization effort could not be decreased proportionately (or at all) in order to ensure effective school functioning. Exhibit 58 shows that the programmatic component experiencing the largest average increase above the base model was core instruction ($535), reflecting a need for full-time equivalent staff positions for instruction that do not tend to decrease proportionally with enrollment. Similarly, the use of particular special education instructional staff and other student support staff did not always decrease proportionately with the lower enrollment. Compared to the base model, the panel modifications resulted in increases in adequate per-pupil costs associated with these categories as follows: other student support ($416), school administration ($366), and special education instruction ($309).

The results suggest that there are substantial diseconomies of scale associated with providing adequate schooling programs that cause per-pupil costs to rise as the number of students served decreases. The resources specified for an elementary school with low student enrollment resulted in an increase in the average overall adequate per-pupil cost of about $1,589 above that of the average base model specification (to $18,547).

Middle School Program Designs

Middle school base model. Exhibit 59 shows the average per-pupil expenditures by different cost components for each middle school program design. Across the six panels, average suggested class sizes for Grades 6 through 8 was less than or equal to 21 students. As with the elementary base model, panelists noted the necessity of two adults in every classroom, with staffing decisions based on the content area and student population being served in each course section. For instance, in a base model classroom, several panelists noted that a teacher certified in the content area and a paraprofessional would be sufficient for meeting students' needs. Compared to the elementary base model, extended time costs were higher due to the inclusion of dedicated athletic and band staff and athletic and band equipment. Panelists also noted the need for strong career education programming beginning in middle school for all students, such that those students could make more informed decisions about which career and/or college readiness programs and coursework they might pursue in high school.

Exhibit 59. Average Middle School Projected Adequate Costs by Cost Component and School Task



Note. EL = English learner; SPED = special education. Unlabeled bar segments are less than $300 per student.

The specifications resulted in an overall adequate per-pupil cost of $15,142, with the core instruction component accounting for 43% of the overall per-pupil cost. The second-largest component was special education instruction, which accounted for 23% of the overall cost.

Middle school high-poverty program design modifications. Similar to the elementary school program designs, the panelists followed a philosophy of providing students living in poverty with supports that may not be available at home. The panels made substantial modifications to their middle school base model specifications to account for increased levels of student poverty in the middle school high-poverty program design. A substantial increase in adequate per-pupil cost stemmed from the core instruction component, which can be attributed largely to a shift to a more experienced teaching force.

As with the elementary high-poverty model, panels also noted the need for a school food and clothing pantry, backpack program for meals beyond the regular school day, nutritionists to support the backpack programs, and Wi-Fi hotspots for students without home Internet access. Panelists indicated the need for school wellness centers in high-poverty schools, where health care staff could attend to daily needs of students in the building as well as offer more comprehensive wellness healthcare. Additional behavior interventionists, social workers, and school psychologists would be used to provide positive behavioral interventions and mental health support for adolescents from low-income backgrounds. Academic enrichment and remediation beyond that which is typically offered was deemed essential by panelists. Extended day and year programs would provide opportunities for students to build effective study skills, participate in academic enrichment, and engage in academic remediation to build grade-level knowledge and skills.

The resources specified for the middle school high-poverty program design resulted in an increase in the overall adequate per-pupil cost of $2,143 above that of the middle school base model (to $17,284). On average, while the per-pupil cost for each individual category in the high-poverty program design was higher than in the base model, the category with the largest absolute increase in cost was core instruction, which was $848 higher, while the average per-pupil cost associated with the other student supports and extended time component increased by $451 and $455, respectively, above the base model specifications.

Middle school high-poverty/high-EL program design modifications. Unsurprisingly, the panel specifications for the high-poverty/high-EL program design resulted in an even larger increase in adequate per-pupil cost compared to the base model than did the high-poverty program design. Building on the middle school high-poverty model, the most noteworthy modifications were made to the EL support and other student support cost categories: an increase in the number of EL specialists and educational assistants and the inclusion of bilingual family liaisons who could communicate with parents/caregivers. These led to significant increase in costs of EL instruction ($736 per pupil) and other student support ($566 per pupil) compared to the base model.

In addition, there was also an increase in nonpersonnel costs above that of the base model, on the order of $392 per pupil, as panelists specified additional nonpersonnel EL resources such as curriculum materials in students' home language and sustained and ongoing professional learning for instructional staff on culturally responsive teaching and effective practices in sheltered English instruction.

With an average overall per-pupil cost of $18,724, the resources specified for the high-poverty/high-EL program design resulted in the second-highest adequate cost across the different models—an increase of $3,582 per pupil above that of the middle school base model. Within this overall cost figure, the cost component with the largest increase above the base model was core instruction ($1,231).

Middle school high special education program (basic needs) design modifications. The most notable modifications made to the high special education program designs for middle schools were within the special education instruction component. The panels increased the number of special education teachers, specialists, and paraprofessionals to support the increased number of students receiving special education services and to keep caseloads similar to the other program designs. A noteworthy change in classroom staffing made by several panels was a content-area certified teacher and a special education teacher in each classroom. Specifically, many panelists indicated that a true co-teaching model with two dedicated, certified teachers would best serve students in special education, rather than one content-area certified teacher dedicated to the classroom and one special education teacher who “floats” among classrooms with a particular cohort of students or grade level.

The resources specified for the middle school high special education with basic needs program design resulted in an average overall adequate per-pupil cost of about $16,843—an increase of approximately $1,700 per pupil above the base model cost. The programmatic component with the largest average per-pupil cost increase was special education instruction, which increased by $1,050 above the base model.

Middle school high special education program (intensive and complex needs) design modifications. Building on the high special education with basic needs program designs, the main changes made to the program designs for high special education with intensive and complex needs were within the special education instruction component. The panels increased the number of special education teachers, specialists, and paraprofessionals to support the increased number of students receiving intensive and complex special education services and to keep caseloads in line with other program designs, which led to significant increases in special education instruction costs. Panelists added instructional and pupil support staff to further account for the needs of the increased number of students enrolled in special education.

The resources specified for the middle school high special education program design resulted in an average overall adequate per-pupil cost of about $18,840—an increase of $3,698 per pupil above the base model cost. The programmatic component with the largest average absolute increase in cost per pupil above the base model was special education instruction ($2,032).

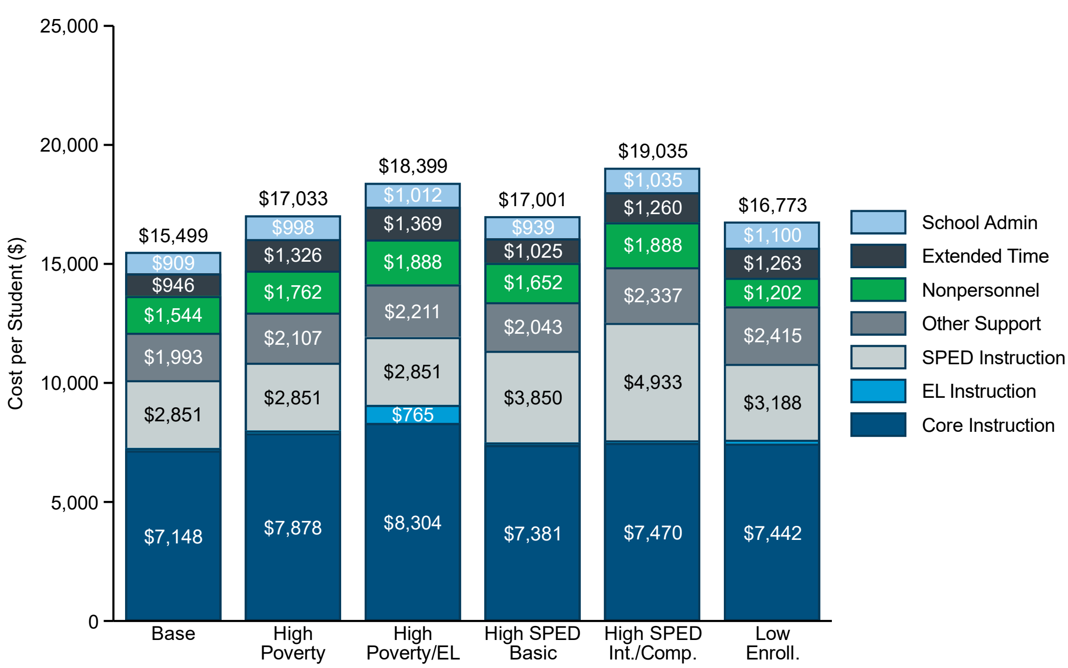
Middle school low-enrollment program design modifications. The general approach taken by panels to modify the resources specified for the low-enrollment program design was to reduce the base model resource specifications proportionally (or close to proportionally) to the enrollment decrease. Similar to the elementary low-enrollment model, panelists noted that some key building staff, such as administrators, IT personnel, and student behavior support staff could not be reduced proportionally or at all. Additionally, panelists were firm that the same academic and enrichment opportunities, such as career and technical education (CTE) and athletic programming, offered in other schools should be offered in low-enrollment schools.

The resources specified for a smaller school with lower student enrollment resulted in an increase in the average overall adequate per-pupil cost of $1,487, compared to the base model (to $16,628). Notable cost increases appeared across almost all of the cost categories. For instance, core instruction, special education, and other student support increased by $403, $395, and $330, respectively, while smaller increases were observed for extended time ($186) and school administration ($142).

High School Program Designs

High school base model. The average overall adequate per-pupil costs for each high school model are presented in Exhibit 60. As described in the following sections, the panelists tended to recommend similar resources as they did for elementary and middle school levels. Across the six panels, suggested average class sizes for Grades 9 through 12 was less than or equal to 25 students. One of the main differences between the middle and high school designs was the focus on resources to support high school graduation and postgraduation success, which are unique to the high school models. This included a larger number of CTE coursework offerings; resources for career exploration, co-ops and internships, and/or college or military preparation. As with the middle school base model, panels specified resources for athletics and band but at higher rates of funding. Panelists noted that career-related coursework and extracurricular activities were essential for maintaining student engagement throughout high school until graduation.

Exhibit 60. Average High School Projected Adequate Costs by Cost Component and School Task



Note. EL = English learner; SPED = special education. Unlabeled bar segments are less than $300 per student.

As seen in Exhibit 60, the panel specifications resulted in an average overall adequate per-pupil cost of $15,499 for the high school base model. The core instruction component accounted for 46% of the overall per-pupil cost, and the special education instruction component accounted for a little less than one fifth (18%) of the average overall adequate per-pupil cost.

High school high-poverty program design modifications. The resources specified for the high-poverty high school program designs increased adequate per-pupil costs, on average, by over $1,500 above base model specifications, resulting in an adequate per-pupil cost of $17,033. The average per-pupil costs for all cost categories increased above base model levels, but the component with the largest increase was core instruction, which rose by $730. This was followed by more moderate increases in per-pupil costs associated with extended time programs ($380) and nonpersonnel ($218).

Panels also specified resources dedicated to SAT preparation, student transportation for co-ops and internships, as well as additional counseling staff to support career planning, college applications, and completing the Free Application for Federal Student Aid. Finally, panels specified lower school psychologist and school counselor caseloads than those in the base model to support the additional social-emotional and academic needs of students from low socioeconomic status backgrounds. This led to a small increase in student support costs compared to the base model ($114).

High school high-poverty/high-EL program design modifications. The panel program designs and corresponding resource specifications for the high school high-poverty/high-EL model resulted in an increase in average overall per-pupil costs above the high-poverty model on the order of $1,366. Resource changes included increases in the number of EL specialists and spending on books, curriculum, software, and intervention materials. As with the middle school program, panelists also specified bilingual family liaisons to support communication with parents/caregivers and an on-site school wellness center for students to access wellness healthcare. These modifications resulted in increases to costs associated with EL instruction ($657) and nonpersonnel ($344) above those found for the base model.

The resources specified for a school with higher proportions of both students living in poverty and those classified as ELs resulted in the second-highest per-pupil costs across the different models. In this case, overall average adequate per-pupil cost was about $18,399. This represents an increase of almost $2,900 per pupil above that of base model.

High school high special education program (basic needs) design modifications. Resources specified for high schools with high proportions of students with basic special education needs included an increase in special education teachers, paraprofessionals, and related service providers, which led to a $999 increase in special education instruction costs per pupil above the base model. As with the elementary and middle school models, panel specifications included a special education support team to accommodate the academic needs of special education students. This included additional school psychologist(s); MTSS coordinator(s) or data analyst(s) to support data collection and analysis of student progress monitoring and inform core instruction; educational diagnostician(s) to coordinate and administer testing; and special education coordinator staff to manage and coordinate IEP/504 meetings and associated paperwork. Several panels suggested the inclusion of a dedicated special education specialist per building who could work directly with teachers to ensure instruction met the needs of special education students.

The resources specified for the high special education with basic needs model resulted in an overall average adequate per-pupil cost of $17,001, which represents an increase of $1,502 above that of the base model specification.

High school high special education program (intensive and complex needs) design modifications. In addition to those resources specified in the high school high special education students with basic needs model, panelists specified an additional increase in total number of special education teachers and educational assistants to support the increased number of students receiving intensive and complex special education services and to keep caseloads in line with other program designs. This led to an increase in per-pupil costs by $2,082 above that of the base model. The panel specifications included one or more occupational therapist(s), physical therapist(s), speech language pathologist(s), and assistive technology specialist staff who are dedicated to a single building. Panels also stated that additional professional development would also be necessary for core instructional staff to best meet the needs of students with intensive and complex needs. These led to cost increases related to both other student supports ($344) and nonpersonnel ($344).

The resources specified for the high special education for students with intensive and complex needs model resulted in an overall average adequate per-pupil cost of $19,035, an increase of $3,536 above that of the base model.

High school low-enrollment program design modifications. The panels made relatively few modifications that diverted from the principles of the base model. The modifications followed a similar strategy as that used for the middle school low-enrollment model in reducing resources proportionally (or close to proportionally) to the decrease in student enrollment. Reductions in resources were made across student and other support staff, school administration, the number of students attending extended time programs, and nonpersonnel expenditures. However, these reductions only led to a significant decrease in nonpersonnel costs (approximately $342 lower compared to the base model). In response to the reduced number of teachers within the school, a few panels specified a larger share of more experienced teachers than was in the distribution in the base model. Rationale for this choice was that teachers require additional experience to take on multiple roles and provide instruction in multiple subject areas.

The resources specified for a smaller school with low student enrollment resulted in an average increase of $1,274 in adequate per-pupil cost above the base model, leading to an overall adequate per-pupil cost of $16,773.

Using Regression to Model Variation in School Program Costs

Using the costs calculated from the program designs, we conducted a regression analysis to estimate an equation describing how the measure of overall per-pupil cost of providing an adequate school program was associated with the different student characteristics and enrollments distinguishing the various school models. Due to the small number of data points, we pooled the data from across panels and generated a single equation. The regression included overall adequate per-pupil cost (dependent variable) as a function of schooling level enrollment shares (proportions of enrollment in the elementary, middle, and high school grades); natural log of enrollment (centered on the statewide average); and percentages of students from low-income families, classified as EL students, students with disabilities, and students with disabilities with intensive and complex disabilities; and panel specific indicators as follows:[61]

$$Cost\ Per\ Pupil = f(Schooling\ Level, Enrollment, Low\ Income\ \%,$$

$$EL\ \%, SWD\ \%, Complex\ and\ Intensive\ SWD\ \%, Panel\ Indicators)$$

The regression results are presented in Exhibit 61. The constant can be interpreted as a base per-pupil cost of school-level programming for an average-sized school with no additional needs as specified by the Kent A panel. The remaining coefficients can be interpreted as multipliers of the base cost and are centered on 1. In other words, a value of 1 represents no change from the base cost. Values greater than 1 represent factors that when present (or higher) increase costs, while coefficients below 1 result in reduced costs.[62] The panel indicators represent how much higher or lower the estimated base cost would be for each panel's specifications.

[61] Additional detail on the estimated regression model is provided in Appendix E of the Technical Appendix.
[62] Due to the small number of data points, the results of this analysis in terms of statistical significance of the estimated coefficients should be treated with caution. The main purpose of this analysis was to develop relationships between the PJP-generated measures of adequate per-pupil costs and the factors included in the model based on a collection of school-level data points that span purposeful ranges of student needs, not to draw statistical inference from these estimated relationships. To this end, while measures of statistical significance are reported, we stress that these should be interpreted in this context.

Exhibit 61. Regression Results Predicting Adequate Cost Per-Pupil at the School Level

Predictor variables	Value
Student needs	
Low-income proportion	1.57*
Disabilities proportion	3.19*
Intensive and complex disabilities proportion	8.21
English learner proportion	1.75*
Programming/grade range	
Middle school enrollment proportion	0.91*
High school enrollment proportion	1.03
School enrollment	
Number of students (ln)	0.94
Panel indicators	
Kent B	1.17***
New Castle A	0.91***
New Castle B	0.89***
Sussex A	0.96
Sussex B	0.89***
Constant	11,294.7***
Number of observations	108
pseudo R^2	0.651

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 57% more spending per student, on average, holding all other cost factors in the model constant.

Note. Coefficients shown are exponentiated coefficients from a Poisson regression. The constant term represents the per-pupil cost with all other coefficients set to 1. The number of students for enrollment is mean-centered, making the constant reflective of an average-sized school. The reference panel is Kent A. Data are from the professional judgment panel specifications from six panels, six school tasks, and three grade levels. The costs represented do not include costs associated with district or central administration, maintenance and operation of facilities, food service, and student transportation. *$p < .05$. **$p < .01$. ***$p < .001$.

The results indicate that an average-size elementary school with no students from low-income families, no students who are ELs, or no students with disabilities has an adequate base per-pupil cost ranging from $10,052 when the smallest panel indicator is applied (0.89 for New Castle B and Sussex B) to $13,215 when the largest panel indicator is applied (1.17 for Kent B). At the same enrollment size, the middle school base per-pupil cost is moderately less than the elementary school, while the high school cost was slightly more. Adequate cost per pupil decreases as school size increases, consistent with the notion of economies of scale.

The student demographic coefficients indicate that a low-income student costs 57% more than a student who is not low income; a student classified as EL costs 75% more than a student not classified as EL; and a student enrolled in special education costs approximately 200% more than a student not enrolled in special education. A student enrolled in special education with intensive and complex needs costs approximately 700% more than a student without intensive and complex needs.

When interpreting the results of these covariates, it is important to understand that the influence of the coefficients also depends on the percentage of students for which each variable applies. For example, even though a coefficient of 8.2 for students with intensive and complex disabilities is quite high, the influence of this coefficient is limited by the relatively small share of students in this category. Students with intensive and complex disabilities make up less than 10% of enrollment for nine out of 10 schools in Delaware.

Estimating the Cost of Adequacy from PJP Specification

Projecting School-Level Programmatic Expenditures

The AIR study team assembled administrative data on Delaware's public schools for the 2021–22 school year. This data included enrollment of each school in total and by grade, as well as the percentages of students from low-income families, students with disabilities, and students who are English learners. Using this data on the actual enrollments and characteristics of schools, we generated a predicted cost of school programming for each school using the regression results presented in Exhibit 61.[63] These projected costs per student are inclusive of the following: core instructional program costs; student support costs; school administrative costs; costs for extended day and year programs; and costs for special populations of students, such as students who are low-income, classified as ELs, or enrolled in special education. The projected costs for school programming do not include the costs of some overhead categories or certain districtwide services, including district or central administration, operation and maintenance of school buildings, food services, and student transportation. After projecting the cost of school-level programming for each school, we used the Comparable Wage Index for Teachers (CWIFT) to adjust the school-level projected costs to reflect differences in the costs required to hire and retain staff across geographic areas.[64] Because the CWIFT is specific to

[63] Each of the panel indicator variables in the regression shown in Exhibit 61 adjusts the intercept (or constant) upward or downward based on the overall richness of the particular panel's specification. For the purpose of projecting costs from the regression, we had to determine what the value of the intercept should be. We chose to generate predictions at the level of both New Castle A and Sussex A, the middle two panels. We then took the average of the two predictions as the final prediction. In this way, our predictions represent a median intercept value.
[64] The CWIFT data and corresponding documentation is publicly available for download from the National Center for Education Statistics here: https://nces.ed.gov/programs/edge/Economic/TeacherWage.

wages, we implemented geographic cost adjustments by multiplying the portion of projected costs representing salaries by the state-centered CWIFT.

Accounting for Overhead and District-Level Functions

Because of the special complexities involved in determining costs associated with district and central administration, maintenance and operations of facilities, food service, and student transportation, we did not attempt to determine adequate cost levels for these components through the PJP process. Instead, we used extant fiscal data provided by the Delaware Department of Education to determine suitable amounts for these four functions across districts and charter schools. We then added estimates of these costs to the estimated costs of school programming generated from the PJP process. By adding the costs of overhead and district-level functions, our final cost estimates are comprehensive of all services accounted for in current expenditures for Grades K–12 education, allowing us to directly compare our estimates of adequate costs to actual spending.[65] For more detail on how we calculated costs of overhead and district-level functions using extant fiscal data, see Appendix F of the Technical Appendix.

PJP Results

The initial adequacy cost estimates presented below reflect the resource specifications of the PJPs combined with the estimated expenditures on overhead costs and adjusting for geographic variations in wage costs. Additionally, federal expenditures on Grades K–12 education, such as Title I funding for high-poverty schools, have been removed because federal programs are meant to supplement state and local revenues and not supplant them. Additionally, this study is meant to inform potential updates to the state's method of distributing funding. The state is responsible for how state and local revenue is distributed across districts, with federal funding being distributed through separate mechanisms. Therefore, the base and weights represented in Exhibit 62 can be used to determine target funding levels based on the PJP approach.

Estimated Base and Weights

After adding in overhead costs, adjusting for geographic variations in wages, and subtracting federal spending on education, the base per-pupil target funding amount (representing an elementary school with at least 800 students serving no students with additional needs) is $11,996 per pupil (Exhibit 62). Middle schools have moderately lower target funding and high schools have slightly higher target funding per pupil. A decrease in enrollment slightly increases the funding target per pupil according to the model.

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[65] For the purpose of comparison, both adequate costs and actual spending do not account for the cost of capital and school construction or debt service.

The model indicates that low-income students should be funded at approximately 54% higher rates than those students who are not low income, and English learners should be funded at approximately 78% higher rates than students who are not ELs. Target funding for students with disabilities is estimated to be about 2.70 times (170% more than) the amount for students without disabilities. Last, target funding for students with intensive and complex disabilities is estimated to be 9.32 times (832% more than) the amount for students without intensive and complex disabilities.

Exhibit 62. Weight Estimation Using the Professional Judgment Approach

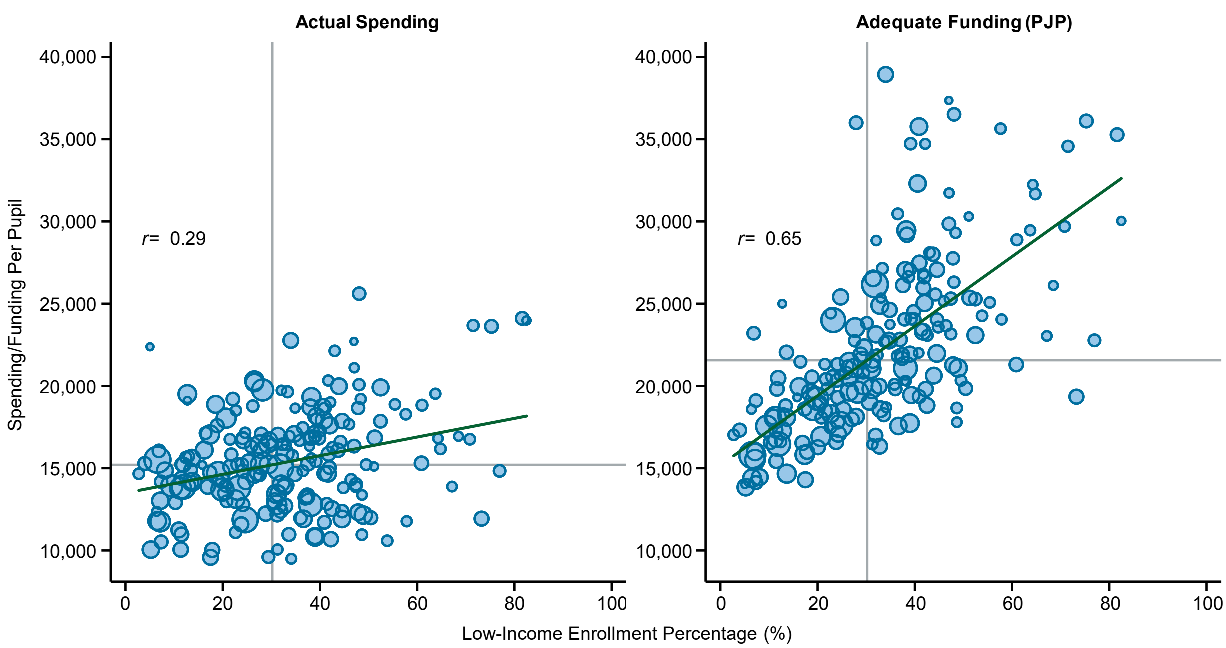
Weight variables and base	Value
Student needs	
Low-income proportion	1.54
Disabilities proportion	2.70
Intensive and complex disabilities proportion	9.32
English learner proportion	1.78
Programming/grade range	
Middle school enrollment proportion	0.91
High school enrollment proportion	1.03
School enrollment	
<300	1.05
300 to 449	1.03
450 to 599	1.03
600 to 799	1.02
Geographic cost (Comparable Wage Index for Teachers)	1.63
Base funding	11,996
Number of schools	198
Pseudo R^2	0.989

Exhibit Reads. An increase in the low-income student proportion from 0 to 1 (i.e., from no low-income students to 100% low-income students) is associated with 53% higher target funding levels, on average.
Note. Weights shown are exponentiated coefficients from a Poisson regression. The base funding represents target funding per pupil in 2021–22, with all other weights set to 1. Regression model is weighted by enrollment. The reference enrollment category is schools with more than 800 students. The programming and grade-range proportion coefficients are interpreted relative to enrollment in elementary grades. So that weights were not driven by outliers, six schools with costs greater than 1.5 times the 95th percentile were excluded from the regression.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Comparing Target Funding to Actual State and Local Spending by Student Need

In Exhibit 63, we compare the distribution of actual spending per pupil from state and local sources with respect to the shares of students from low-income families to the distribution of adequate funding according to weights. Target funding based on the PJP specifications is both notably higher and more progressive with respect to the percentage of low-income students compared to actual spending. Related to actual spending, schools serving the highest percentages of low-income students are expected to spend about $4,000 (or 30%) more per student than those with the lowest percentages of low-income students, whereas the target funding based on the PJP approach suggests that schools with the highest percentages of low-income students should receive about $15,000 (or 100%) more in funding than those with the lowest percentages of low-income students. However, there is substantial variation in target funding levels for schools with higher proportions of low-income students, likely reflecting differences in proportions of students who are English learners and students with disabilities in those schools.

Exhibit 63. Comparing Distributions of Actual State and Local Spending and Adequate Funding Using the PJP Approach With Respect to Low-Income Enrollment Percentages (2022)

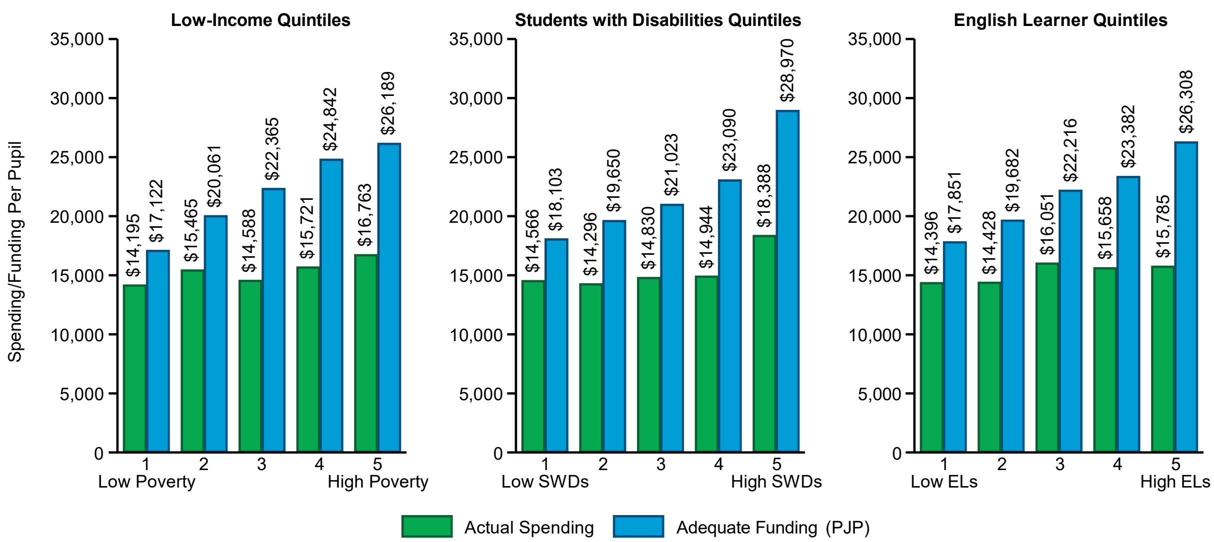


Note. The gray lines show statewide averages of both variables. The enrollment-weighted correlation coefficient is represented by *r*. This analysis omits six schools where more than 50% of students have disabilities.
Source. Authors' calculations based on data from the PJP, Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Exhibit 64 compares actual spending and costs for schools grouped into quintiles from low to high shares of students from low-income families, students with disabilities, and students who are ELs (Exhibits F3–F5 in Appendix F provide characteristics of schools by quintile). Each bar represents approximately 20% of the schools included in the analysis.

The leftmost panel shows schools grouped by low-income quintile. It shows actual spending and target adequate funding based on the PJP approach for all quintiles of schools. As with Exhibit 63, the plot by quintiles suggests that target funding should be higher and distributed more progressively with respect to the percentage of low-income students compared with actual spending. This is evidenced by the higher rate of increase in adequate funding compared with actual spending as quintiles progress from lower poverty to higher poverty. Although actual spending in the highest poverty quintile is higher than that in the lowest poverty quintile by over $2,500 (or 18%), the projected adequate funding amounts based on the PJP approach suggest that the highest poverty quintile should receive about $9,000 (or 53%) more in funding.

Exhibit 64. Comparing Actual State and Local Spending and Adequate Funding Using the PJP Approach Across Student-Need Quintiles (2022)



Note. PJP = professional judgment panel.
Source. Authors' calculations based on data from the PJP, Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education. This analysis omits six schools where more than 50% of students have disabilities.

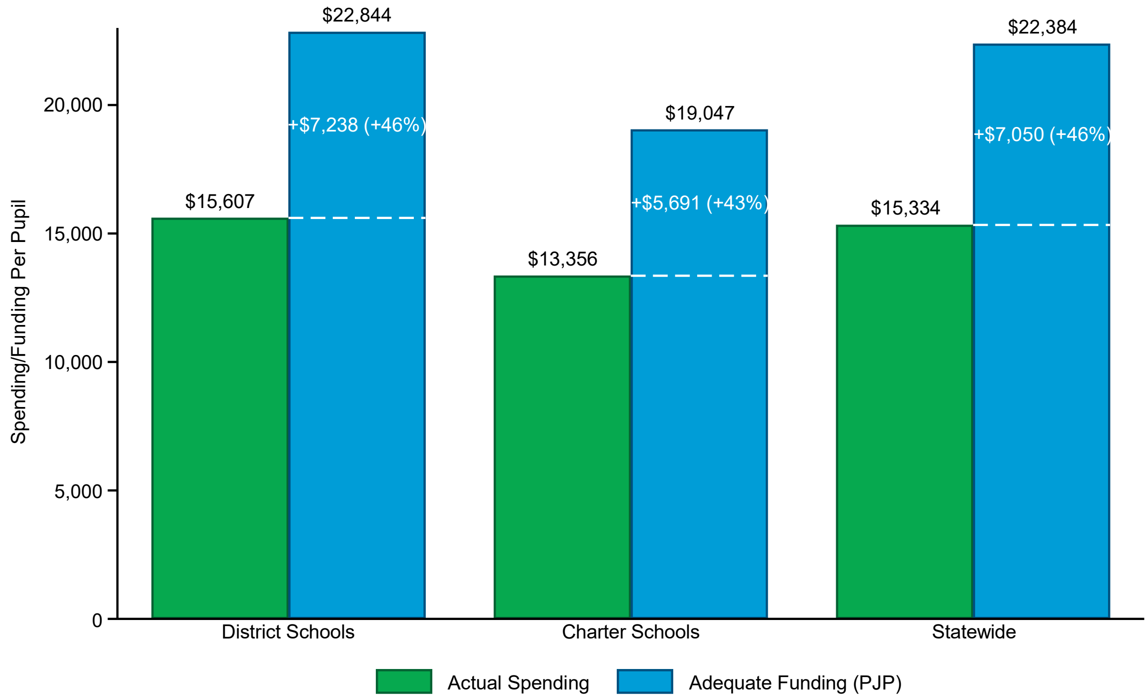
The middle panel provides a similar analysis by organizing schools by their shares of students with disabilities. As with by low-income, the results by students with disabilities quintile indicate that schools serving the highest percentage of students with disabilities should receive relatively more funding compared with actual spending than those serving the lowest percentage of students with disabilities. In Quintile 1, the target funding level is about $3,500 (24%) more per pupil than actual spending; whereas in Quintile 5, the target funding is over $10,500 (58%) more than actual spending.

Finally, the right-most panel shows the distribution of actual spending and formula funding for schools with lower and higher shares of students who are English learners. Once again, the target funding levels based on the PJP specifications suggest that schools serving the highest proportions of students with additional needs—this time English learners—require larger increases in funding. Schools with the largest shares of students who are ELs have target funding that is over $10,500 (67%) more than their actual spending levels. The Quintile 1 schools by English learner percentage have target funding approximately $3,500 (24%) more than actual spending levels.

Comparing Target Funding to Actual State and Local Spending by Sector

Exhibit 65 displays the actual statewide per-pupil spending from state and local sources and target per-pupil funding levels based on the PJPs' specifications for the 2021–22 school year. For district schools, actual spending totaled $15,607 per pupil, and adequate funding was projected to be $22,844 per pupil. This indicates that target spending levels to support an adequate education in the 2021–22 school year for district schools were 46% higher than actual spending. As a percentage, the gap for charter schools was similar to that of public schools. The statewide average for adequate funding per pupil across Delaware charter schools was $19,047; the average actual spending per pupil was $13,356. This represents a statewide average gap in charter school funding of $5,691, equal to 43% of average actual spending.

Exhibit 65. Comparing Actual State and Local Spending and Adequate Funding (PJP) For District and Charter Schools (2022)



Note. PJP = professional judgment panel. White text above the dashed line in the adequate funding bar represent the additional amount per pupil compared to actual spending.
Source. Authors' calculations based on data from the PJP, Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Chapter Summary

As a second approach to examining the adequacy of Delaware's school funding system, we conducted professional judgment panels. During these panels, expert educators from Delaware described the school programming and resources that would be necessary to enable all Delaware students the opportunity to meet the state's educational goals. Over the course of a series of tasks, these experts defined the resources that a school with relatively low student needs would require as well as the additional resources that would be required for schools with higher incidences of low-income students, students with disabilities, and English learners. For example, panelists noted that schools serving higher percentages of low-income students would need richer extended school-day and school-year programs compared to a school with lower needs.

After converting the resources to costs and extrapolating the results to Delaware's schools, we find that the resource specifications of expert educators in Delaware suggest that the state requires a 46% increase in resources overall and substantially stronger differentiation of resources according to student needs.

9. Comparing Adequacy Results from the Education Cost Model and Professional Judgment Approaches

The education cost model (ECM) and PJP approaches to estimating adequacy rely on quite different data sources and methods as well as assumptions about what the goals of education should be. The ECM approach relies on administrative data and sophisticated regression modeling while the PJP approach relies on the knowledge and experience of expert educators. The ECM approach is an outcome-oriented approach, with a focus on the statistical relationships among spending, outcomes, and cost factors; the PJP approach is an input-oriented approach that starts with quantities of resources that expert educators believe are necessary to meet a set of stated outcome goals and builds up to costs.

In addition, although we kept the cost factors included in the models and the analytic procedures as consistent as possible, there are some notable differences in the cost factors included. In gathering and analyzing data from the PJPs, we were limited in the number of cost factors for which we could estimate a cost differential, given that each additional cost factor would necessitate an additional PJP exercise. Therefore, for the PJP model, we did not estimate cost differentials for vocational education or for population density.

We also account for student with disabilities in different ways across the two models. Specifically, we did not include the proportion of students with intensive disabilities in the ECM estimation, because statistically it was strongly related to both overall special education and complex special education incidences, making it difficult to measure as an independent cost differential. For the PJP approach, we opted to include complex and intensive as a single combined category to limit the number of different exercises we asked panelists to complete.

In this section, we compare the weights and target funding amounts estimated from these different approaches to estimating adequacy. Several of these comparisons focus on the needs indexes. As described in a prior deliverable presenting the ECM, the weights specified by the models are converted into *effective weights*, which are the weights adjusted according to the fraction of students that a given weight applies to for each school. The product of all effective weights is termed the needs index and represents the amount of need or cost for a school relative to the base per-pupil amount. A needs index of 2, for example, means that the school requires twice as much funding as the base per-pupil amount that is provided for all students regardless of their needs or where they attend school. In addition to an overall needs index, we calculated a student needs index, which is the product of just the student needs weights. The student needs index represents the relative effect of only the student needs weights (not accounting for other school characteristic or contextual cost factors) on the estimated adequate target funding amounts.

Comparison of Base and Weights

Exhibit 66 displays the weights and base per-pupil amounts estimated through both the ECM and PJP analyses. Within the student needs category of weights, the ECM resulted in a higher weight than the PJP for low-income students (1.81 vs. 1.54) and students with disabilities in general (3.34 vs. 2.70), but lower weights for English learners (1.15 vs. 1.78) and students with intensive and complex disabilities (3.75 for complex only vs. 9.32 for intensive and complex). Within the programming/grade range set of weights, the most notable difference is the absence of a weight for vocational/technical units for PJP, whereas this was a rather strong weight as estimated through the ECM (4.56). The grade-level weights are quite comparable across the two models, with middle schools costing slightly less and high schools costing slightly more than otherwise comparable elementary schools. Within the school enrollment category of weights, the ECM estimated stronger weights for small schools relative to the PJP. For the smallest category—schools with fewer than 300 students—the ECM-based weight was 1.29 compared with a PJP-based weight of 1.05.

The last notable difference is the magnitude of the base. Using the ECM, we estimated a base per-pupil cost of $10,074, whereas the base per-pupil cost based on the PJP model was almost $2,000 higher, at $11,996 per pupil.

Exhibit 66. Comparison of Weights Estimated Using the Education Cost Model and Professional Judgment Panel Approaches

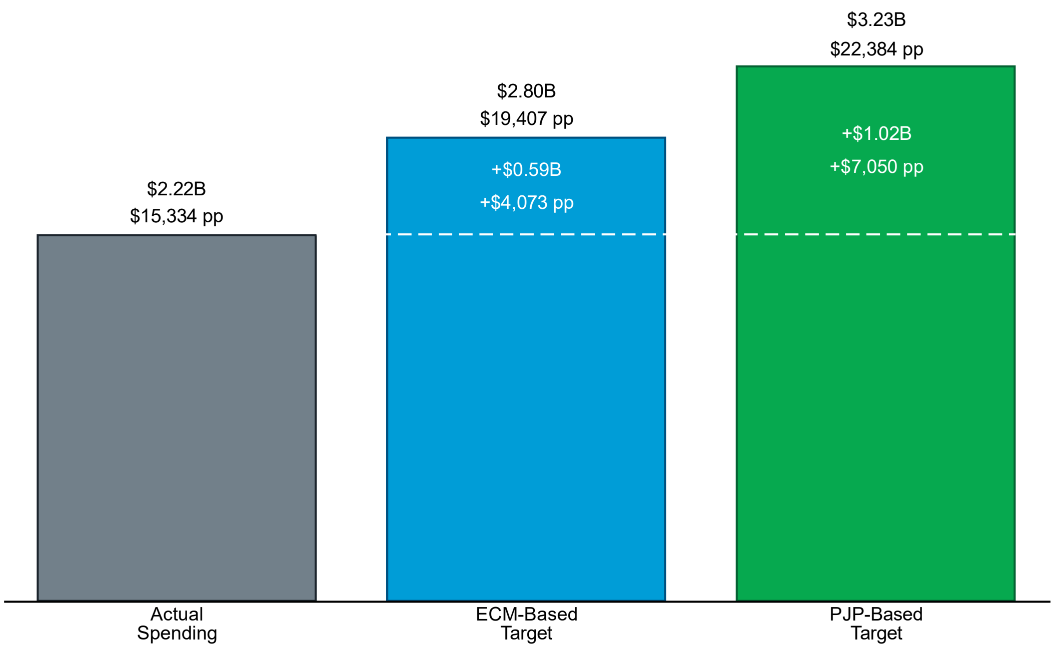
Weight variables and base	ECM Value	PJP Value
Student needs		
Low-income proportion	1.81	1.54
Disabilities proportion	3.34	2.70
Complex disabilities proportion	3.75	–
Intensive and complex disabilities proportion	–	9.32
English learner proportion	1.15	1.78
Programming/grade range		
Vocational/technical units proportion	4.56	–
Middle school enrollment proportion	0.99	0.91
High school enrollment proportion	1.04	1.03
School enrollment		
<300	1.29	1.05
301 to 449	1.12	1.03
450 to 599	1.07	1.03
600 to 799	1.04	1.02
Population density		
300 to 799	1.03	–
800 to 1,999	1.05	–
2,000 to 4,999	1.06	–
>=5,000	1.08	–
Geographic cost (Comparable Wage Index for Teachers)	1.38	1.63
Base	$10,074	$11,996

Note. ECM = education cost model; PJP = professional judgment panel.
Source. Authors' calculations based on data from the PJP, Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Comparing Total Target Funding

Exhibit 67 compares total target funding across the two approaches and to actual spending from state and local sources. ECM-based target funding amounts to $2.80 billion or $19,407 per student whereas PJP-based target funding amounts to $3.23 billion or $22,384 per student. Relative to actual spending, these amounts represent increases of $0.59 billion and $1.02 billion, respectively, or $4,073 and $7,050 per student, respectively. In relative terms, these are 27% and 46% increases from actual spending in the 2021-22 school year.

Exhibit 67. Comparison of Total Target Funding Generated Using the Education Cost Model and Professional Judgment Panel Approaches to Actual Current Spending From State and Local Sources



Note. ECM = education cost model; PJP = professional judgment panel; B = Billions; pp = per pupil.
Source. Authors' calculations based on data from the PJP, Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Comparing the Distribution of Funding and Needs Indexes

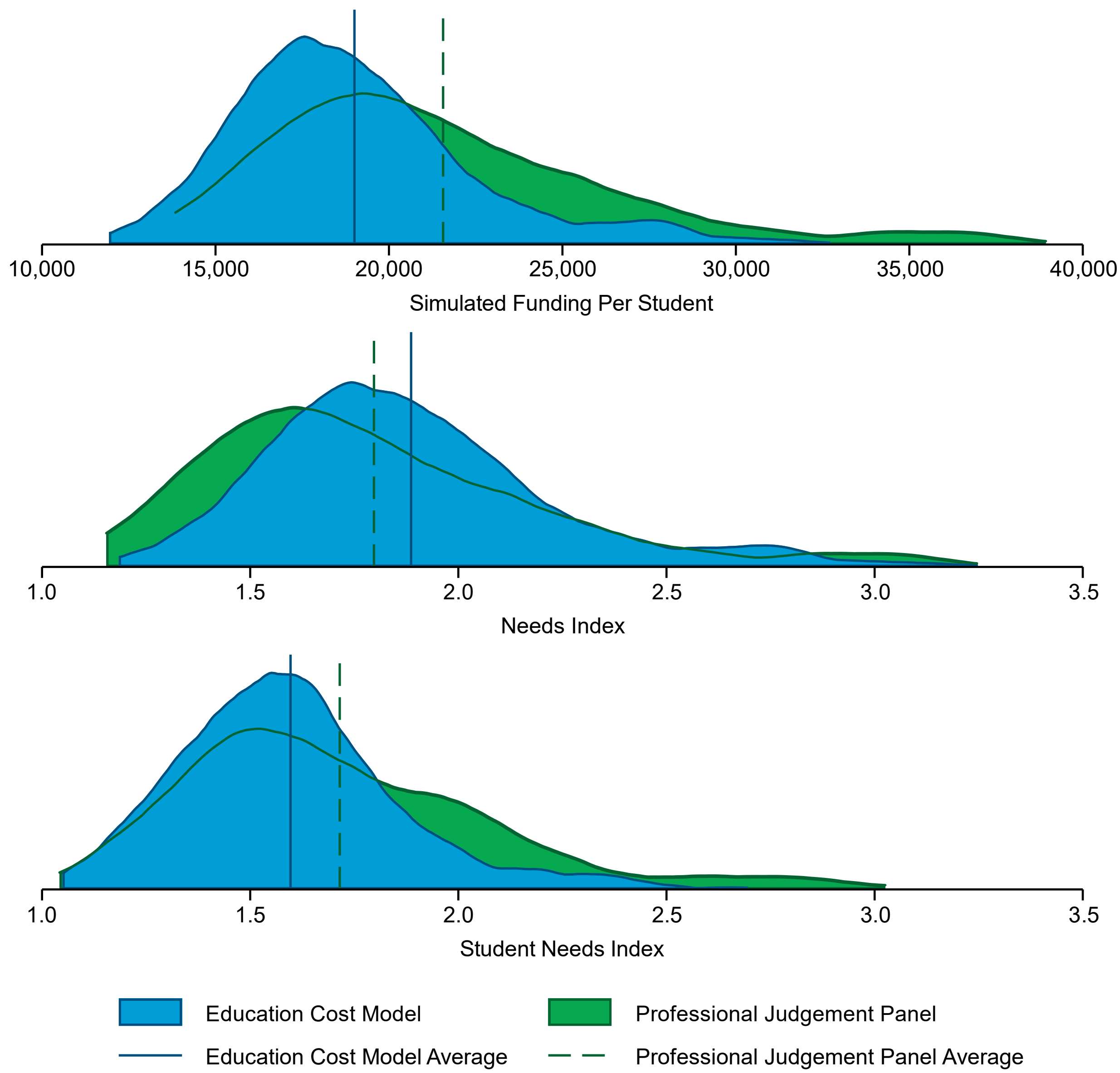
To better understand how the combinations of base and weights estimated through the two approaches would affect funding levels, we conducted a series of additional analyses comparing the resulting cost estimates and relative need of schools implied by the weights. Many of the analyses focus on the need index values rather than the targeted funding levels. Target funding levels for schools are driven by both the base per-pupil amount and the weights. The needs index values, by contrast, reflect only the influence of the weights, which drive the differences in funding across schools and districts. Through focusing some analyses on the needs indexes, we can more clearly compare the equity implications of the two approaches to estimating adequacy and target funding levels.

Exhibit 68 shows the distributions of simulated funding per student, the needs index, and the student needs index, when the ECM and PJP formulas are applied to public schools present in Delaware in 2022. The top panel shows that the PJP formula results in average funding per student that is almost $2,700 greater than under the ECM formula. In addition, the PJP formula results in a broader distribution. Under the ECM formula, the 10th to 90th percentile of simulated per-pupil funding ranges from just under $15,000 per student to under $24,000 per student, with a difference of about $8,700 between the two. By contrast, 10th to 90th percentiles of simulated funding under the PJP formula range from about $16,500 to almost $28,000 per pupil, with a difference of $11,400 between the two.

However, the higher spending under the PJP model is largely a function of its higher base per-pupil cost. When we compare the distributions of needs indexes of schools resulting from the application of ECM and PJP formula weights, we see that the ECM weights result in a modestly higher needs index on average (1.89) than the PJP weights (1.80), and this is largely a result of fewer schools with a very low needs index using the ECM-based weights. This means, that relative to the base, a larger share of funding is distributed on the basis of weights under the ECM formula compared to that of the PJP. In other words, had the ECM and PJP models generated the same base per-pupil amount, overall funding levels would be higher using the ECM-based weights than the PJP-based weights.

The higher average needs index for the ECM approach compared to the PJP approach is a function of the ECM having more weight categories and stronger small enrollment weights, and not a function of the strength of the student needs weights. When using only student needs weights to calculate a student needs index, the average student needs index is higher using the PJP weights (1.72) compared to the ECM weights (1.60). When looking at the weights alone, it is not clear whether the student needs weights under the PJP would be collectively stronger than under the ECM. The collective strength of the student needs weights depends both on the magnitude of the weights and the proportion of students in each category. This means that under the PJP weights, a larger share of funding relative to the base is distributed collectively based on the student needs weights.

Exhibit 68. Distribution of Funding per Student, Needs Index, and Student Needs Index for Education Cost Model and Professional Judgment Panel Estimates

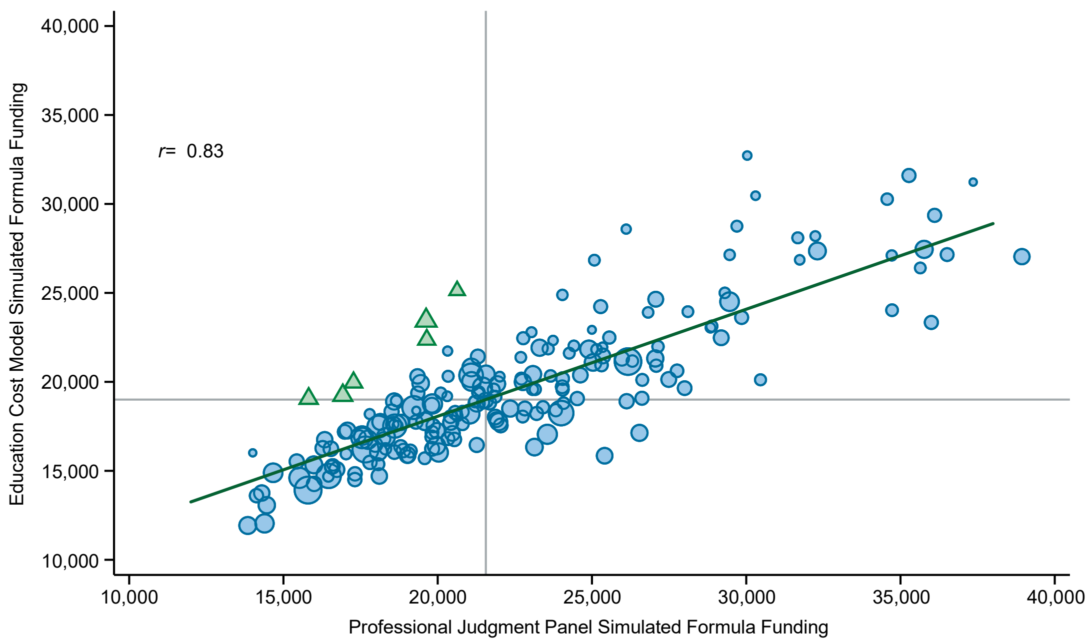


Note: This analysis omits six schools where more than 50% of students have disabilities.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

The Consistency of ECM-Based and PJP-Based Funding and Needs Indexes

To further examine the consistency of the ECM and PJP base and weights, we created a series of scatter plots that compare the ECM's and PJP's simulated funding, needs index, and student needs index for each school. Comparing funding per student from the two approaches, we see a strong correlation of 0.83 (Exhibit 69). Despite the strong correlation, there are meaningful differences between the two. For example, among schools projected to receive approximately average funding based on the ECM (along the horizontal gray line), there is a spread of over $10,000 per pupil in PJP funding, with some of those schools projected to receive just over $15,000 per pupil and some projected to receive over $25,000 per pupil. Some of the schools with the largest differences between the two approaches are vocational high schools, which are called out in Exhibit 69 as green triangles. These are some of the few schools that would be projected to get more funding under the ECM formula than the PJP formula, as a result of the strong vocational weight in the ECM formula and no vocational weight in the PJP formula. If the six high schools in vocational districts are excluded, the correlation between the two models increases to 0.88.

Exhibit 69. Comparing Simulated Funding per Student From the Education Cost Model and Professional Judgment Panel Approaches



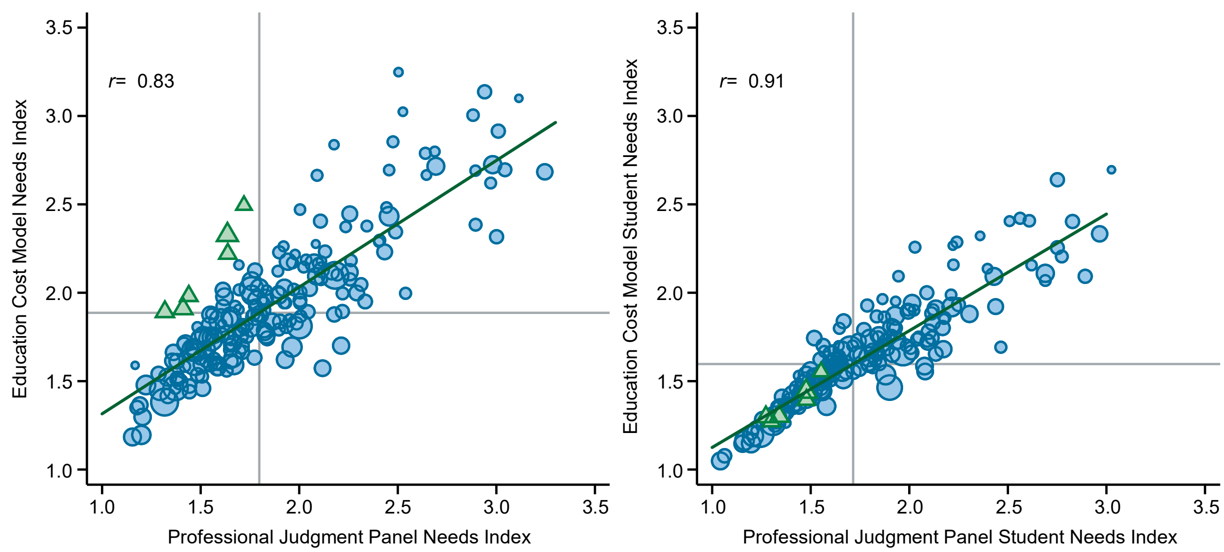
Note. Green triangles represent high schools from vocational districts. Blue circles represent all other schools. The gray lines show statewide averages of both variables. The enrollment-weighted correlation coefficient is represented by *r*. This analysis omits six schools where more than 50% of students have disabilities.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Rather than compare funding amounts, Exhibit 70 compares values of the needs indexes generated from the two models, with the left panel plotting the needs indexes based on all weights and the right panel plotting the needs indexes based only on the student needs weights. As with the prior exhibit, high schools in vocational districts are shown as green triangles. The correlation between the overall needs index (left panel) is the same as the correlation for funding (0.83) because the relative positioning of schools across both indexes is the same as with funding.

When accounting for only student needs (right panel), the correlation strengthens (0.91) and there are fewer schools deviating widely from the trend line. In particular, the vocational high schools are squarely within the main mass of schools confirming that their position as outliers on funding and the overall needs index is due to the large vocational programming weight for the ECM.

In sum, despite using significantly different data and methods, and even different weight categories for high-need special education students, the student needs weights from the ECM and PJP result in remarkably similar funding adjustments.

Exhibit 70. Comparing Needs Indexes From the Education Cost Model and Professional Judgment Panel Approaches



Note. Green triangles represent high schools from vocational districts. Blue circles represent all other schools. The gray lines show statewide averages of both variables. The enrollment-weighted correlation coefficient is represented by *r*. This analysis omits six schools where more than 50% of students have disabilities.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

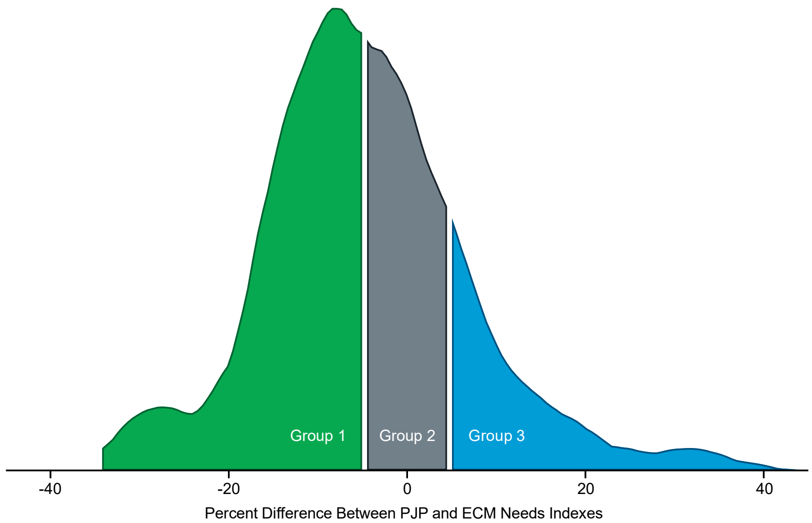
Characteristics of Schools Where ECM-Based and PJP-Based Needs Indexes Differ

To further explore the differences in simulated funding and weight adjustments from the ECM and PJP approaches, we calculated the percentage difference in the needs indexes (based on all weights) resulting from the two approaches. We then grouped schools according to magnitude and direction of the difference. Group 1 represents schools where the percentage difference was less than -5%. For these schools, the needs index calculated using the ECM weights exceeded the PJP needs index by at least 5% of the ECM needs index. Group 2 represents schools where the difference was between -5% and 5%. In other words, for these schools the needs indexes from the two approaches were approximately the same. Group 3 represents schools where the difference was greater than 5%, meaning that the PJP needs index was larger than the ECM needs index by more than 5%. After sorting schools into these groups, there were 97 Group 1 schools, 70 Group 2 schools, and 38 Group 3 schools (see chart in Exhibit 71). We further compared the average characteristics of the schools in each of these three groups to better understand for which schools the ECM resulted in a larger needs-based adjustment than the PJP, and vice-versa (see table in Exhibit 71).

Focusing on Groups 1 and 3, we see the large differences between the groups with respect to higher need disability categories, English learners, vocational programming, and grade ranges. In particular, Group 3 schools (where the PJP needs index exceeded the ECM needs index) tended to have much higher EL percentages compared to Group 1 (27.2% vs. 6.2%) and higher percentages of students with complex (4.0% vs. 1.1%) and intensive (8.2% vs. 2.7%) disabilities. Group 3 schools were also more often elementary schools compared to Group 1 (72.6% vs. 29.1%) and less often middle (13.0% vs. 28.6%) and high schools (14.4% vs. 42.3%). The grade-level differences are at least in part driven by the strong vocational programming weight in the ECM, which only applies to middle and high schools, and favors Group 1 schools. However, elementary schools tend to have higher percentages of students who are ELs than middle and high schools, as many of these students become English proficient as they advance through grades. Thus, at least some of the sorting of schools by grade across the groups is likely due to differences in student needs by school level.

When we define groups in a similar way as above, but based only on the student needs index rather than needs based on all weights, we find that almost half of schools (n = 97) have a difference between the two of less than 5% (Exhibit 72). The needs index based on the PJP student needs weights was at least 5% below the needs index from the ECM student needs weights (Group 1) in only 10 schools. These 10 schools tended to have quite high percentages of students from low-income families (58.7%), but low percentages of students who are ELs (4.1%) and students with complex (0.4%) or intensive (1.3%) disabilities. By contrast, 98 schools had a PJP student needs index that was at least 5% greater than the ECM-based student needs index. These schools tended to have high EL percentages (18.6%) and high percentages of students with complex (2.7%) and intensive (6.5%) disabilities.

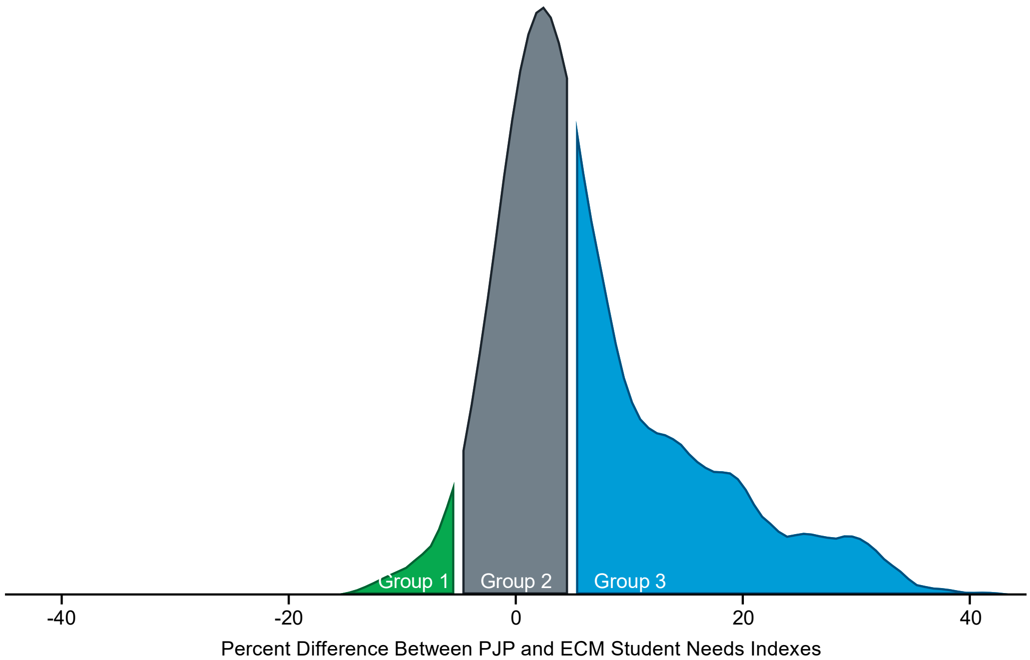
Exhibit 71. Number of Schools and Average Characteristics by Schools Grouped According to Relative Difference Between PJP and ECM Needs Indexes



	Group 1	Group 2	Group 3
Needs indexes			
Needs index (PJP)	1.61	1.85	2.69
Needs index (ECM)	1.87	1.86	2.26
Student needs index (PJP)	1.55	1.76	2.53
Student needs index (ECM)	1.54	1.61	1.94
Student needs			
Low-income percentage	29.0	30.3	34.5
Disabilities percentage	18.4	20.3	26.2
Complex disabilities percentage	1.1	1.7	4.0
Intensive disabilities percentage	2.7	4.5	8.2
English learner percentage	6.2	12.6	27.2
Programming/grade range			
Vocational/technical units proportion percentage	5.5	1.5	1.4
Elementary school enrollment percentage	29.1	55.7	72.6
Middle school enrollment percentage	28.6	21.4	13.0
High school enrollment percentage	42.3	22.9	14.4
Population density (Population per square mile)	1,452.1	1,403.6	1,617.2
School enrollment	1,010.9	895.6	792.6
N	**97**	**70**	**38**

Note. ECM = education cost model; PJP = professional judgment panel. Density chart and averages in table are weighted by enrollment.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Exhibit 72. Number of Schools and Average Characteristics by Schools Grouped According to Relative Difference Between PJP and ECM Student Needs Indexes



	Group 1	Group 2	Group 3
Needs indexes			
Needs index (PJP)	1.75	1.57	2.23
Needs index (ECM)	2.12	1.77	2.10
Student needs index (PJP)	1.68	1.51	2.10
Student needs index (ECM)	1.84	1.49	1.77
Student needs			
Low-income percentage	58.7	25.4	34.1
Students with disabilities percentage	20.3	17.7	23.4
Students with complex disabilities percentage	0.4	1.1	2.7
Students with intensive disabilities percentage	1.3	2.4	6.5
English learner percentage	4.1	6.4	18.6
Programming/grade range			
Vocational/technical units proportion percentage	0.2	4.4	2.6
Elementary school enrollment percentage	85.0	36.5	52.1
Middle school enrollment percentage	15.0	26.0	21.6
High school enrollment percentage	0.0	37.5	26.4
Population density (Population per square mile)	2180.2	1373.7	1515.5
School enrollment	503.1	1032.0	856.1
N	**10**	**97**	**98**

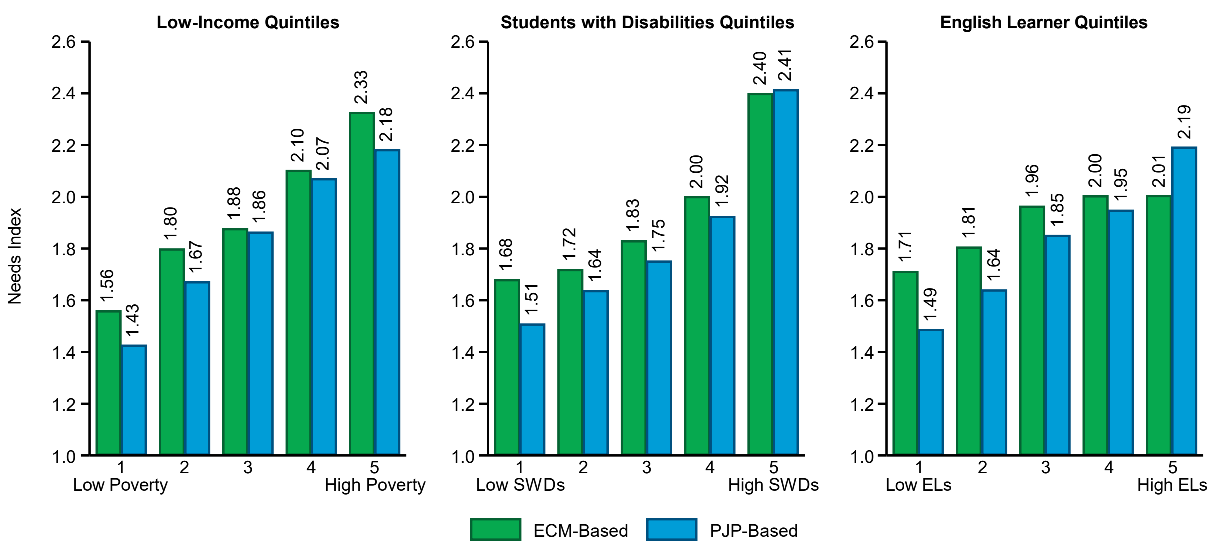
Note. ECM = education cost model; PJP = professional judgment panel. Density chart and averages in table are weighted by enrollment.

Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Comparing the Progressiveness of ECM-Based and PJP-Based Needs Indexes

As a final set of analyses, we compared the average ECM-based and PJP-based needs index values across schools grouped into quintiles of different student needs (Exhibits F3–F5 in Appendix F also provide characteristics of schools by quintile). In Exhibit 73, we compare the ECM-based and PJP-based needs indexes calculated using all specified weights. Focusing on the overall index, we see that both sets of weights offer progressive distributions of funding. Using both formulas, schools with higher proportions of students from low-income families, students with disabilities, and students who are English learners receive more funding than schools serving lower proportions of student in those groups. Based on quintiles of students with disabilities and students who are ELs, the PJP-based formula appears more progressive than the ECM-based formula. That is, the difference in relative funding levels between the lowest and highest needs quintiles is larger using the PJP-based formula than the ECM-based formula. For example, based on EL quintiles when using the PJP-based needs index the schools with the highest proportion of students who are ELs (Quintile 5) receive 2.19 times the base compared to 1.49 times the base for schools with the lowest proportions of students who are ELs (Quintile 1). This is a difference of 0.70. In contrast, the difference between the average needs index values in Quintiles 1 (1.71) and 5 (2.01) using the ECM-based needs index is only 0.30.

Exhibit 73. Comparing ECM-Based and PJP-Based Needs Indexes Across Student-Need Quintiles (2022)

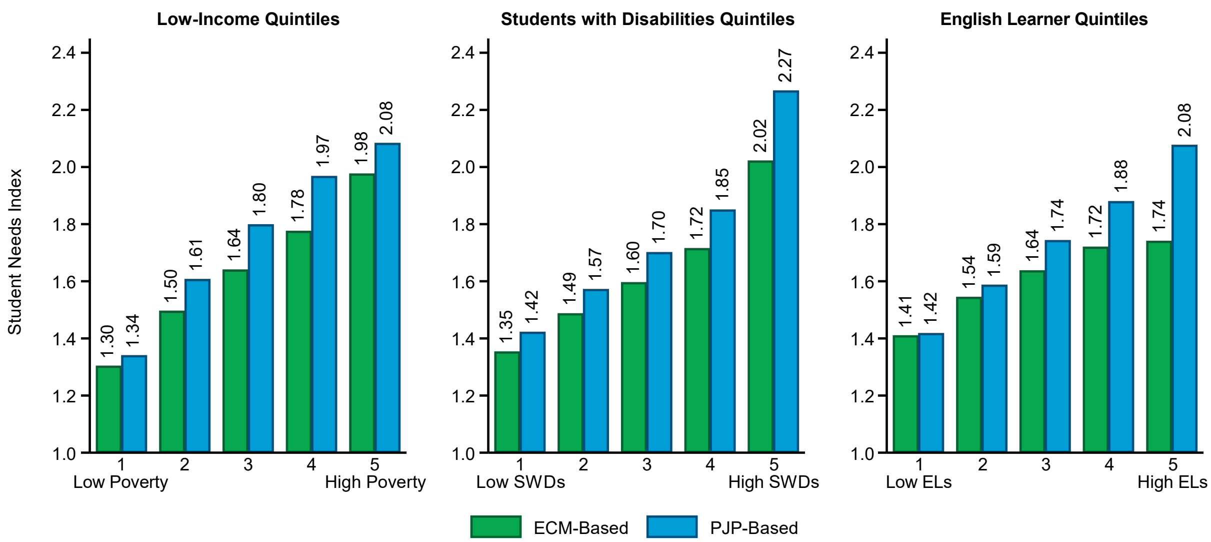


Note. ECM = education cost model; PJP = professional judgment panel. Each quintile includes 39 or 40 schools. Averages within quintiles are enrollment weighted. This analysis omits six schools where more than 50% of students have disabilities.

Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

In Exhibit 74, we compare the ECM-based and PJP-based student needs indexes (those based on only the student needs weights). The analysis of student needs alone shows a similar picture to Exhibit 73. The removal of the influence of other school contextual weights makes the influence of the student needs weights more comparable across the two formulas. Across quintiles categorized by all three student needs variables, the PJP-based student needs index is consistently higher than the ECM-based index. The PJP-based student needs index is also more progressive, generally increasing to a greater extent than the ECM-based student needs index as needs increase across quintiles.

Exhibit 74. Comparing ECM-Based and PJP-Based Student Needs Indexes Across Student-Need Quintiles (2022)



Note. ECM = education cost model; PJP = professional judgment panel. Each quintile includes 39 or 40 schools. Averages within quintiles are enrollment weighted. This analysis omits six schools where more than 50% of students have disabilities.
Source. Authors' calculations based on data from the Delaware Open Data Portal, Delaware Department of Education, and U.S. Department of Education.

Results by District

Thus far, we have mainly discussed results of the ECM- and PJP-based approaches to estimating adequacy and target funding at the school level. However, state funding policy primarily dictates funding at the district level. Districts then make decisions about the resources that each school will receive, retaining some portion of funding for district-level operations and districtwide services. In this section, we compare ECM-based and PJP-based target funding levels with actual spending levels in 2021–22, excluding federal spending, across Delaware school districts and charter schools (the latter of which operate independently from school districts as local education agencies).

Exhibit 75 displays actual spending per pupil and ECM-based and PJP-based target funding per pupil as well as the gaps in funding from actual spending represented in both dollars and percentage terms for each district. Positive funding gaps mean that target funding levels exceed actual spending. For context, we also provide several key student needs variables as well as the ECM-based and PJP-based needs indexes, which represent the product of the effective weights (the weights adjusted for the proportion of students for whom the weight applies) from each approach.

For both the ECM-based and PJP-based target funding, the districts with the largest gaps are those with rather low levels of actual spending and moderate to high funding targets, due to high levels of need. Using both approaches for estimating target funding, Laurel is the district with the largest funding gap (71% using the ECM target funding and 91% using PJP target funding). Laurel has the second-lowest actual spending per student in the state among districts ($11,563), but it has the third-highest low-income percentage (43%) and relatively high percentages of students with disabilities and who are English learners, respectively. Laurel's low-cost geographic factors mean that it receives an approximately average needs index using both approaches.

For some districts, their relative standing in terms of funding gap and need differ somewhat for the two different approaches to estimating adequacy and target funding levels. Based on the ECM-based approach, Capital has the second-highest funding gap and the fourth-highest needs index. However, using the PJP-based approach, Capital has the sixth-highest funding gap and the fifth-highest needs index. Capital has the highest low-income student percentage in the state. However, it has fairly moderate percentages of English learners. Because the PJP-based approach places less weight on low-income students and stronger weight on EL students, several districts with high EL percentages have higher PJP-based needs indexes and larger funding gaps compared with Capital.

The districts with relatively low funding gaps are those that have relatively high actual spending per pupil. Christina School District has high needs, with the highest PJP-based and ECM-based needs indexes (2.23 and 2.32, respectively) and therefore the highest target funding levels as a result. However, it is in the bottom half of districts in terms of funding gaps because it is among the highest spending districts in the state, at $19,052 per student from state and local sources. The vocational/technical districts are also among those with the lowest gaps because they also have high levels of actual spending. Because the PJP-based approach does not provide additional weight for vocational education, and because the vocational/technical districts have relatively low student needs, the target funding levels based on the PJP-based approach are actually less than what is currently spent. Using the ECM-based approach, which includes a strong vocational weight, the vocational/technical districts require an additional 7% to 14% in funding compared with a statewide average of 27%.

Statewide, the average target funding per pupil for districts is $19,803 for the ECM-based approach, and $22,844 for the PJP-based approach. However, average actual spending per pupil is $15,607, representing gaps of $4,196 (27%) and $7,238 (46%), respectively.

Exhibit 75. Actual State and Local Spending and Target Funding Per Pupil by District (2022)

District	Enroll-ment	Low-income %	SWD %	EL %	Vo-Tech %	ECM needs index	PJP needs index	Actual spending per pupil	ECM target funding per pupil	ECM funding gap	ECM funding gap %	PJP target funding per pupil	PJP funding gap	PJP funding gap %
Appoquinimink	12,497	12%	19%	4%	3%	1.67	1.55	$13,916	$16,776	$2,860	21%	$18,595	$4,679	34%
Brandywine	10,963	29%	22%	6%	3%	2.01	1.84	$17,526	$20,244	$2,719	16%	$22,126	$4,600	26%
Caesar Rodney	8,377	28%	19%	6%	2%	1.74	1.62	$12,378	$17,498	$5,121	41%	$19,488	$7,110	57%
Cape Henlopen	6,086	22%	21%	9%	3%	1.71	1.58	$15,312	$17,237	$1,925	13%	$18,986	$3,673	24%
Capital	6,726	48%	25%	9%	3%	2.15	1.92	$14,449	$21,612	$7,163	50%	$23,036	$8,588	59%
Christina	14,107	41%	27%	16%	2%	2.32	2.36	$19,052	$23,366	$4,314	23%	$28,315	$9,263	49%
Colonial	9,798	38%	22%	14%	2%	2.05	2.17	$16,710	$20,676	$3,966	24%	$25,976	$9,266	55%
Delmar	1,487	15%	10%	5%	7%	1.45	1.24	$10,224	$14,573	$4,349	43%	$14,821	$4,596	45%
Indian River	10,770	26%	17%	26%	3%	1.71	1.84	$14,395	$17,189	$2,794	19%	$22,125	$7,730	54%
Lake Forest	3,686	37%	23%	3%	3%	1.86	1.64	$13,816	$18,718	$4,902	35%	$19,713	$5,897	43%
Laurel	2,793	43%	22%	18%	3%	1.96	1.84	$11,563	$19,744	$8,181	71%	$22,126	$10,562	91%
Milford	4,596	37%	21%	21%	3%	1.84	1.83	$12,434	$18,559	$6,125	49%	$21,940	$9,506	76%
NCC Vo-Tech	4,743	27%	14%	5%	21%	2.25	1.61	$19,846	$22,681	$2,835	14%	$19,257	-$589	-3%
POLYTECH	1,222	17%	13%	1%	22%	1.89	1.32	$17,046	$19,060	$2,014	12%	$15,818	-$1,228	-7%
Red Clay	15,362	33%	23%	18%	2%	2.24	2.34	$17,318	$22,586	$5,268	30%	$28,090	$10,773	62%
Seaford	3,488	45%	21%	24%	2%	2.02	1.90	$14,010	$20,346	$6,337	45%	$22,816	$8,807	63%
Smyrna	6,303	23%	21%	3%	4%	1.77	1.75	$13,680	$17,817	$4,138	30%	$20,946	$7,267	53%
Sussex Technical	1,319	21%	11%	2%	22%	1.91	1.41	$18,042	$19,239	$1,197	7%	$16,924	-$1,118	-6%
Woodbridge	2,634	38%	21%	18%	3%	1.91	2.08	$14,542	$19,252	$4,710	32%	$25,008	$10,465	72%
Totals	**126,951**	**31%**	**21%**	**12%**	**4%**	**1.97**	**1.90**	**$15,607**	**$19,803**	**$4,196**	**27%**	**$22,844**	**$7,238**	**46%**

Note. ECM = education cost model; EL = English learner; PJP = professional judgment panel; SWD = students with disabilities.

Results by Charter School

Next, we show the results of adequate funding using weights estimated using the high-outcome Delaware-specific model for each charter school (Exhibit 76). Charter schools have both a wider range in actual spending and student characteristics compared with the public schools. Therefore, there is also a wider spread in the magnitude of funding gaps. At the high end, the Positive Outcomes Charter School is spending under one-third of what their target funding would be under the PJP-based formula. The Positive Outcomes Charter School has relatively high actual spending ($29,557 per student), but it serves a very high-need student population. Two-thirds of its students have disabilities, with a sizable share of those having intensive and complex disabilities. Additionally, almost half of its students are low-income. Therefore, target funding under the PJP-based formula is $94,318 per student, largely the result of the very high PJP-based weight for students with intensive and complex disabilities. Target funding for Positive Outcomes using the ECM-based formula is just over $45,000 per student, representing a gap of 53%. Due to the unique mission and student population of Positive Outcomes, it is an outlier in terms of target funding. No other charter schools have target funding that exceeds $40,000 per student, using either the PJP-based or ECM-based formulas. Other schools with high funding gaps are typically those with low actual spending and relatively high student needs.

The charter schools with the lowest funding gaps are typically those with rather low-need student populations. For example, based on both the ECM-based and PJP-based approaches, the Newark Charter School's current spending level is just higher to or approximately equal to the target levels of funding. This is the result of moderate levels of actual spending per student ($15,514) and relatively low target funding per pupil due to small proportions of students who are low-income and students who are English learners.

Statewide, the average target funding per pupil for charter schools is $16,538 for the ECM-based approach and $19,047 for the PJP-based approach, whereas average actual spending per pupil is $13,356, representing gaps of $3,182 (24%) and $5,691 (43%), respectively.

Exhibit 76. Actual State and Local Spending and Target Funding Per Pupil by Charter Schools (2022)

Charter school	Enroll-ment	Low income %	SWD %	EL %	Vo-Tech %	ECM needs index	PJP needs index	Actual spending per pupil	ECM target funding per pupil	ECM funding gap	ECM funding gap %	PJP target funding per pupil	PJP funding gap	PJP funding gap %
Academia Antonia Alonso	636	44%	11%	64%	0%	1.95	2.33	$16,091	$19,648	$3,557	22%	$28,004	$11,913	74%
Academy of Dover	398	54%	20%	12%	0%	2.15	2.02	$10,592	$21,613	$11,021	104%	$24,266	$13,674	129%
Campus Community School	401	49%	17%	4%	2%	1.88	1.56	$10,959	$18,937	$7,978	73%	$18,660	$7,701	70%
Charter School of New Castle	791	43%	14%	2%	0%	1.76	1.57	$12,540	$17,728	$5,188	41%	$18,818	$6,278	50%
Charter School of Wilm.	976	5%	1%	0%	0%	1.18	1.15	$10,049	$11,929	$1,880	19%	$13,845	$3,796	38%
Delaware Military Academy	601	7%	2%	1%	5%	1.35	1.18	$10,521	$13,605	$3,084	29%	$14,126	$3,605	34%
Early College HS at Del State	365	31%	10%	1%	0%	1.46	1.37	$10,060	$14,683	$4,623	46%	$16,456	$6,397	64%
East Side Charter School	493	77%	15%	1%	0%	2.23	1.90	$14,838	$22,455	$7,616	51%	$22,774	$7,936	53%
Edison (Thomas A.)	705	73%	10%	1%	0%	2.02	1.61	$11,932	$20,309	$8,376	70%	$19,348	$7,415	62%
First State Military Academy	470	19%	21%	3%	0%	1.56	1.63	$14,234	$15,708	$1,475	10%	$19,578	$5,344	38%
First State Montessori	603	10%	17%	1%	0%	1.51	1.38	$12,912	$15,218	$2,307	18%	$16,560	$3,648	28%
Freire Charter School Wilm.	530	47%	23%	3%	0%	2.08	2.11	$14,024	$20,945	$6,921	49%	$25,311	$11,287	80%
Gateway Lab School	183	47%	50%	6%	0%	3.1	3.11	$22,708	$31,230	$8,522	38%	$37,357	$14,649	65%
Great Oaks Charter School	321	64%	35%	7%	1%	2.8	2.69	$16,810	$28,194	$11,385	68%	$32,240	$15,430	92%
Kuumba Academy	651	61%	20%	2%	0%	2.13	1.78	$15,303	$21,425	$6,122	40%	$21,301	$5,998	39%
Las Americas Aspira Academy	1,245	28%	17%	33%	0%	1.69	1.96	$15,234	$17,054	$1,821	12%	$23,554	$8,320	55%
MOT Charter School	1,388	7%	10%	2%	7%	1.45	1.29	$11,751	$14,608	$2,857	24%	$15,519	$3,768	32%
Newark Charter School	2,462	7%	11%	3%	2%	1.38	1.32	$15,514	$13,918	-$1,596	-10%	$15,798	$284	2%
Odyssey Charter School	2,009	12%	12%	10%	1%	1.46	1.37	$13,864	$14,714	$850	6%	$16,466	$2,602	19%
Positive Outcomes	112	47%	67%	0%	1%	4.5	7.86	$29,557	$45,302	$15,745	53%	$94,318	$64,760	219%
Providence Creek Academy	712	18%	16%	3%	0%	1.42	1.33	$10,031	$14,269	$4,238	42%	$15,994	$5,963	59%
Sussex Academy	1,134	7%	7%	4%	1%	1.2	1.20	$11,790	$12,046	$256	2%	$14,388	$2,597	22%
Sussex Montessori School	343	34%	17%	6%	0%	1.74	1.56	$9,494	$17,538	$8,044	85%	$18,699	$9,205	97%
Total	**17,522**	**25%**	**14%**	**8%**	**1%**	**1.64**	**1.59**	**$13,356**	**$16,538**	**$3,181**	**24%**	**$19,047**	**$5,691**	**43%**

Note. ECM = education cost model; EL = English learner; PJP = professional judgment panel; SWD = students with disabilities.

Chapter Summary

The PJP approach to estimating the cost of an adequate education relies on the knowledge of expert educators to design educational programming and specify quantities of resources necessary to meet educational outcome goals. Their designs and resource specifications are not intended to be prescriptive, but rather can serve as a starting point for understanding what an appropriate level of resources might be and their corresponding costs. Importantly, the approach also provides information on how adequate resources and costs vary to meet the needs of schools serving different types of students.

The results of this analysis suggest that Delaware's schools are under-resourced as a whole and that schools serving higher needs student populations—particularly those with higher percentages of low-income students, English learners, and students with disabilities—require greater investment to provide an adequate educational opportunity to the students they serve.

Additionally, the analysis compared target funding levels and relative funding differentials (needs index values) from the PJP and ECM approaches to estimate the cost of providing educational adequacy. Despite the very different data sources and assumptions underlying the two approaches, the results share many consistencies. When considered collectively, the student needs weights suggesting the differential funding necessary to adequately serve different types of students produced by the two approaches resulted in remarkably similar relative funding adjustments. In contrast, one key difference between the two was the magnitude of the base, which was higher for the PJP approach and resulted in larger overall costs of adequacy compared with the ECM approach.

Opportunity Funding

Opportunity Funding is a categorical grant program that was introduced in 2019 to provide additional resources to support the needs of English learners and low-income students in Delaware. As part of the legal settlement in 2020, Opportunity Funding was made permanent. The amount of funds to be allocated through the program are set to increase yearly, such that by the 2024–25 school year, $60 million will pass through the program each year. That money will be split into two components:

- $55 million will be allocated on a per student basis, dividing that pot of money by the sum of low-income students and ELs to calculate a per-student amount. Each district and charter school would then receive an amount in accordance with the number of low-income and EL students they serve.
- $5 million is to be allocated to schools where at least 60% of students are low-income or where at least 20% of students are ELs. These funds are intended to be used specifically for mental health or reading supports for low-income and EL students.

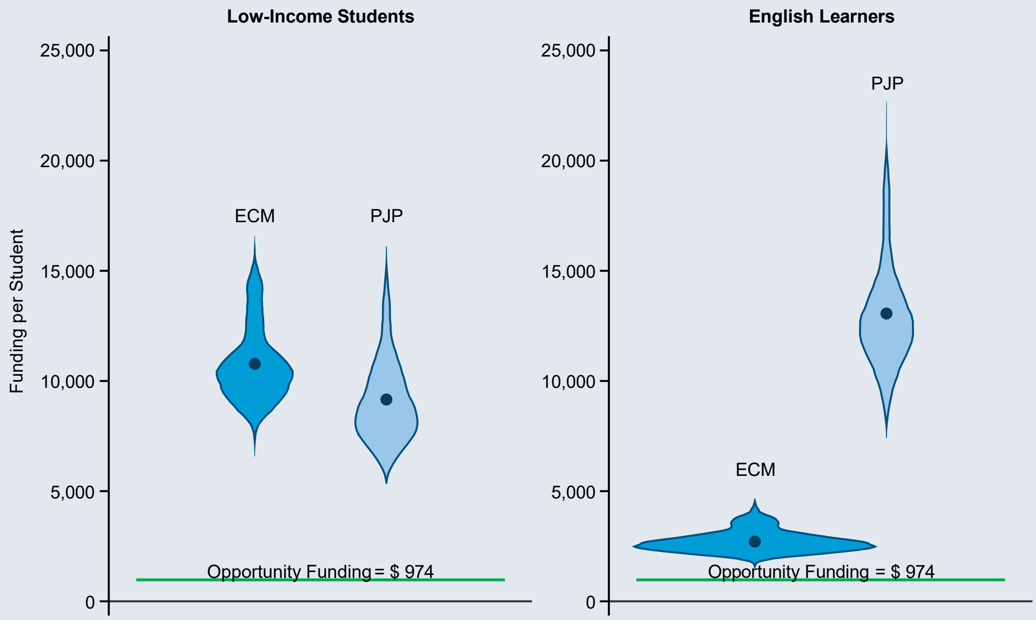
In order to receive the funds under this grant, districts and charter schools must submit expenditure plans to the Department of Education for how they will use the dollars, identifying evidence-based practices to improve outcomes for the low-income and EL students.

Opportunity Funding addresses an obvious gap in the unit system. Prior to Opportunity Funding, Delaware was one of only four states that did not have any sort of adjustment to provide additional resources on the basis of economic disadvantage and was one of only two states that did not provide additional resources for English learners (Kolbe et al., 2019).

Although Opportunity Funding is certainly a step forward, the amount of money it provides to low-income and English learners is insufficient to meet the substantial needs facing low-income and English learner students in Delaware. Assuming numbers of low-income and EL students stay the same (almost 44,000 low-income students and 17,000 ELs), we estimate that when Opportunity Funding is fully funded, it will result in an additional $974 per low-income or EL student, on average (Exhibit 77).

By contrast, our two approaches to adequacy suggest that funding for low-income students should be approximately 10 times the amount that will be provided through Opportunity Funding when fully implemented. The ECM model results indicate that almost $11,000 should be distributed per low-income student, on average. However, this amount varies from about $7,000 to $16,000 per low-income student depending on the rates of other needs in the school. In other words, because we model the weight as multiplicative, the low-income weight has a stronger influence on funding when there are also more SWDs and ELs or when the school has other contextual characteristics requiring additional funding. The amount distributed per low-income student based on the PJP results is only slightly lower than the amount suggested through the ECM approach, with an average of almost $9,200.

Exhibit 77. Comparing Funding Amounts From Opportunity Funding to Those Estimated Through Adequacy Analyses



Notes: The target funding amount per low-income or EL student based on the PJP and ECM analyses was calculated as the difference in actual target funding per pupil and target funding per pupil setting the low-income or EL weights to 1, divided by the percentage of low-income or EL students at a school. This amount varies across schools depending on the rates of other needs in the school. The average target funding amount per low-income or EL student is represented by the dot. This analysis omits six schools where more than 50% of students have disabilities.

Opportunity funding does not distinguish between low-income and EL students. Therefore, the amount of Opportunity Funding per EL is the same as the amount per low-income student. The amounts per EL vary substantially between the ECM and PJP-based approaches, with the amount suggested by the ECM approach being approximately one-fifth of that suggested by the PJP approach. However, even the ECM-based average amount per EL is almost three times the amount provided through Opportunity Funding, at over $2,700 per EL. Under the ECM-based approach the amount per EL varies across schools from almost $1,700 to just over $4,500. The amount suggested by the PJP is 13 times the amount provided by Opportunity Funding, with an average amount of over $13,000 per EL. Under the PJP approach, the amount per EL varies across schools from just over $8,000 to just over $22,000.

District and charter school leaders overwhelmingly agreed that additional funds for low-income and EL students have been an essential component of education funding. Mental health counselors, behavioral health coordinators, and EL teachers and specialists were the types of staff that education leaders most often reported hiring through opportunity funds. Despite the addition of staff, district and charter school leaders also indicated that the nature and amount of Opportunity Funding was inadequate for meeting those students' actual needs. School leaders indicated several interrelated concerns about Opportunity Funding.

First, the year-by-year, grant-based nature of the funding means that districts cannot engage in long-term planning to sustainability meet students' needs year over year. The $5M amount for mental health and reading supports is allocated to a certain set of schools that have high percentages of low-income or EL students. Schools near those qualifying thresholds may receive the funding one year but not in the next.

Second, a limited pool of funds allocated annually means that districts perceived they are competing against one another for funding. If the number of low-income and EL students increases, the amount per pupil decreases (assuming that the total allocation to Opportunity Funding remains the same). This means that schools with constant numbers of low-income and EL students could receive less funding if the number of low-income and EL students increase elsewhere.

> But the Opportunity Funds, they have two different buckets with two different qualification factors. One is for reading and mental health, and then the other one is what we all call the flexible pot. And those, they can't be commingled, and they have different qualifications. The more buckets get added outside of the unit count, the harder it gets to make everything work in terms of like, "Okay, you got to know what all these rules are, you got to have everything captured somewhere in a system." And it just creates a lot of administrative time and energy to keep track of it all…. We're grateful for the support and the added resources, but the House Bill 100 and House Bill 300, that added mental health positions just recently, they were added in as part of the unit count…the block grant add on, we're just going to pile on top of the unit count system…. That's not the way to fix the system, you do need to fix it within the units themselves.
>
> *– District Administrator*

> The bottom line is if we continue to increase students just in general, we're going to get more units, we're going to get more staff, we're going to get more money to meet the needs of those kids. But if you just have a block of money, it's just going to be split up differently. To get more money, you're going to have to grow at a higher rate than the other districts. What I would like to see is that [funding] built into the unit system so that if I start from a 20%, 25%, 30% category, I'm going to get those additional units to go with it rather than competing against other districts for a pot of money.
>
> *– District Administrator*

10. Evaluating Delaware's Current System

In this chapter, we use the results of this study to evaluate Delaware's current system of funding based on several desirable properties of mechanisms for distributing funding as defined by Chambers and Levin (2009). Specifically, Chambers and Levin (2009) indicate that systems for distributing resources should:

- provide *adequate* levels of resources appropriate to meeting the needs of the unique populations served by schools and districts;
- provide *equitable* resources, such that program quality meets the needs of the students served and funding levels are not associated with the amount of local wealth of school districts;
- be *transparent* and understandable by all concerned parties with straightforward calculations and procedures that avoid unnecessary complexity;
- be *predictable* and *stable,* such that policymakers can count on receiving a certain level of resources from year to year and such that the system allows policymakers to develop the long-term planning necessary to allocate resources properly;
- allow for *flexibility* in resource use such that resources can be used to address specific circumstances and conditions unique to a given school or district; and
- be *cost-based,* such that funding amounts are related to measured cost differences in providing adequate programming across educational contexts.

Adequate

To be adequate, funding should be sufficient for all districts to provide appropriate programming for the unique population of students served, such that all students are afforded the opportunity to achieve the state's educational outcome goals. Several of the analyses presented in this report inform our understanding of whether Delaware's current system is adequate in this way. First, over the past decade, Delaware's students have performed worse on standardized tests than neighboring Mid-Atlantic states, suggesting a lower average quality of education compared with those states. Second, Delaware's student outcomes are far below the state's own stated outcome goals found in the Delaware ESSA Plan. Third, both the ECM and PJP analyses suggest a need to increase levels of funding and resources to achieve target student outcome levels. The ECM results indicate a need to invest approximately $540 million more compared to 2021–22 spending levels, an increase of 25%. The PJP results indicate a need to invest $918 million (or 43%) more.

Equitable

Student Equity

For a funding system to be equitable to students, funding should be distributed to sufficiently account for differences in student needs. In other words, more resources must be provided for student groups that require additional services to succeed educationally. Student groups typically acknowledged as requiring more resources are SWDs, ELs, and low-income students. Several of the analyses for this study shed light on whether Delaware's current system is equitable for students.

First, we conducted analyses examining the distribution of spending under Delaware's current system to understand whether schools with higher percentages of low-income students, ELs, and SWDs spend more than otherwise comparable schools with lower percentages of those students. We found that Delaware's current system is moderately progressive in that schools with higher percentages of students from those groups do tend to have higher spending. The progressiveness, however, is largely driven by the additional resources schools and districts receive for SWDs and the positive correlation between percentages of SWDs and low-income students. Delaware's choice to compensate districts for teacher units based on a salary schedule is a barrier to improved equity. Schools with higher percentages of low-income students have less experienced teachers with lower teacher salaries, on average, than otherwise similar schools with lower percentages of low-income students. This finding demonstrates that schools with higher percentages of low-income students receive less state funding per unit.

Second, we examined the relationships between school-level outcomes and the percentages of low-income students, SWDs, and ELs in schools. If the school funding system provides sufficiently more resources to schools with higher levels of need, we would expect to find weak relationships between student needs of schools and negative school outcomes. Instead, we find that schools serving a greater percentage of students from low-income families consistently show poorer student outcomes. We also find that schools with higher percentages of SWDs and ELs have poorer outcomes than otherwise similar schools. These findings suggest that schools serving higher percentages of students with additional needs are not receiving sufficient additional resources to appropriately meet the needs of their students.

Third, the results of both the ECM and PJP approaches to estimating adequacy indicate a need to distribute resources more strongly according to student needs. Schools with higher percentages of low-income students, SWDs, and ELs have larger discrepancies between the target levels of funding suggested by the analyses and their actual levels of spending during the 2021–22 school year.

Lastly, we heard through interviews with district and charter school administrators that the funding adjustments in the current system were not sufficient to meet the needs of low-income students, SWDs, and ELs. Although interviewees appreciated the additional units for SWDs and the additional funding for low-income students and ELs through Opportunity Funding, they still indicated the need for more resources to appropriately serve those student populations.

Taxpayer Equity

An education funding system is equitable to taxpayers if the ability to provide an appropriate education is not related to local wealth. In other words, low-wealth districts should not have to levy higher tax rates to provide similar services as high-wealth districts. Our analysis of property valuation, tax rates, and education spending indicates that Delaware's system of funding does not sufficiently account for differences in local capacity to raise revenue. Local property tax rates vary substantially across the state, and some districts have tax rates almost four times the rate of other districts. In addition, a number of districts with low-to-moderate wealth and high student needs have lower spending levels than other districts with lower student needs and higher wealth, despite having substantially higher tax rates.

The finding that Delaware's funding system does not sufficiently account for differences in local capacity was also a strong theme stemming from the interviews with district and charter leaders. Delaware's current system has a component known as equalization funding, which provides some additional funding to districts with lower capacity to raise revenue locally. However, district administrators described equalization funding as "broken," "flawed," and "outdated."

Transparent

An education funding system is transparent if it is easily understandable by various stakeholder groups, including policymakers, education leaders, parents, and other education advocates. Formulas underlying a funding system should not be unnecessarily complex. Although many district and charter leaders thought the basic principles of the unit system were easy to understand, they noted that the many details underlying the current system are not easily accessible to stakeholders. The main unit formula describes the allocation of teacher units, but many other formulas are used to allocate other staffing positions. For example, Opportunity Funding and equalization funding are allocated based on their own unique formulas and decision rules. In addition, "units" and other allocated staff positions cannot be readily converted into effective funding amounts because their value varies according to the experience and qualifications of each individual staff member. The use of many different formulas governing the allocation of various types of staff and other funding allocations, as well as the unclear relationship between staff allocations and funding levels, limits transparency under the current system.

Charter school leaders also had concerns about the transparency of the local cost per pupil calculation. Specifically, several categories of spending are excluded from the calculation of the local cost provided to charter schools, including spending from the tuition tax and match tax as well as spending on capital improvements and debt services. Charter leaders voiced the need for more transparency about which district expenditures were excluded from the calculation.

Predictable and Stable

Predictability and stability were cited as strengths of the unit system by many district and charter leaders, several of whom explicitly noted that the system's predictability is its greatest asset. Despite the equity implications, several administrators noted that the state salary schedule allows them to hire the most qualified staff without concern for the additional costs associated with additional years of experience or qualifications. This meant that they received a predictable number of staff from year to year, even though experience and qualifications, and thus actual levels of pay, may fluctuate.

Although the unit system was overwhelmingly described as stable and predictable, some of the additional allocations, including local funding, were not. For example, one component of Opportunity Funding is allocated to schools with a certain percentage of low-income or EL students. Administrators in districts with schools close to the threshold of the qualification criteria indicated that there was uncertainty as to whether schools would remain eligible from year to year, making it less predictable. Other administrators noted that the per-pupil amounts of Opportunity Funding could change over time as the numbers of low-income and EL students in the state change (e.g., the set pot of dollars appropriated for Opportunity Funding might be spread over a larger number of low-income and EL students, diluting the value of the funding on a per-pupil basis).

Stability and sustainability of local funding was also a concern of district and charter administrators. District administrators described the referendum process as costly and risky, which creates inequities between districts that are able to successfully pass tax increases and those that are not. The process also creates a perception that local revenue is not predictable and stable, as local revenue does not grow with costs without successful passage of a referendum. Charter leaders also had concerns about the predictability and stability of their local revenue shares provided by districts, noting that local revenue amounts provided to charter schools vary considerably from district to district and can vary from year to year.

Flexible

To be flexible, districts should be given wide latitude to determine how resources are to be used to address their local needs and circumstances. Flexibility should be paired with an accountability system that holds districts and schools accountable for student outcomes and with review and oversight of resource allocation and planning. Under Delaware's current system, specific staffing positions are assigned to districts and schools with the intent that the positions are used in the manner for which they are allocated. Districts have some flexibility to trade in certain positions for others or to cash out certain positions for funding, but the implication is that districts and schools should use the units for the positions for which they were allocated.

In interviews, district administrators also noted the inflexibility that comes with some of the additional allocations outside of the unit system. Additional allocations often come with requirements that they be used in specific ways. Not only did district administrators highlight this as a source of inflexibility, but they also noted the increased administrative burden as a result of needing to know and understand the rules and comply with reporting requirements for different funding streams. District leaders often pointed to the contrast in the flexibility they are afforded compared to charter schools. Charter schools are provided dollar allocations through the unit system rather than staffing allocations, granting them more flexibility. A number of district leaders mentioned that they would like the same flexibility afforded to charter schools, but also noted that such a shift would need to come with increased accountability and transparency.

Cost-Based

For a formula to be cost-based, funding amounts should be tailored to the unique populations of students in districts and their programming needs. Specifically, the formula should provide enough funding and appropriately account for the estimated cost differentials of providing an equal opportunity for meeting the state's educational goals for students with different needs attending schools in different contexts. For a formula to achieve adequacy and appropriately differentiate resources across districts according to student need and context, it must be cost-based. The ECM and PJP analyses demonstrate that the current formula is not sufficiently cost-based, as it does not provide adequate levels of resources to achieve the state's goals or appropriately differentiate resources across districts according to the needs of students. Several of this study's analyses point to targeted ways in which the current formula does not support the actual cost of resources necessary to achieve state goals.

Although Opportunity Funding is an important first step in providing additional resources for Delaware's low-income and EL students, the amount of funding provided is far from sufficient to meet the needs of those students. When fully funded, Opportunity Funding will provide approximately $1,000 to districts and schools for each low-income and EL student they serve. Our ECM and PJP analyses suggest that funding for low-income students should be approximately 10 times the amount provided by Opportunity Funding and the amount for ELs should be three to 12 times what Opportunity Funding provides. In addition, Opportunity

Funding is based on an overall pot of money ($60 million), which means that, if the number of low-income and EL students in Delaware increases, the amount per student will decrease unless the amount appropriated for Opportunity Funding increases. In interviews, district and charter school administrators indicated that they did not feel that the funding support provided through Opportunity Funding was sufficient to meet their needs.

District and charter school leaders provided several examples of how the current funding system seems outdated and does not reflect the cost of current practices and needs. One example was the increasing cost of providing special education services. A second example was the increased use of technology, which many district administrators felt required additional staff to provide maintenance and training. District administrators noted that IT staff was not included as a staffing allocation under the current system, so they had to make decisions on which positions they could trade to obtain IT staff, who they felt were indispensable.

11. Recommendations and Conclusions

The analyses undertaken as part of this comprehensive evaluation of Delaware's school funding system have revealed some strengths and a number of areas for improvement in Delaware's funding formula. We have distilled these results into six overarching recommendations.

Recommendation 1: Increase Investment in Delaware's Public Education

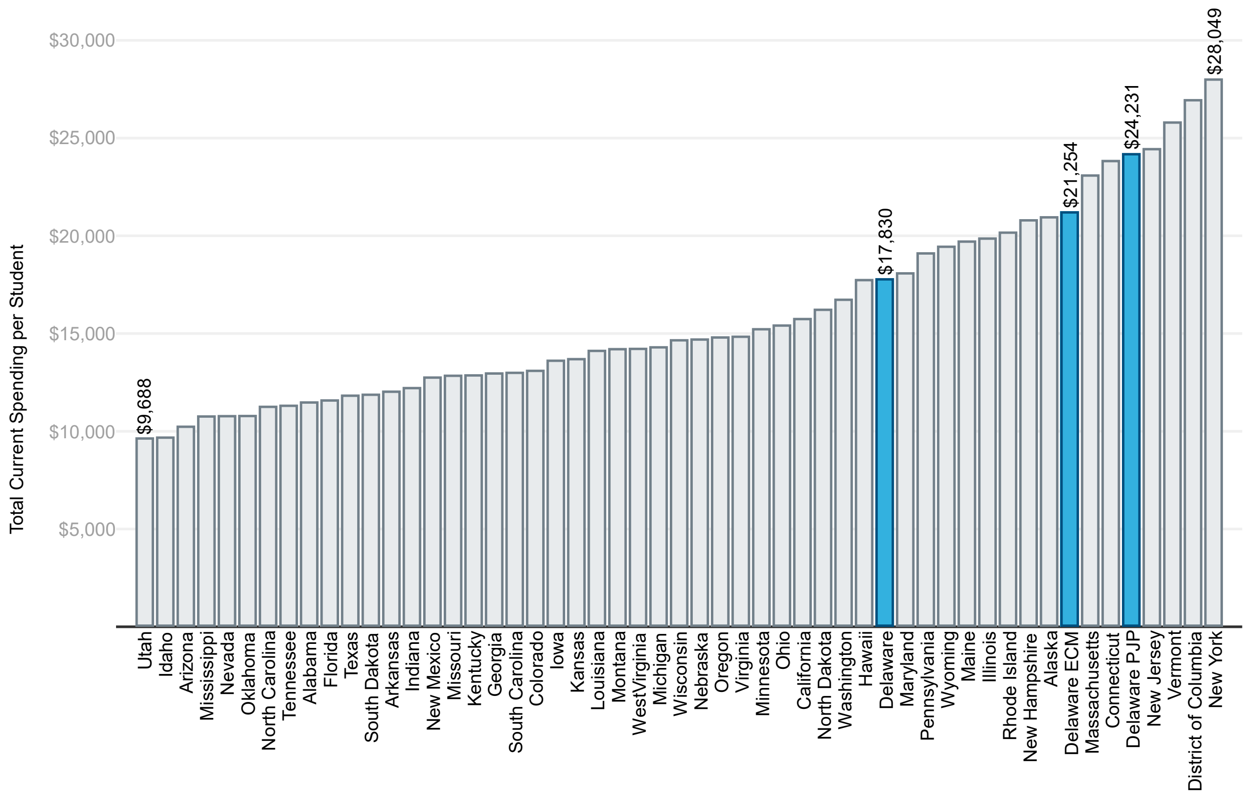
Delaware's performance on the NAEP, a nationally administered assessment meant to provide valid comparisons of student achievement both across states and over time, shows that student performance in Delaware is lagging behind its peer and competitor states. Student performance in Delaware has also fallen precipitously over the past decade, a trend that began well prior to the COVID-19 pandemic (see Exhibit 9). These findings indicate that Delaware's education system does not currently have the resources necessary to be regionally competitive in the education it provides to its students, and increases in resources have been insufficient to keep up with the changing nature of education and the growing needs of students.

Over the past decade, Delaware has substantially increased its investment in education; however, this increase has largely reflected the amount of economic growth in the state. When measured as a percentage of gross state product or aggregate personal income, Delaware's investment in education has remained constant or even dropped slightly between 2009 and 2019. As a percentage of gross state product, Delaware invests less in education than all of its Mid-Atlantic neighbors, which suggests that Delaware has the fiscal capacity to invest more in education.

Our findings from the ECM and PJP-based adequacy analyses confirm that Delaware is not investing enough in education to meet its educational goals. The increases in education funding suggested by our analyses are sizable; the ECM and PJP analyses suggest increases in state and local funding of 27% and 46%, respectively. These increased amounts, however, are not unreasonable. Based on the ECM and PJP analyses, we estimate target funding levels per student of $21,254 and $24,231, respectively.[66] These target levels represent increases of $3,400 to $6,400 per pupil compared to Delaware's reported current spending per student (NCES, 2023). Other states already spend at or above the levels of funding deemed adequate by the ECM and PJP analyses, meaning that the target levels are attainable (Exhibit 78). In particular, Massachusetts and Connecticut spend at levels between the ECM and PJP estimates and New Jersey, Vermont, DC, and New York all spend more per pupil than the PJP estimates.

[66] Note that these include federal dollars to make them comparable with the total current spending figures. Estimates of target funding reported previously in this report did not include federal dollars.

Exhibit 78. Total Current Spending Per Student by State With ECM and PJP Funding Estimates (2022)



Note. State estimates are based on 2020–21 data from NCES (2023). The state estimates have been adjusted for inflation to represent 2021–22 dollars. Blue bars show Delaware spending as reported by NCES (2023) and the ECM and PJP estimates for 2021–22. Delaware ECM and PJP estimates are based on authors' calculations and include spending from local, state, and federal sources to be comparable to state estimates.

Recommendation 2: Distribute More Resources According to Student Need

The equity and student outcomes analyses reveal the need to better differentiate resources across districts according to student need. Although Delaware's current system is not completely inequitable, the current mechanisms that direct additional resources to students with additional needs are not strong enough to provide equal educational opportunities for all students. An alarmingly clear and negative relationship exists between the percentage of low-income students served by schools and the outcomes they achieve for students. Schools with higher proportions of SWDs and EL student also tend to have lower outcomes, suggesting a need for additional resources for these schools. This finding is confirmed by the two adequacy analyses, which both demonstrate that substantially more resources should be distributed to districts and schools based on student needs—low-income students, SWDs, and ELs.

Recommendation 3: Improve Funding Transparency

Study findings have identified two barriers to transparency in the current system. First, although the teacher allocation formula is thought of as the main funding formula, state resources are actually distributed through many formulas for different staffing positions as well as supplemental funding allocations. Most district and charter school leaders thought the basic principles of the unit system were easy to understand. The concept of receiving teacher units for a certain number of students makes sense to administrators, and they thought that other stakeholders could understand that. However, under the current system, many positions (e.g., administrative and student support positions) and pots of funding (Opportunity Funding and equalization funding) are allocated outside of the main unit formula, each with their own formulas and rules. In addition, annual reductions, often referred to as the "give back," result in districts and schools having to choose some portion of units to "give back" to the state. As more tweaks and adjustments to resource allocation are made outside of the main formula, transparency of resource allocation is decreased. This issue is not unique to the unit system. The same issue is true of weighted student funding systems, where resources can either be allocated through the main formula or tacked on through a different allocation method. For the formula to be transparent, the vast majority of resources need to be allocated through a main formula that can be easily communicated, as opposed to a more complicated series of funding mechanisms.

A second barrier to transparency of the unit system is that units do not neatly translate into dollars. The state payout to a district for a given unit varies based on the experience and qualification of the individual for whom the unit is used. To the extent that certain districts and schools have staff with varying average experience and qualifications will result in large differences in the dollar value of the resources paid for by the state. This variance creates less transparency, as there is little way to determine the extent to which unit values vary across districts and schools short of doing extensive analyses. The varying value of a unit also presents equity concerns. Across schools, both average teacher salaries and average teacher experience are moderately negatively correlated with schools' low-income student percentages. This means that for schools and districts with higher proportions of low-income students, the state payout per unit is lower, on average, than in schools and districts with lower proportions of low-income students.

Transparency of funding would be improved by addressing those two barriers: (a) distributing more dollars through the main funding formula and reducing the number of positions and programs that work outside of this formula; and (b) addressing the unequal payout per unit. The latter could be accomplished through a formula that allocates dollars instead of positions (e.g., a weighted funding formula) or by updating the current unit-based system such that the state payout per unit does not vary according to the experience and qualifications of the staff. This method could result in some districts having to make tough choices with respect to who they hire. Some district administrators thought that the fact that the state pays a certain share of teacher salaries regardless of experience was a strength in that they did not have to make those tradeoffs, and they could focus on hiring the most qualified staff without concern for the additional cost associated with years of experience. Other administrators, however, noted that the current system is a disadvantage to them because they struggle with hiring the most experienced and qualified teachers—again raising equity concerns.

Recommendation 4: Allow for More Flexibility in How Districts Use Resources

In theory, flexibility of resource use results in more efficiency in meeting the needs of students, under the assumption that those working directly with the students are most aware of their specific needs and what resources might be required to address those needs. In most state funding systems, dollars are allocated to districts largely as general funding which districts can then decide how to use. Delaware's unit system is unique in that it allocates units for positions with the expectation that districts will largely use the units for the positions for which they are allocated.

District leaders often contrasted their perceived lack of flexibility relative to the flexibility afforded to charter schools, with one noting that "additional flexibility is never a bad thing for anybody… I think there should be equity in terms of flexibility across both districts and charters." Other district administrators noted that some of the lack of flexibility stems from ad hoc funding programs outside of the main formula, the latter of which often dictates that funding must be spent in certain ways and have specific reporting requirements. Administrators also noted that the lack of flexibility created administrative burden in terms of needing to know the rules for how various funds can be spent and monitoring and documenting how different funds have been spent.

The inflexibility of the unit system potentially leaves resources on the table that are not being used. District administrators noted that if they have positions they cannot fill—whether it is because they cannot find an individual to fill the specific position for which units have been allocated or because they cannot afford the local share—they lose that position rather than having cash that they could use for some other purpose.

Recommendation 5: Account for Local Capacity and Address Tax Inequity

In large part, Delaware's state funding system allocates state resources independently of districts' ability to raise revenue locally. Division I and II units, Opportunity Funding, and many of the add-on funding programs allocate resources across schools and districts regardless of the ability of districts to raise local revenues. Delaware's attempt to address local capacity is an add-on formula that allocates a bit extra to districts with low capacity to raise revenue locally. Although districts with less capacity do receive somewhat more state funding than districts with greater capacity, the difference is not enough to offset differences in spending from local revenue sources.

The result is a system that largely treats districts similarly in terms of the state funding they receive, meaning that districts are largely left to fend for themselves in terms of supplementing state revenues with additional local funding. Some districts with high property valuation can raise substantial local revenue at very low tax rates on top of their state funding. Other districts struggle to raise local revenue, even at moderate tax rates. The result poses inequities to (a) taxpayers as a result of districts with lower capacity needing higher tax rates to provide a similar level of services; and (b) students as a result of districts with lower capacity often having lower overall resources.

Local capacity could be better addressed through a formula that generates target funding levels that account for both state and local revenue for each district or school and then assigns districts varying local shares based on capacity. Many state funding mechanisms known as foundation formulas (which are also usually weighted student formulas) operate this way. These mechanisms actually consist of two formulas that operate in two independent steps. In the first step, a formula is used to generate a target funding level. Differences in student need are accounted for so that districts with higher student needs have a higher target funding level per student. In a second step, the local share of target funding is determined based on local capacity. This amount is usually determined by defining how much each district should be able to raise locally through a similar and reasonable level of effort or tax rate. The state then funds the difference between the target funding level and the local share. At a constant tax rate, for example, some districts may only raise $1,000 per student while others may raise $7,000 per student. State funding would then pay the difference between the funding target and the local share. For the district that could only raise $1,000 per student, if the funding target is $15,000 per student, the state contribution would be $14,000 per student. For the district that could raise $7,000 per student locally, the state contribution would be much lower assuming a similar target funding level. A majority of states and all four of Delaware’s nearest neighbors (Maryland, New Jersey, Pennsylvania, and Virginia) take this approach of defining a variable state versus local share based on each district’s capacity to raise revenue locally.

If a local share approach is implemented, the requirement for a referendum to be held in order to change tax rates is a barrier that exists in current policy. If the approach to funding relies on a local share, a referendum should not be required to implement the tax rates necessary to raise the local share. State policy could still require a referendum for tax rates that exceed the rate required to meet the local share or for rates that exceed some level beyond the local share.

Recommendation 6: Regularly Reassess Property Values

The outdated assessment of property values creates several issues which could be solved if there was a process to regularly assess and update property values. First, the outdated property values, which were seen as potentially inaccurate, contributed to the decision to freeze the current equity formula. As a result of the formula being frozen since 2009, district leaders had little confidence that the amounts distributed through the equalization formula reflected what they were owed, contributing to a perception of inequity. Any approach to addressing differences in local capacity must first and foremost have accurate information on local capacity.

Second, the fact that assessed property values do not increase over time despite substantial increases in actual property values means that, for local revenue to increase, districts must regularly increase tax rates. District leaders described the referendum process as burdensome and risky in that they might devote a substantial amount of time, effort, and monetary resources into a referendum campaign that could fail. If property values were regularly reassessed, and assessed property values were allowed to increase over time at the rate of actual increase in property values, districts would have to go to referendum far less often to increase taxes for current expenses since local revenue would naturally increase at the rate of the increase in property values.

Recommendation 7: Simplify the Calculation of the Local Share Provided to Charter Schools

The formula for determining the local share for charter schools is a clear source of consternation for charter school leaders. Charter school leaders perceive the current system to lack transparency and be excessively variable from year-to-year and across districts. Part of the problem stems from the issues motivating our recommendations around addressing local capacity—Delaware's current funding formula drives the allocation of state revenue in a mostly equal way across districts and charter schools, meaning that differences in local funding create inequities. A formula that accounted for both state and local revenue to generate funding targets and then met those targets through a combination of state and local revenue would also address variability around charter schools' local shares. If charter school funding were driven by a target based on student needs and was inclusive of both state and local revenue, it would not matter how much local revenue charter schools received from any given district or from year-to-year, because the state revenue would fill in the difference to achieve the funding target. In the absence of such a method, the state could simplify the calculation of the local share to be based on local revenue per student residing in the district from the current expense tax rather than expenditures from local sources. Revenue should be more stable from year to year compared to expenditures and the concern around transparency related to which expenditures are being excluded from the local cost calculation would be alleviated. This change would not, however, address the variability in local revenue raised per student (and therefore provided to charter schools) across districts.

Recommendation 8: Implement a Weighted Student Funding (or Foundation) State Funding Formula

Delaware's current unit system could be modified to accommodate some of our recommendations. Additional categories of units could be allocated for low-income and EL students to allocate more resources based on student need. The many positions and side-pots of funding that are allocated outside of the main unit formula could be reduced in favor of allocating more units through the main formula. The value of a unit could be defined using a constant rate rather than an amount that varies based on the experience of those teachers employed, increasing transparency and equity. Units could be more flexibly converted to different types of staff or cash. The approach to equalization within the unit system could be strengthened, possibly by defining a varying local share per unit based on local capacity. Although these changes could be made to the existing unit system, the result of these changes would be attempts to make the unit system operate more like a foundation system.

We believe that these recommendations would be most easily implemented through a foundation formula that uses student weights to distribute dollars to districts and charter schools. Using a foundation formula:

- dollars can easily be distributed according to student need through the use of appropriate funding weights for different student need groups;
- funding is distributed transparently based on simple calculations of the dollar amounts to be allocated;
- funding can be used flexibly, allowing districts and charter schools to use the dollars in various ways that best meet local needs;
- differences in local capacity can be easily incorporated by calculating a local share that varies based on local capacity to raise revenue; and
- the formula can be applied consistently to both districts and charter schools, alleviating concerns from both about the calculation of local cost shares.

A majority of states have turned to this approach to school funding in some form.

Recommendations for a Phase-In Plan

If a foundation formula using a weighted student approach is adopted, it will be important to develop a phase-in plan rather than implement it immediately, which might force districts and schools to make sudden changes to programming. The first step will be to decide what the formula should look like when fully implemented: What will be the statewide target funding level? What weights will be used to differentiate funding across districts? How will the local share be determined? The core findings of the study and subsequent recommendations intend to help policymakers as they answer these questions.

After those questions are resolved, the state will need to determine the length of the phase-in period. How many years will it take get to full implementation? An advantage of a longer phase-in plan is that the yearly changes can occur more gradually. A disadvantage is that full implementation will take longer, thus prolonging the identified inequities in funding and unequal opportunities for students. After the number of years is determined, the state can project what funding will look like for each district and charter school once the formula is fully phased in, including the target funding level and the split in funding between state and local sources. The projected funding for a future school year should account for yearly increases in target funding due to inflation and also for possible changes to enrollment and demographics.

Once target funding for each district and charter school is determined, the state can evaluate for how many districts and charter schools the target funding exceeds the current funding amount, and for how many districts and charter schools the target funding is less than the current spending amounts from state and local sources. We anticipate that the number of districts and charter schools for which target funding is less than current spending will be few, if any. For example, using the ECM-based target funding amounts, no districts and only one charter school displayed target funding that was less than current spending. For those districts or charter schools for which this is the case, the state will have to determine a hold-harmless policy to ease those districts or schools into their lesser funding amounts. For example, the state may set the maximum rate of year-to-year decrease at 5%, such that no district or school will have a decline in state and local funding greater than 5% of a prior year’s funding.

For districts and schools where target funding exceeds actual spending, the state should develop a schedule to decrease the gap between target funding at the time of full implementation and actual spending in each successive year until full implementation. This schedule should include a plan for how much will come from state versus local sources for each district, allowing for local property tax rates to change gradually over the course of the phase-in period.

Exhibits 79 and 80 show how a phase-in plan for a foundation formula might work in four districts. For simplification, we assume that the enrollment and other district characteristics do not change over time. We assume that property valuation is increasing at a rate of 3% per year (Exhibit 79). Exhibit 80 includes a panel for the year just prior to implementing the phase-in through Year 5, which represents full implementation.

The state and local revenue per student in Year 5 represents the target amount based on the chosen overall target funding level and the application of weights assuming a 3% annual increase to adjust for inflation. The target amounts vary across districts according to the needs and characteristics of each district reflected in the weight categories. For this example, we also chose a local share per district by setting the property tax rate to a 0.450 uniform property tax rate across all districts that would generate an appropriate amount of local revenue. A comparison of the chosen property tax rate to those in the pre-implementation year shows that two of the four districts will be able to decrease their property tax rate to achieve their target level of local revenue, and the other two districts will have to increase their property tax rate to achieve the target level of local revenue. Despite a uniform property tax rate in Year 5, the yield in terms of revenue per student varies substantially, with District 3 raising only $3,353 per student locally and District 4 raising almost $17,000 per student locally, reflecting the very different levels of property wealth on a per student basis in these districts.

To fill in the rows for Years 1 through 4, we assumed a constant yearly change per student for each revenue source and calculated the property tax rate necessary to raise the local share of revenue based on the assumed property valuation by year. The state could make different assumptions about how the change over time will occur. For example, the changes could be frontloaded so that larger increases occur in Years 1 and 2 followed by smaller increases in Years 3 through 5.

Although our example below is for districts, the phase-in for charter schools would occur similarly. In Exhibit 79, we show both attending enrollment and residential enrollment of students who live in the boundaries of districts. The tax rates and the associated local revenue per student shown in Exhibit 80 apply to students residing within the district regardless of where they attend school. Charter schools would receive their share of local revenue on a per student basis, and the state would fill in the difference to achieve the target level of funding in the same way as for districts.

Exhibit 79. District Characteristics for Phase-In Plan

	Enrollment attending district	Residential enrollment	Full property valuation					
			Pre-implementation	Year 1	Year 2	Year 3	Year 4	Year 5
District 1	11,774	13,918	$10,463,394,012	$10,777,295,832	$11,100,614,707	$11,433,633,149	$11,776,642,143	$12,129,941,407
District 2	10,706	12,597	$14,064,747,706	$14,486,690,137	$14,921,290,841	$15,368,929,567	$15,829,997,454	$16,304,897,377
District 3	7,818	8,523	$5,477,810,989	$5,642,145,319	$5,811,409,678	$5,985,751,969	$6,165,324,528	$6,350,284,263
District 4	6,086	6,828	$22,108,454,955	$22,771,708,604	$23,454,859,862	$24,158,505,658	$24,883,260,827	$25,629,758,652

Exhibit 80. Example Phase-In Plan

	State and local revenue per student	Property tax rate (per $100 of full valuation)	Local revenue per student	State revenue per student	State and local revenue per student	Property tax rate (per $100 of full valuation)	Local revenue per student	State revenue per student
	Pre-implementation				Year 1			
District 1	$13,838	0.593	$4,461	$9,377	$14,925	0.562	$4,353	$10,573
District 2	$17,204	0.609	$6,802	$10,402	$18,246	0.574	$6,606	$11,640
District 3	$12,407	0.328	$2,105	$10,302	$13,991	0.356	$2,354	$11,637
District 4	$15,312	0.236	$7,645	$7,667	$16,249	0.285	$9,495	$6,755
	Year 2				Year 3			
District 1	$16,013	0.532	$4,245	$11,768	$17,101	0.504	$4,137	$12,963
District 2	$19,289	0.541	$6,411	$12,878	$20,331	0.509	$6,216	$14,115
District 3	$15,576	0.382	$2,604	$12,972	$17,160	0.406	$2,854	$14,307
District 4	$17,187	0.330	$11,344	$5,843	$18,124	0.373	$13,193	$4,931
	Year 4				Year 5			
District 1	$18,188	0.476	$4,030	$14,159	$19,276	0.450	$3,922	$15,354
District 2	$21,373	0.479	$6,020	$15,353	$22,416	0.450	$5,825	$16,591
District 3	$18,745	0.429	$3,103	$15,642	$20,329	0.450	$3,353	$16,976
District 4	$19,061	0.413	$15,043	$4,019	$19,999	0.450	$16,892	$3,106

Conclusions

Delaware's system of funding schools has experienced few changes in recent history. Some of the recommendations made here have been stated previously in other studies of Delaware's education system (for example, the LEAD Committee Report of Education Funding in Delaware from 2008). Although some of these recommendations have been made by others previously, we provide new analyses and evidence to back those recommendations. In particular, the analyses presented in this report accomplished the following:

- compared Delaware's school funding system to other states nationally in terms of the mechanisms used to provide additional resources to districts and schools;
- examined student outcomes to understand the extent to which the state is meeting the educational needs of all students;
- investigated issues of equity through various methods that consider equity for students and equity for taxpayers;
- conducted two rigorous analyses of educational adequacy that approach the issue in two different ways: (a) the first using administrative data consisting of school spending, student outcomes, student needs, and school characteristics for all of Delaware's schools; and (b) the second, relying on the experience and expertise of some of Delaware's best educators to determine what resources would be necessary to provide an adequate education for all of Delaware's students; and
- included voices and perspectives of education leaders from all of Delaware's school districts and most of Delaware's charter schools.

Providing an education system that ensures that all students are afforded the opportunity for educational success requires an equitable and adequate education funding system. We have this goal in mind when making our recommendations. Delaware's students deserve a high-quality education that enables them to be successful educationally and in their future lives, regardless of their individual needs and where they happen to attend school. The analyses and recommendations provided in this study can be used by Delaware leaders and policymakers to create a more equitable and adequate education funding system in service to all of Delaware's children.

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