Estimating the Costs Associated with Reaching Student Achievement Expectations for Kansas Public Education Students

A Cost Function Approach

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Chapter 1: Introduction

Over the past five decades, the Kansas Legislature has made efforts to address concerns of inadequacy and inequity of the state's school finance system. The Kansas Supreme Court has ruled the current finance system to be unconstitutional, prompting the Legislature to investigate options for education finance reform. This chapter provides background on the relevant legislation that has shaped the landscape of Kansas's public education finance system and sets the stage for this study.

The 1970s: The School District Equalization Act

The current context of school finance in Kansas can be traced to the early 1970s, when the Johnson County District Court ruled in *Caldwell v. State* that the School Foundation Act of 1965 violated the Equal Protection Clause. Having identified at least three major deficiencies with the state's school finance formula, the court determined that the formula made "the educational system of the child essentially the function of, and dependent on, the wealth of the district in which the child resides."[i] The court ruled that by requiring school districts to rely heavily on local tax revenue, this financing system led to inequity.

To address this, the Kansas Legislature adopted the first iteration of the School District Equalization Act (SDEA) in 1973. However, *Mock v. State*, filed in 1990 in Shawnee County, challenged the SDEA formula. As presiding judge Terry Bullock wrote, "In addition to equality of educational opportunity, there is another constitutional requirement and that relates to the duty of the legislature to furnish enough total dollars so that the educational opportunities afforded every child are also suitable."[ii] Bullock refers to Section 6, Article 6(b) of the Kansas state constitution, an amendment added by voters in 1966, which states: "the Legislature shall make suitable provision for finance of the educational interests of the state." Bullock thus highlights the constitutional requirement not only for equity, but for adequacy, in the state's school funding levels.

The 1990s: The School District Finance and Quality Performance Act (SDFQPA)

These two requirements, equity and adequacy, became the recurring crux of litigation challenging the constitutionality of Kansas's funding formulas. In 1992, the Legislature replaced SDEA with a new school finance formula, the School District Finance and Quality Performance Act (SDFQPA). SDFQPA aimed to ensure equal spending power for school districts, regardless of local tax capacity, and shifted more of the school funding responsibility to the state level.[iii]

The SDFQPA was challenged on constitutional grounds, but the Kansas Supreme Court upheld it as constitutional in 1994.[iv] After this decision, however, the Legislature amended SDFQPA several times, leading to a new legal challenge filed in 1999 in Shawnee County District Court.[v] The district court dismissed the lawsuit, but upon appeal, the Kansas Supreme Court determined that the plaintiffs brought valid claims. The Court noted that "the issue of suitability is not stagnant," and school finance requires monitoring and re-evaluation to determine

whether or not it remains adequate.[vi] The district court revisited the matter and concluded that SDFQPA did not provide suitable funding, noting demographic shifts among public school students, higher admission standards at postsecondary institutions, and modifications to SDFQPA that had occurred since the 1994 decision.[vii]

In May 2004, the court issued an injunction to block expenditures to public schools, thereby closing the school system, until the defects in the funding system were corrected.[viii] The district's order was stayed pending appeal, and the Kansas Supreme Court issued its second decision in January 2005 (*Montoy II*). The Court affirmed that SDFQPA was neither equitable not adequate, particularly for "middle- and large-sized districts with a high proportion of minority and/or at-risk and special education students."[ix] Addressing adequacy, it ruled that "the financing formula was not based upon actual costs to educate children but was instead based on former spending levels and political compromise," and that "[t]he equity with which the funds are distributed and the actual costs of education… are critical factors for the legislature to consider in achieving a suitable formula for financing education."[x]

The court set a deadline of April 12, 2005 to correct the school finance formula, and the Legislature responded with House Bill No. 2247 (HB 2247) and Senate Bill No. 43 (SB 43), which provided an increase of approximately $142 million for the 2005–2006 school year and modified several components of the formula.[xi] The Legislature also ordered a cost study to be performed by the Division of Legislative Post Audit (LPA). In June 2005, the Court held that this was not sufficient (*Montoy III*), prompting the Legislature to hold a special July session and pass SB 3, providing an additional funding increase of $147 million. Once the Legislature received the results of the LPA cost study, it passed 2006 SB 549, which significantly changed the school finance formula. The changes included a three-year plan that would provide a total of $466 million in additional funding.

The 2000s: *Gannon v. State*

The SDFQPA and its finance formula held until the recession, when fiscal year 2010 saw a reduction in the base state aid per pupil (BSAPP), capital outlay state aid, and supplemental general state aid. In *Gannon v. State (Gannon I)*, first filed in November 2010, various plaintiffs again argued that the State violated Section 6, Article 6(b) by failing to provide a suitable education to all Kansas students. The Kansas Supreme Court issued its ruling in March 2014 and reaffirmed that Article 6 contains both an equity and an adequacy component.[xii]

The Court defined that the adequacy component is met "when the public education financing system provided by the Legislature for grades K–12 — through structure and implementation — is reasonably calculated to have all Kansas public education students meet or exceed the [Rose standards]."[xiii] The Rose standards consist of seven educational goals which will be discussed in-depth in Chapter 3 of this report. Explaining its selection of the Rose standards, the Court cited the decision of courts in several other states, including Massachusetts, New Hampshire, North Carolina, and South Carolina, to adopt this same "adequacy rationale and definition."[xiv] The Court also noted the district court's observation that the Rose definition of adequacy "bear[s] striking resemblance to the 10 statements or goals enunciated by the Kansas legislature in defining the outcomes for Kansas schools, which includes the goal of preparing learners to live, learn and work in a global society. K.S.A. 72-6439."[xv]

In *Gannon I*, the Court provided a definition for the equity component as well. For the equity component to be met, "School districts must have reasonably equal access to substantially similar educational opportunity through similar tax effort."[xvi] The Court noted an analogous issue faced by the Texas Supreme Court in *Edgewood Indep. School Dis. v. Kirby* (*Edgewood I*), in which it found that "The lower expenditures [per each student] in the property-poor districts are not the result of lack of tax effort. Generally, the property rich districts can tax low and spend high, while the property poor districts must tax high merely to spend low. 777 S.W. 2d at 393."[xvii] The Court found that under this equity test, both the capital outlay state aid and supplemental general state aid levels were unconstitutional. The case was then passed back to the Shawnee District Court panel.

The panel found the SDFQPA to be unconstitutional under the new test for adequacy.[xviii] The Legislature responded by repealing the SDFQPA and replacing it with a new finance formula, the Classroom Learning Assuring Student Success Act (CLASS Act). The CLASS Act was established as a two-year block grant of state aid for school districts, based on the amounts of state aid from SDFQPA but with some modifications.[xix] But in 2015, the panel found that the CLASS Act's funding was inadequate and, through its supplemental general state aid and capital outlay state aid equalization formulas, inequitable.[xx] The Panel's decisions were appealed to the Kansas Supreme Court, which determined that the equity and adequacy components were at different stages of resolution and expressed a need for "an expedited decision on the equity portion of the case."[xxi] The Court bifurcated the issues of equity and adequacy, with *Gannon II* and *Gannon III* ruling on equity and *Gannon IV* ruling on adequacy.

In February 2016 with *Gannon II*, the Court held that the State failed to show that it had rectified the constitutional inequities described in *Gannon I*.[xxii] The Court gave the Legislature until June 30, 2016 to solve these inequities, or else it would block all expenditures by the school finance system for fiscal year 2017,[xxiii] similar to the potential consequences named in *Montoy I*.

The Legislature responded by enacting 2016 Senate Substitute for House Bill No. 2655 (HB 2655). In *Gannon III*, the Court held that HB 2655 rectified the wealth-based disparities of the capital outlay state aid, but not those of the supplemental general state aid.[xxiv] The Legislature then passed Substitute for House Bill 2001 (HB 2001). In June 2016, the Court found that HB 2001 rectified the supplemental general state aid inequities, solving the equity portion of the case.[xxv]

In March 2017 with *Gannon IV*, the Court ruled on the adequacy component of the case. It concluded that the CLASS Act failed to meet both the structure and implementation requirements of the adequacy test.[xxvi] With respect to structure, the Court noted that the CLASS Act's block grants are merely a "funding stopgap" rather than a finance formula, and that its funding levels remains static from fiscal year 2015 through 2017, rather than responding to changing conditions such as increased enrollment.[xxvii] With respect to implementation, the Court examined the inputs to the K-12 educational system (the costs and funding sources of providing an adequate system) and the outputs (student achievement measures), and concluded that the funding levels and outcomes were both inadequate. It noted, for example, that the State was failing to provide nearly one-fourth of all public school students with basic skills in both reading and math, and that achievement gaps existed between student subgroups. The ruling relied heavily on the Rose standards, referring to it sixty-eight times.

The Court stayed all orders to give the Legislature the opportunity to enact a new, improved finance system by June 30, 2017, when the CLASS Act was set to expire.[xxviii] On June 5, 2017, the Legislature passed Senate Bill 19

(SB 19), which included the establishment of a new finance formula, the Kansas School Equity and Enhancement. Act (KSEEA). The Rose standards played a central part in its accountability measure, as KSEEA required the Kansas State Board of Education to design and adopt a school district accreditation system based on meeting or exceeding those standards.[xxix] The base funding per pupil was set to increase annually, and formula provided weightings for additional funds based on at-risk populations, special education, low enrollment, and other areas of concern. Furthermore, to address *Gannon IV*'s concern about stagnant funding failing to meet the needs of a dynamic environment with ever-shifting populations, KSEEA required LPA to perform regular audits to monitor whether the funding and weightings remain adequate.

Gannon V and Directed Court Action

In October 2017, the Kansas Supreme Court issued its fifth ruling on the Gannon case (*Gannon V*). The Court acknowledged that SB 19 "arguably makes positive strides" but ultimately concluded that KSEEA failed to satisfy both the equity and the adequacy requirements of Section 6, Article 6.[xxx] The ruling repeatedly noted that as mentioned in previous Gannon rulings, "the party asserting compliance with court decision ordering remedial action bears burden of establishing that compliance." That is, the State still carries the responsibility of clearly demonstrating how its remedial legislation brings the finance formula into constitutional compliance.

With regard to equity, the Court concluded that SB 19 included four major equity violations: (1) expanding the uses of capital outlay, (2) reinstating a procedure for districts to increase their Local Option Budget (LOB) funds, subject to protest-petition, (3) basing LOB equalization state aid on the preceding school year, and (4) setting a 10% floor for at-risk funding.

The use of capital outlay funds had previously been limited to certain property-related expenses, but SB 19 had expanded that to include property and casualty insurance, as well as utility expenses.[xxxi] Previously, a district would have had to pay these expenses from its general fund, LOB fund, or both. Because the use of these latter funds is generally unrestricted, this provided increased flexibility for school spending decisions. However, wealthier districts had a greater ability to shift these expenses to their capital outlay fund, and thus could benefit more from this flexibility than other districts.[xxxii] Additionally, the Legislature's equalization point for the capital outlay fund is lower than for the LOB fund, due to the former' historically limited uses, so if districts relied more on the capital outlay fund, the State would not have to provide as much equalization aid.[xxxiii]

As for the new procedure to raise local taxes for LOB funds, the Court noted that "a correlation exists between a district's wealth and its ability to gain voter approval of a board resolution that is certain to raise mill levies," and so wealthier districts would more likely succeed in increasing their tax effort to generate higher LOB revenue.[xxxiv] SB 19's third equity violation, basing LOB equalization state aid, is tied to the issue of increasing LOB funds as well. If a district qualifies for LOB equalization aid and does manage to raise its LOB level, its equalization aid would still be based on the previous year's aid, rather than on the new LOB level.[xxxv] Finally, the Court's fourth identified equity violation dealt not with local funds, but with state aid for at-risk students. Under SB 19, if fewer than 10% of a district's students qualify for free meals (i.e., the at-risk measure), the district would nevertheless receive the at-risk weighting as if 10% of its students qualified. According to projections, this would benefit only

two districts, and the Court felt that the Legislature did not provide justification for determining this 10% cutoff.[xxxvi]

When considering the adequacy component under KSEEA, the Court again discussed both its structure and its implementation. The plaintiffs argued that both structure and implementation were inadequate, but the Court held that the structure was adequate, as the plaintiffs' claims "involve too many contingencies and require us to make too many assumptions."[xxxvii] However, the Court determined that the funding's implementation was inadequate. To demonstrate adequacy, the State primarily used a "successful schools" model based on an analysis by the Kansas Legislative Research Department (KLRD). The analysis identified forty-one Kansas school districts that exceeded KLRD's performance expectations and calculating the average of their per weighted pupil base amounts. However, the Court sided with the plaintiffs, who argued that while these districts "outperform[ed] expectations," they did not meet constitutional standards for student performance outcomes, and many had high rates of students not performing at grade level for either reading or math.[xxxviii] In other words, they argued that the chosen districts "are perhaps merely the best, or the most efficient, of the constitutionally inadequate."[xxxix] The Court affirmed that the State's model was deeply flawed in defining success as exceeding expectations, rather than high test performance.[xl]

Furthermore, the Court determined that not only were the chosen schools' performance below constitutional adequacy, but the State's methodology of proving compliance was dubious. Deficiencies identified by the Court included "KLRD's virtually undisclosed review of the school districts," as well as "the brevity of its resultant memo and attachments" and "the timeliness of the presentation of those materials to a legislative body."[xli] The Court contrasted KLRD's quick, four-page report to previous, more comprehensive cost studies, particularly the LPA cost study, whose report and attachments totaled 344 pages. The Court also doubted the State's choice to employ a successful schools model, given that the LPA cost study had specifically rejected this model in favor of the more sophisticated cost function approach, and given that the State's own expert witness had previously testified that the successful schools model was "not reliable."[xlii]

The Court chose to continue what it identified in *Gannon IV* as its "general practice" to retain jurisdiction and stay its mandate, providing the Legislature with an opportunity to remedy the constitutional deficiencies in its school finance formula. The Court justified this practice by citing the Legislature's previous success in remedying these deficiencies, namely in *Montoy IV*, as well as the equity component following *Gannon III*.[xliii] However, the Court emphasized the need for urgency, stating that "the education financing system has been judicially declared to be inadequately funded for at least 12 of the last 15 years." The Court would stay its mandate until June 30, 2018,[xliv] but stated that after that, "the demands of the Constitution cannot be further postponed."[xlv]

Study Orientation

The Kansas Supreme Court's October 2, 2018 ruling (*Gannon V*) provides the Legislature until June 30, 2018, to bring the KSEEA into constitutional compliance. The Court has set a briefing schedule for arguing the merits of any school finance legislation passed in the 2018 legislative session that is enacted to rectify any constitutional infirmities with the KSEEA that begins on April 30, 2018.[xlvi] In responding to the Court's mandate, the Kansas Legislature retained this research team to conduct an adequacy cost study that is designed to "estimate the

minimum spending required to produce a given outcome within a given educational environment." In doing so, the research team investigated the following dimensions of the Kansas public education system:

1. Investigate the linkage between the Rose standards and implications for Kansas K-12 spending, which is discussed further in Chapter 3.
2. Explain why the option or options set forth by the study "produce an education system reasonably calculated to achieving those Rose standards," which is discussed in Chapters 2, 4, and 5.
3. Focus on the structure of the Kansas school finance formula as well as overall K-12 spending levels including forms of funding (local, state, and federal) available to Kansas K-12 schools, which is discussed in Chapter 5.

Importantly, this analysis is framed in large part by the extent to which educational data would be available to conduct such analyses. This, and other contributing factors for the analysis, are described in detail in Chapter 4.

Chapter 2: Literature Review

In conducting an adequacy cost study, it is important to review the research and evidence base supporting methodologies for these types of school finance investigations. As such, this section of the report investigates several of these topics, including: (1) explaining spending differences across school districts, (2) costing out study methods, (3) costing out study method suitability to Kansas, (4) improvements over previous Kansas costing out studies, (5) school district consolidation, and (6) ensuring the effective and efficient use of resources.

Spending Differences Across School Districts

The cost of education in Kansas varies by district for reasons outside of school district control. Put simply, some districts must spend more to provide similar educational services. There are three factors that account for this variation:

- Differences in the resource levels required to provide educational services to different student populations ("needs") will drive differences in educational costs. For example, disadvantaged, gifted, or vocational students may require additional services or resources relative to other students, and thus costs for districts with large numbers of these students will likely be higher.
- Differences in the prices districts must pay for educational resources, the most important of which is labor ("prices") will drive differences in educational costs. For example, districts operating in locations where the cost of living is high must naturally pay more to hire the same quality of teachers available to districts in other locations at lower cost.
- Differences in economies of scale will drive differences in educational costs. Small districts and schools may be unable to take advantage of the economies of scale available to larger ones, and therefore will likely need to spend more per-pupil than larger districts and schools to achieve similar results.

These three cost factors frame this study and provide an opportunity to explain why some school systems in Kansas must spend more in order to achieve similar student outcomes. In other words, addressing adequacy of the Kansas system of funding requires attention to both the level of funding and structure whereby it is allocated to individual districts.

Difference in Needs

While the precise amounts depend on numerous factors, it has been well established that different student populations require additional resources in order to achieve the same educational outcomes. In particular, policies at the state and federal levels acknowledge that additional resources are required to serve students who are (1) from low-income backgrounds, as indicated through qualification for free lunch through the National School Lunch Program, (2) English Language Learners, and (3) those receiving special education services.

There is near consensus that it costs more to educate students from low-income backgrounds to support equitable achievement of outcomes. Prompted by the Civil Rights Act of 1964, the federal government released a comprehensive national study on this issue in 1966, paving the way for federal policy supporting low-income students. Titled "Equality of Educational Opportunity" but often known as simply "The Coleman Report" after its principal author, the national study identified poverty and its related problems, including unstable housing, poor nutrition, and lack of healthcare, as causes for lower student outcomes. However, a wide variety of factors impact the cost of educating low-income students. For instance, one must consider that the federal poverty level of income is the same in New York City as in Salina, Kansas, or any other United States city. But these cities have very different costs of living levels, so being identified as economically disadvantaged has a different meaning in each context. The LPA's 2005 Kansas adequacy cost study calculated the poverty weighting as 0.70 in the median district, but it ranged from 0.65 in rural districts to 1.15 in urban districts (Duncombe, W., & Yinger, J. (2005). A more recent survey of the literature by Golebiewski (2011) found widely divergent estimates of the extent to which being economically disadvantaged contributed to the cost of education. As a general rule, the highest estimates of the differential costs associated with student poverty came from analyses of New York and the lowest cost estimates came from analyses of more rural states such as Arkansas, Arizona, Kansas and Texas.

Educating English Language Learner (ELL) students also requires additional funding, though research has shown that these costs vary by context as well. Factors influencing ELL's learning outcomes include socioeconomic status, parent education level, age entering the United States, and level of formal schooling obtained in the student's country of origin (Capps, et al., 2005). These additional challenges require additional supports, and thus, additional costs. Another cost factor is the number and proportion of ELL students who share a common language. Districts where most ELL students share a common language may have a cost advantage, as they can leverage the same materials, instructors, and other supports for many of their ELL students. Meanwhile, districts that lack this economy of scale will tend to have greater costs. Augenblick, Palaich and Associates (APA)'s 2005 statewide adequacy cost study for Pennsylvania calculated an ELL weighting ranging from 1.48 to 2.43, with smaller districts having the highest weights. Recent reviews of the literature — including Jimenez-Castellanos and Topper (2012), Golebiewski (2011) and Rumberger and Gandara (2008) — all found that the estimated range of costs is even wider for ELL students than for economically disadvantage students. For example, Duncombe and Yinger (2005) estimated that the cost of serving an ELL student in Kansas was a statistically significant, but tiny, 0.14 percent higher than the cost of serving a student who was not ELL. At the other end of the spectrum, Duncombe and Yinger (1997) estimated that the cost of serving an ELL student in New York was four times the cost of serving a student who was not ELL.

Similarly, there is no consensus on how much additional funding special education requires, as this too varies widely by context. Data from the nationwide Special Education Expenditure Project (SEEP) indicate that on average, in 1999–2000, the spending ratio for a student with special needs compared to a student with no special needs was 1.90. The data also indicate lower weights for larger districts, again presumably due to economies of scale. However, a comparison of several special education adequacy studies across the country highlighted additional major factors in cost variation: differing categories of student disabilities (e.g., deafness, visual impairment, autism, emotional disturbance, etc.), severity of disability,

and districts' varying approaches to assigning students to categories and severity levels. Diagnoses of disability can vary widely across physical, emotional, and behavioral bounds, each of which requires different combinations of resources to support the student.

Difference in Prices

Variation in the price of labor is a particularly significant driver of educational cost differentials in Kansas because salaries and benefits make up such a large share (approximately 81%) of elementary and secondary education expenditures in Kansas.[1] While there are other educational inputs with prices that also vary across the state (such as casualty insurance or electricity), these costs each make up a relatively small proportion of current operating expenditures, so incorporating those additional sources of price variation would likely have a very modest impact on the overall cost.

The costs of education investigate how districts are able to hire the same quality of teachers, administrators, and support staff despite regional differences in the prices they must pay for them (i.e., differences in the wage level). Districts of all sizes and with varying student populations must offer wages sufficient to staff their schools with qualified teachers, and districts in high-labor-cost locations must pay more than other school districts just to be able to hire comparable personnel.

As described in Taylor (2011), there are three basic reasons why public school teacher wages differ across individuals: the person, the job, and the location.

- **Person.** All else equal, people with stronger qualifications are paid higher wages. For teachers in Florida, as in most of the country, the key qualifications are experience and higher educational attainment. However, other qualifications may also be relevant such as verbal communication skills, certification to teach English learners or special education students, possessing a multi-subject teaching credential, or classroom effectiveness.
- **Job.** Differences in working conditions can also impact wages. A position with less desirable characteristics may need to offer a higher wage to compensate workers for this, or will be forced to hire less qualified individuals — or both.
- **Location.** Finally, differences in location can impact wages substantially. The same individual applying for comparable jobs in Kansas City compared to Topeka demand a very different salary for these positions. Moreover, many of the factors that influence these differences are outside of the control of districts (e.g., housing costs, local economy, crime rate, etc.).

The first two reasons are largely within school district control. A school district can choose the qualifications of the teachers it hires and can influence working conditions within the district. In contrast, the characteristics of the location are largely outside of school district control. As discussed in Taylor (2015), "only factors outside of school district control represent cost differences that should be accounted for in funding formulas and equity calculations."

[1] Calculation based on the ratio of salaries and benefits to total current expenditures. Data is from the National Public Education Financial Survey for the 2013–2014 school year at: https://nces.ed.gov/ccd/stfis.asp

There are generally two reasons why wages vary by location, all else being equal. The first of these is simply the cost of living. The prices for the same goods and services vary across the state, and thus one district must pay teachers more than another for the teacher to have the same "standard of living." In sum, the higher the cost of living, the more a district must pay teachers. The second is the relative attractiveness of a community. While attractiveness may be harder to measure precisely, it is no less significant than variation in the price of goods and services in determining wage levels. A location that has a high crime rate, little or no infrastructure (e.g., public transportation, reliable public services, etc.), and is isolated from recreational activities (e.g., movie theaters, beaches, restaurants, etc.) will be relatively less attractive than one with these amenities. As a consequence, districts in such locations would have to pay teachers more to recruit and retain them. In other words, the less attractive the community, the more a district must pay teachers.

As is evident from the description above, locational variation in teacher salaries is largely outside of district control. If this variation is not accounted for in a state's funding mechanism, those more expensive and/or less attractive districts would not be able to pay for a similarly high-quality workforce compared with less expensive or more attractive neighbors.

Economies of Scale

Economies of Scale is the third factor that explains the differences in costs across public schools and school districts. That is, some school systems like any other organization can provide a large volume of service — defined as instruction in the classroom, transporting students, feeding students, etc. — for a lower marginal cost. This cost of education has been well-documented and observed. For example, the per-pupil cost of operating a small district and/or school is much higher than the per-pupil cost of operating a larger one (Taylor, Gronberg, & Jansen 2017). Yet, in public education researchers have observed a U-shaped curve to economies of scale meaning that once the school district gets significantly larger we can observe some diseconomies of scale (Robertson 2007). There are a variety of explanations for school systems experiencing a diseconomies of scale. Relative to the circumstances of Kansas, research on economies of scale in education have found that geography forces the education system to have smaller school districts and schools which naturally creates some diseconomies of scale. Kansas has had various experiences in attempting to address such diseconomies of scale including various school district consolidation studies (Augenblick, Myers, & Silverstein, 2001; Augenblick, Myers, Silverstein, & Barkis, 2002; Legislative Divison of the Post Audit, 1992). Yet, recent research has shown that most cost savings through such consolidations are achieved at the school-level (Gronberg, Jansen, Karakaplan, & Taylor, 2015).

Costing Out Study Methods

Adequacy or costing out studies have been performed in at least 30 states as a method to estimate the cost associated with ensuring that all students have the opportunity to reach a particular level of performance based on standards set out by the state. There are two common approaches for these costing out studies, the input-based and output-based approach.

Table 1. Various methodologies for costing out studies

Input-based (resource-oriented) methods	Output-based (performance-oriented) methods
Professional judgement: *Based on current spending by a set of high-performing schools*	**Successful schools:** *Based on current spending by a set of high-performing schools*
Evidence-based: *Based on calculations linking performance outcomes with spending and other variables*	**Education cost function:** *Based on calculations linking performance outcomes with spending and other variables*

Each of these methods are explored in further detail below including a description of each method and then the strengths and weaknesses.

Input-based Method

Both of the approaches that are classified as bottom-up approaches rely on orienting their analysis from the lowest level of the system, e.g., classroom or school, to identify the necessary resources. There are two approaches. The first is the professional judgment method, and the second is the evidence-based method.

Professional Judgment approach

The professional judgment method involves convening focus groups of local educators and policymakers to design prototype schools that meet performance goals. Designing these prototype schools includes determining the resources (staff, equipment, etc.) required. Researchers then calculate cost estimates for these prototype schools in various settings, such as urban, suburban, rural, low-need, and high-need communities. Augenblick & Myers used this method as one of two approaches that it published in a study on costing out an adequate education in Kansas for 2000-2001 (Augenblick, Myers, Silverstein, & Barkis, 2002).

Evidence-Based

In the evidence-based method, a team of consultants' design prototype schools that meet performance goals. The consultants draw upon a wide body of education practices and strategies that have proven effective. While the professional judgment approach draws primarily upon practitioners' experience, the evidence-based approach relies more heavily on research.

Advantages and Disadvantages

A major advantage of both types of bottom-up approaches is that their methodology and results are relatively simple, transparent, and easily understood. Their practices are grounded in on-the-ground expertise from active practitioners, and they present not only *how much* should be spent, but *how* it should be spent. Furthermore, these approaches don't require that an "adequate" level of performance be defined or measured; both of these approaches are resource-oriented, rather than performance-oriented. While the practitioners and researchers keep a goal performance level in mind when determining resources, these methods typically do not estimate specific outcomes from prototyes.

This simplicity can be an advantage when conducting the cost study, but when evaluating the cost study, this tends to be a major limitation. For instance, the outcomes that an evidence-based model's strategies are "proven" to achieve may be different than the outcome goals set by policymakers. Another disadvantage is that neither method focuses on the cost-effectiveness of their recommended resource allocation. In evidence-based studies, cost estimates tend be based on the averages among districts, and while they do address the need for additional resources for certain demographics, they still may not accurately estimate the costs for actual districts that differ from the "typical" prototype, especially when multiple regional variables are at play. Professional judgment analyses carry this same weakness and may be vulnerable to blind spots and biases of individual experts on the panel. Crucially, this method produce specific recommendations that realistically reflect the needs of only a handful of prototypical districts.

Output-based Approach

While bottom-up approaches are resource-oriented, top-down approaches are performance-oriented. Such analyses are based on observed relationships between (a) school spending, (b) student performance, and (c) other school characteristics. There are two main approaches in this category — the successful schools method and cost function method.

Successful Schools

The successful schools method begins by identifying a set of schools with high performance outcomes in relation to the state's performance goals. Estimates of providing a quality education are then based on the lowest level of per-student spending among these actual, high-performing schools. Augenblick & Myers used this method as one of two approaches that it published in a 2002 study on costing out an adequate education in Kansas (Augenblick, Myers, Silverstein, & Barkis, 2002).

Education Cost Function

In the cost function method, cost and performance data are used to estimate the relationship between expenditures and other dependent and independent variables, including: school outcomes, resource prices, student needs, district size, and other relevant characteristics of districts. Once cost estimates for these relationships have been calculated, analysts can use these calculations to predict the cost of achieving a designated set of outcomes, taking into account the aforementioned factors. Duncombe & Yinger (2005) used this approach for the costing out study conducted in 2005 and subsequently published with complementary material from the Kansas Legislative Post Audit (LPA) division in 2006. The cost

function methodology has been refined over several decades of empirical application, and cost function studies have been undertaken for New York (Duncombe and Yinger, 1996, 1998, 2000, 2005; Duncombe, Lukemeyer, and Yinger, 2003), Arizona (Downes and Pogue, 1994), Illinois (Imazeki, 2001), Texas (Imazeki and Reschovsky, 2004a, 2004b; Gronberg, et al., 2004), and Wisconsin (Reschovsky and Imazeki, 1998).

Since that time, additional education cost function analyses have been conducted in California (Duncombe & Yinger, 2011b; Imazeki, 2008), Indiana (Zimmer, DeBoer, & Hirth 2009), Kansas (Chakraborty & Poggio, 2008; Duncombe, Lukemeyer, and Yinger, 2008), Kentucky and Maine (Lee, 2010), Massachusetts (Nguyen-Hoan & Yinger, 2014), Missouri (Baker, 2011; Duncombe et al., 2008; Duncombe & Yinger, 2011a), New York (Duncombe & Yinger, 2005); and Texas (Gronberg, Jansen, Karakaplan and Taylor, 2015; Gronberg, Jansen, & Taylor, 2011, 2017; Imazeki & Reschovsky, 2006).

Advantages and Disadvantages

A major advantage of top-down approaches is their grounding in a demonstrated standard of student achievement and actual per-pupil costs. Estimates are based on the actual experiences of students in the region, and cost function analyses can provide a strong empirical foundation for their estimates of cost differentials. The direct link between education costs and desired outcomes is particularly valuable from a policymaking perspective, as one can use these methods to estimate costs tied to a specific performance goal.

One disadvantage of the successful schools method, compared with other methods, is that while it directly links costs to outcomes, it generally does not describe in detail how funds ought to be used. Another disadvantage is that because its estimates are based upon only a sampling of schools, as with estimates based on prototypes, other variables may prevent these estimates from accurately reflecting the needs of schools in other contexts. While the successful schools method adds additional funding for certain student populations, such as those with special needs, limited English proficiency, and low-income backgrounds, it focuses primarily on identifying the “base cost” for per-pupil spending in a general education context.

The cost function approach avoids many of these disadvantages. Because it establishes a cost relationship with a wide variety of variables that could potentially affect student outcomes, drawing from a larger set of schools — potentially the entire state’s — it can more easily control for variables within different school contexts. However, the estimates of cost function studies still have limitations. By design, statistical models describe relationships between current data, so extrapolating to performance standards outside current experience is problematic. For example, resources may provide diminishing returns at a certain level of high performance, and so if unprecedented goals are set, the projected estimates for required resources may still be inadequate.

Because cost function studies are grounded in data, another potential disadvantage is that they require high quality measures of current performance and expenditures. Similarly, for a cost function study to inform policy, policymakers must set goals based around *measurable* performance outcomes. With its higher level of complexity and economic modeling techniques, a cost function study tends to be more difficult to explain in non-academic settings. Statistical models are not readily transparent, and they require analysts to make judgment calls that inevitably affect the results.

Cost Study Method Suitability to Kansas

The education cost function approach is, among the four methods, the best suited to the circumstances of Kansas. This is not only because the approach is the most precise, but because it controls for the presence of certain circumstances and contexts. Augenblick & Myers (2002) explained this in the first cost study conducted for Kansas, when they said:

> *"The statistical approach [the education cost function approach] is based on understanding those factors that statistically explain differences in spending across school districts while 'controlling' for performance. In some sense, the statistical approach is the most powerful of the alternatives and is subject to the least manipulation. However, it has proven difficult to explain how the approach works in situations other than academic forums. The approach requires the availability of lots of data, much of which needs to be at the school or student level in order to be most useful."*

In other words, the education cost function approach can be the most robust method to estimate the costs associated with providing an adequate education. In the circumstance of Kansas, there are several supporting points to this fact, including: (a) ability to consider the entire student and school population, (b) presence of strong student- and school-level data enabling better estimation and alignment to the Rose standards and (c) improved statistical techniques over 12 years after the Duncombe & Yinger (2005) analysis was conducted.

Ability to Consider the Entire Student and School Population

The first major advantage of the education cost function approach is that it accounts for the wide diversity across Kansas's 286 public school districts and over 1200 schools. Enrollment ranges from 57 students in Healy Public Schools to 50,416 students in Wichita Public Schools. Some districts serve ELL students from a wide variety of backgrounds, with 119 languages represented in Wichita,[2] while other districts, like Labette County, Osawatomie, and Kaw Valley school districts have no ELL students at all.

[2] Wichita Public Schools. 2017-2018 District Snapshot. Retrieved from https://www.usd259.org/domain/954

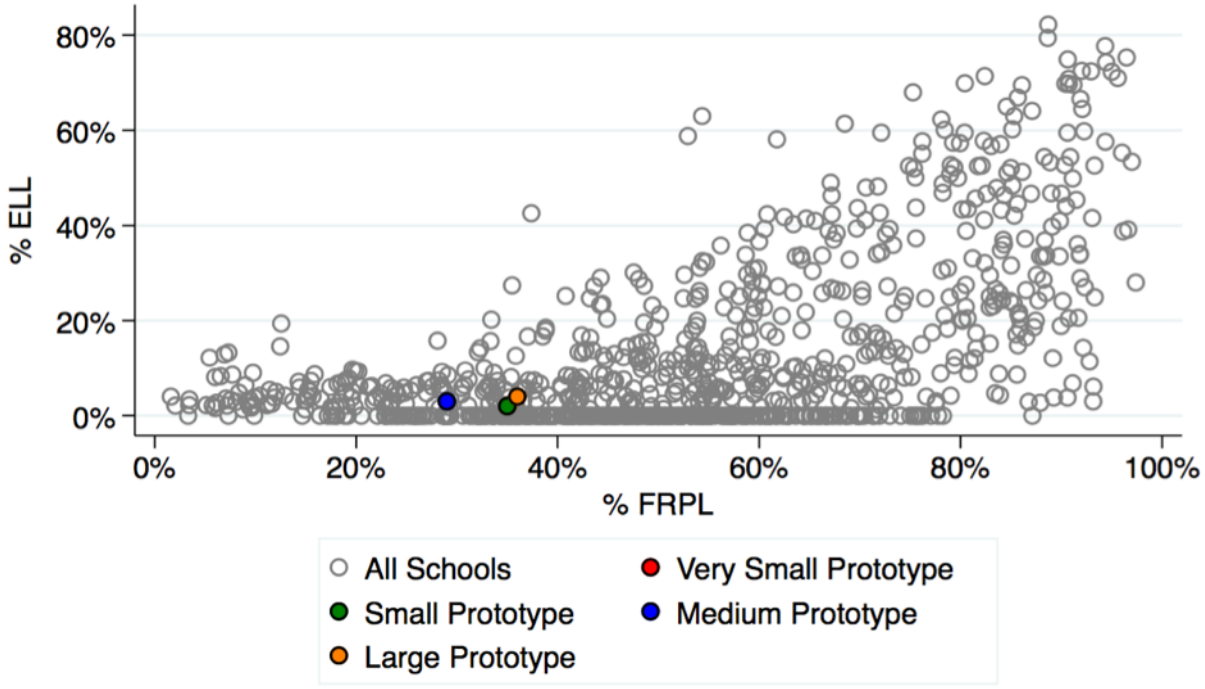
Augenblick & Myers (2002) attempted to simplify school districts' diversity by grouping them into four size categories (quartiles), so that each quartile contained an equal number of school districts and an equal number of students. When the quartiles reflected an equal number of districts, the districts in the largest quartile of districts enrolled 75.3 percent of all students, with about 4,429 students per district and 10.2 schools per district. Meanwhile, districts in the smallest quartile enrolled 3.5 percent of all students, with about 208 students per district and 2.3 schools per district. Then the quartiles reflected an equal number of students, there were four districts in the largest quartile and 230 schools in the smallest. The researchers used this information to construct four prototype districts representing each size category, which they then used for their cost estimates. The characteristics of these four prototype districts are shown in the table below.

Table 2. Characteristics of Prototypes Used in Professional Judgment Model (Augenblick & Myers, 2002)

Prototype School and District Characteristics	Very Small	Small	Moderate	Large
Range in Enrollment	#324	325–555	556–3,600	#3,600
Size of Prototype District	200	430	1,300	11,200
Size of Prototype School				
Elementary	140	150	200	430
Middle	-	-	300	430
High School	60	130	400	1,150
Number of Prototype School				
Elementary	1	2	3	12
Middle	-	-	1	6
High School	1	1	1	3
Proportion of Students in Special Education (%)	14	14	13	14
Proportion of Students Eligible Free/Reduced Lunch (%)	35	35	29	36
Proportion of Bilingual Students (%)	2	2	3	4

By contrast, our current study considers the variations associated with the entire range of schools and school districts in Kansas. A comparison with the chart below illustrates the more expansive view afforded by this methodology.

Figure 1. Percentage of English Learners by Free Lunch Schools, Identified A&M Prototypes



Note: The % ELL and % FRPL is the same for Very Small and Small Prototypes.

Figure 1 shows the number of schools (observations) that compared to the four prototype school used in the professional judgment method used by Augenblick & Myers in the 2001 cost study. We can observe that the cost function method will enable the observation of significantly more variation and types of schools as compared to the professional judgment model used in the Augenblick & Myers study.

Presence of Strong Student- and School-level Data

The comprehensive data calculations used in an education cost function study are not feasible to generate in every circumstance, as one needs to have data available for this broad range of factors. Fortunately, in the case of Kansas for our current study, this was not a problem. Kansas has been nationally recognized for the quality of its education data collection, use, and reporting. In the 2014 report by the Data Quality Campaign, an education data survey in which 46 states and the District of Columbia participated, Kansas was recognized among the top states. A key component of the survey is the Data Quality Campaign's "10

State Actions to Ensure Effective Data Use," and Kansas was one of only ten states implementing nine or more of the recommended actions.

Kansas's diligent data collection allowed for our current analysis to incorporate considerably more factors than most previous cost studies. Most studies concentrate on district-level data and basic measures of student performance, such as standardized assessments. Duncombe & Yinger (2005) and Augenblick & Myers (2002) both acknowledged this as limitations of their own studies. However, the availability of student-level and teacher-level data, as well as postsecondary data and regional characteristics, allows our analysis to incorporate many more factors at work. This also enables us to view variables' relationships in greater detail; for example, the ability to assign costs of educating students to the building level allows us to create a stronger relationship between costs and outcomes for students.

Additionally, now that significant efforts have been made to align the Kansas public education system to the Rose standards, this analysis can more accurately assess the costs of an "adequate" education, as defined by achievement of the Rose standards, than had previously been possible. As we discuss in Chapter 3, Kansas's state education agencies have oriented their Multi-Tiered System of Support (MTSS), school district accreditation standards, and the Kansas College and Career Ready Standards toward achievement of the Rose standards. School districts have configured their resources accordingly, and so by using data that reflects the current landscape of Kansas's public education system, we can get closer to calculating the cost of achieving the Rose standards statewide than had ever been possible before.

Ensuring the Effective and Efficient Use of Resources

To encourage districts to use resources efficiently — that is, cost-effectively — federal and state agencies have implemented a number of accountability systems over the decades. Some accountability systems, like the federal No Child Left Behind (NCLB), have been criticized for pressuring schools to focus their curriculum toward standardized test achievement or for the counterproductivity of their sanctions (Nichols, Glass, & Berliner, 2005). However, the concept of an accountability system still holds tremendous value, particularly in advancing educational equity. Both through rewards and sanctions and through the public reporting of school progress, accountability systems can be a powerful tool in focusing resource allocation toward improving outcomes for disadvantaged students. Furthermore, after years of practitioners' vocal dissatisfaction with previous accountability measures, the landscape of federal and many states' policy has been shifting toward more flexible accountability systems. For example, many states have reformed their accountability systems to measure success indicators beyond standardized test scores, such as graduation rates and other college and career indicators, and to offer comprehensive support systems to low-performing schools, rather than merely rewards and sanctions (Center for American Progress and the Council of Chief State School Officers, 2014).

It is important to keep in mind that while adequate funding is necessary for achieving desired student outcomes, funding alone is not sufficient; the funds must also be put to effective use. After all, schools with similar student populations, receiving similar funding, can have vastly different student outcomes due to differences in local policies and practices (Williams, Kirst, Haertel, et al., 2005). Thus, if one fails to consider *how well* resources are used, then increasing *how much* resources are provided may have a

limited effect on student outcomes. This section will discuss evidence-based strategies and practices for maximizing the effect of provided resources.

Effectiveness vs. Efficiency

First, we must clarify the distinction between *effectiveness* and *efficiency*. Effective is defined as "producing or capable of producing a desired result."[3] In an education context, effectiveness is then measured by program evaluation: i.e., whether a program produces desired student outcomes. Meanwhile, efficiency refers to cost-effectiveness: achieving the desired outcomes while minimizing resources used. While attempts to improve efficiency sometimes lead to cost-cutting, it is crucial to remember that efficiency still requires the achievement of desired outcomes. Consequently, minimizing resources at the expense of desired outcomes does not improve efficiency, but simply reduces effectiveness.

Effective Decision-Making

The power to affect how effectively and efficiently resources are used fundamentally rests with the decision-makers — i.e., local education leaders at the district and school level — who direct how available funds will be spent. Organizational behavior research suggests that while institutions may be tempted to try to hire individuals who possess an inherent "effective decision-making" capability, attempts to do so have limited success, as this skill is not strongly correlated with intelligence or experience (Dalal & Bolunmez, 2016). Indeed, intelligence can lead decision-makers to rely on cognitive shortcuts rather than engaging in a deeper analytical process (Stanovich, 2009), and experience can lead decision-makers to be overconfident and fail to weigh all possibilities (Russo & Schoemaker, 1992) Rather, research indicates that effective decision-making is a skill that can be developed and which strongly benefits from utilizing proven strategies.

Three such strategies include: (1) "consider the opposite," (2) taking an outside view, and (3) constructing a linear decision model. Each of these can be routinized in an organization, helping build leaders' decision-making capacities and limiting the likelihood that a decision-maker will default to common biases.

In the "consider the opposite" strategy, decision-makers are tasked with generating reasons why their initial decision may be the wrong choice (Larrick, 2004). This approach prompts decision-makers to consider information that they otherwise may not have thought about and prompts them to plan for a greater range of possible scenarios. Numerous studies have shown that the "consider the opposite" strategy increases decision-makers' accuracy when estimating the probability of a given result occurring (Lord, Lepper, & Preston, 1984; Hoch, 1985; Soll & Klayman, 2004). When making decisions, the ability to make the best choice largely hinges upon the ability to accurately gauge the likelihood of various outcomes. By improving this gauge — specifically by reducing overconfidence and expanding the information base — this strategy can thus lead to better and more well-informed decision-making.

[3] *effective*. Retrieved March 9, 2018, from https://www.merriam-webster.com/dictionary/effective.

One possible limitation of the above strategy is if the decision-maker's biases hinder his or her ability to think of the true "opposite." For example, research has shown that when tasked with thinking of a worst-case scenario that could result from a decision, a decision-maker often thinks of only a mildly undesirable scenario, rather than the true worst case (Kahneman & Lovallo, 1993). Bringing in outside parties can help this, such as in the "Devil's Advocate" form of this strategy, in which another person is enlisted to argue against the decision-maker's initial choice. However, a more effective way to combat this limitation may be through the addition of the next strategy: taking an outside view.

In the "outside view" strategy, a decision-maker must research several previous decisions, made by others, that share similarities with the current favored decision. The decision-maker can then examine these similar decisions through the lens of an outsider. In order to reduce an optimistic bias, these examples must include some similar decisions that could be seen as failures. Some researchers suggest that the decision-maker should seek out at least six similar decisions for comparison (Lovallo & Sibony, 2010). The decision-maker can then study the various properties of these previous decisions and use this data to inform the current one. For example, this might inform the decision-maker's estimates as to: how likely the decision is to produce the desired outcome(s), how long it will take to implement the decision, and possible pitfalls.

As decision-makers begin to carefully examine data, this leads to the third, and more advanced, strategy: constructing a linear decision model. Also known as a "weighted additive" model or an "actuarial" model, this decision-making process requires the decision-maker to: (1) determine the available options, (2) determine the factors involved in each option, (3) assign importance ratings or "weights" to each factor, (4) rate each option on each factor, (5) use these cumulative ratings to calculate the overall "score" for each option, and (6) choose the option with the highest score. This model is frequently used, for example, when admissions committees consider various applicants. To reduce admissions committee members' biases and more accurately compare applicants on all of their respective assets, the committee might assign a weighted value to applicants' essays, test scores, etc. Once each of these factors is graded, the applicant can receive a total score, which can more easily be judged against other applicants' scores. Linear models have been shown to consistently improve decision-making in terms of both accuracy and transparency (Rolf, 2005).

Realistically, however, it would likely not be feasible to construct a linear decision model for every decision that one must make throughout the workday. In some cases, decisions must be made more quickly and with less effort. Stanovich and West (2000) coined these two categories of decision-making as System 1 and System 2. The System 1 thought process is fast, automatic, and effortless, while System 2 is slower, more deliberate, and effortful. All three of the aforementioned strategies, with their careful consideration of non-intuitive information, fall into System 2.

Recognizing that System 2 strategies are not appropriate for every context, institutions can instead put policies in place that encourage the best possible results from System 1 decision-making. For example, research has established the existence of a "status quo" bias, meaning that decision-makers are more inclined to stay with the current or default option than to opt for a change (Ritov & Baron, 1992). This known bias can then be leveraged to encourage positive outcomes. For instance, research has shown that by making enrollment in a retirement savings account (Benartzi & Thaler, 2007) or an organ donation

program (Davidai, Gilovich, & Ross, 2012) the default status, rather than an "opt in" choice, a much higher proportion of people will participate. Another strategy to improve System 1 decision-making is to ensure that multiple options are considered, rather than just the status quo and one alternative. An analysis of businesses, nonprofits, and government entities showed that 70 percent of the time, when leadership teams are faced with important strategic decisions, they only consider the status quo and one alternative. Yet adding multiple options has been shown to improve the quality of the decision (Lovallo & Sibony, 2013). Thus, even when time and resource constraints may limit opportunities to engage in a deep, analytical decision-making process, policymakers at any level can routinize policies that encourage more effective decision-making.

Data-driven Decision-Making

Whenever possible, leaders and practitioners should approach decision-making with an analytical, data-driven process. Effective data use enables decision-makers to learn more about the educational system's processes and outcomes, identify successes and challenges, discover specific areas of improvement, and evaluate the effectiveness of programs and practices (Mason, 2002). Many studies also suggest that data-driven decision-making carries strong potential to improve student performance (Alwin, 2002; Doyle, 2003; Johnson 1999; Johnson, 2000; Lafee, 2002; McIntire, 2002).

However, to institutionalize data-driven decision-making across the system, leaders must clarify expectations, define a structure, and provide guidance on effective data use. Conceptions of what constitutes valid evidence and effective evidence use varies across school and district staff roles. For instance, research suggests that top-level district administrators may have more faith in research as a guide to policy and practice, compared with principals and teachers, and they may have stronger conceptions of what constitutes high-quality research. Meanwhile, bringing a student-level, on-the-ground perspective, teachers may strongly value evidence that reveals insight into student thinking and reasoning (Coburn & Talbert, 2006). A consistent finding is that many school administrators and teachers lack formal training or experience in analyzing data or using assessment results to inform instruction or program improvement (Lachat & Smith, 2005).

Schools systems that have successfully implemented data-driven school improvement processes show many similarities, so these may provide a helpful framework (Halverson, Grigg, Pritchett, & Thomas, 2007). First, the typical school improvement cycle begins with collecting, organizing, and storing data. This includes inputs, such as student demographics, budget information, and master schedules, as well as outputs, i.e., student outcomes. Second, school leaders provide time to collaboratively reflect on local data. This includes breaking down state assessment data to the student level. Teachers then have the opportunity to connect student performance to social and behavioral data, providing deeper context for the results. Third, school leaders and educators consider program alignment. Together, they examine current programs, compare outcome data to collective goals, and identify gaps in meetings the needs of students. Fourth, the group works on program design, keeping the focus on perceived instructional needs. Curricula, pedagogies, and student service programs may be created, adapted, or removed. Fifth, educators study student progress through "formative feedback": local, continuous, two-way communication between teacher and student that reflects student learning. Examples might include student questions, quiz results, and teacher comments on student work. Finally, when incorporating

standardized test preparation into the school curriculum, these data-driven schools make efforts to authentically integrate the content and test-taking skills into the regular curriculum, rather than diverting students toward temporary, test-focused lessons and drills. Together, these steps form a cycle, and through consistent iterations of this cycle, school leaders can collaboratively make careful, gradual improvements to the system.

Before implementing strategies for data-driven decision-making, school systems find the most success when they lay the necessary foundation. This includes (1) establishing specific, measurable goals at the system, school, classroom, and student levels, along with an aligned curriculum; (2) setting norms and expectations for data use, to be reinforced throughout the process; (3) investing in a user-friendly data management system with appropriate access for staff at varying levels; (4) determining which types of data will be collected; and (5) build staff capacity to utilize data (Datnow & Park, 2010). This last, but highly critical piece, may include professional development, modeling of data use, time for teacher collaboration, and opportunities to connect and share strategies with educators at other schools.

While much of the conversation around supporting effective data use focuses on the school level, central district offices also play a critical role in this improvement process. At the vision-setting stage, district offices can influence the goals and expectations around data use (Honig & Venkateswaran, 2012). In terms of capacity-building, districts can be a main provider of professional development and external resources (Park & Datnow, 2009). Perhaps the most unique role of district staff in this process is in the collecting, sifting through, and distribution of important information to school staff. For example, district staff may guide school staff in improvement efforts by selectively providing information on evidence-based programs that seem relevant to the particular school's context, and they frequently serve as schools' main source for district-wide and state-wide assessment data (Honig & Venkateswaran, 2012). Even for school-level and classroom-level decisions, district offices thus serve as a key partner in promoting and supporting the use of data-driven decision-making.

Use of Networks to Improve at Scale

While some schools and districts have uncovered effective practices for improving student outcomes, this poses the question of how to transfer this knowledge to others and, when possible, how to scale it to other school systems. One concept to keep in mind is that effective programs and practices do not exist on their own; they rely on full integration with the larger system. If a program is adopted blindly, without a complementary framework supporting it, the program may collapse or fail to achieve its intended outcomes.

One study examined 60 years of school-community partnership programs at troubled, urban high school in Boston. Among these programs was a wildly successful small learning community (SLC) piloted by the school during the 1988 recession (Leonard, 2011). The SLC consisted of a public service-oriented academic track for 90 students, with teachers and a community partner working closely together to promote student development and keep students motivated toward the goal of attending college. This partnership included the involvement of a career specialist who would speak with parents about potential conflicts between students' school and work schedules, with teachers about students' academic priorities, and with employers about matching students' interests with job requirements. Within four years, 95 percent

of this program's students were enrolling in college, and the program sustained its success through 2003. By comparison, the school's overall high school graduation rate ranged from 27 percent in the 1980s to 41 percent in the late 1990s.

Yet in this same school, the study found a similar example of a community partnership that failed to integrate itself with the rest of the school site's system, and consequently failed to achieve similar outcomes. This second partnership, launched in 1999, had a similar goal: to support and motivate a cohort of 60 students to graduate and attend college. Two full-time tutors were placed inside the school to implement this program, and students enjoyed the services provided. However, in contrast with the earlier SLC program's instructors, these tutors operated independently and did not communicate with parents, teachers, administrators, or other adults in the students' support network. As a result, the program came into conflict with the school's regular operations, students received mixed messages, and the program was unable to create a focused, cohesive culture of achievement like that seen in the previous SLC. The dropout rate for students in this program resembled that of the school at large, and so the program was quickly discontinued.

One way to examine the structures in place, and the crucial interaction between them, is to use the ecological theory developed by child psychologist Urie Bronfenbrenner. Bronfenbrenner introduces the idea that a developing child is surrounded by several layers of relationships (Bronfenbrenner, 1979). The inner layer, or *microsystem*, consists of the environment in which the child has a direct, personal relationships, such as with parents, teachers, or friends. Beyond this is the *exosystem,* an outer circle of people who indirectly influence the child's development; in an education context, this could include central school administrators, school committee members, state policymakers, foundations, and community partners. Finally, the largest circle, or *macrosystem*, consists of the cultural or economic conditions in the child's society at large, e.g., racism, poverty, and cultural expectations. To have a positive effect on a child's development, one should be mindful of the different systems at play and should aim for changes in the microsystem and exosystem to work harmoniously together. Creating a system for effective change thus requires communication and collaboration between, for example, those in the exosystem who decide policy and launch initiatives, and those on the ground who interact every day with students.

Once there is a shared understanding between all parties involved in the change effort, an attempt can be made to scale education best practices across larger systems. To maximize chances of successful implementation within new environments, it is important to consider the conditions in which these best practices were initially implemented, and be open to adjusting implementation as necessary to fit the new circumstances (Klinger, Boardman, & McMaster, 2013). One of the most widely-scaled best practices is Schoolwide Positive Behavior Supports (SWPBS), with over 14,000 public schools having adopted the practice (Debnam, Pas, & Bradshaw, 2012). SWPBS aims to both reduce student behavioral problems and promote a positive school climate. Researchers have examined what led to successful, sustainable adoption of this practice, as well as less successful attempts. Four components identified were identified as significant in ensuring sustainability: (1) priority, (2) effectiveness, (3) efficiency, and (4) continuous regeneration (McIntosh, Horner, & Sugai, 2009). First, the change effort must be supported as a *priority* at all levels, including through sufficient funding. Second, the change should be evidence-based, so that

school personnel will recognize its proven potential for positive outcomes, and it should be implemented with as much fidelity as possible for the given context, in order to maximize *effectiveness*. Third, leaders should pay attention to local capacity and do what they can to assist with the *efficiency* of implementing the new practice, e.g., through professional development. Finally, through *continuous regeneration*, data should be used to monitor, adjust, and improve implementation, based upon outcomes and issues observed within the current system.

A recurring thread throughout much of the research is that authentic educator buy-in and engagement, along with sufficient supports for educators, are critical for the success and sustainability of change efforts. A leading strategy to actively involve educators, develop their capacity, and create a supportive peer group has been the establishment of Professional Learning Communities (PLCs) within schools and districts. PLCs aim to empower teachers as active agents of change, rather than passive recipients of new practices that they're instructed to implement. For example, in 2013, eight school districts in Rhode Island formed the East Bay Professional Learning Community (PLC), a three-year project focusing on rethinking effective student assessment practices (Dillon, Erkens, Sanna, & Savastano, 2015). Each participating district formed a handful of small teacher teams, with teachers representing all subject areas and grade levels. Teams then launched research action plans, guided by an external consultant, to build more balanced, comprehensive assessment systems focused on rigor, relevance, and relationships. The consultant provided inspiration through evidence-based ideas, as well as personalized coaching, feedback, and guidance regarding system integration. However, the teachers took ownership of the decision-making, research, data collection, and implementation of their action plans. Furthermore, teachers who participated in the three-year project were then responsible for carrying on the work and coaching other teachers in the future.

The PLC model thus emphasizes district-level, school-level, and teacher-level ownership, as well as authentic learning from and collaboration with colleagues. All of this leads to genuine educator capacity-building and sustained engagement in the improvement process. An analysis of ten empirical studies of PLCs in the U.S. and one multisite study in England found that in all eleven studies, PLCs had demonstrably shifted each school's professional culture toward one more focused on collaboration and improvement (Vescio, Ross, & Adams, 2008). Evidence of these shifts included new collaborative structures such as sharing lesson plans, observing in one another's classrooms, and participating in "critical friends" peer evaluation groups. While many PLC studies focus on educator outcomes, some studies have also demonstrated a positive relationship between PLCs and improved student outcomes, including classroom grades, performance on state achievement tests, and graduation rates (Lomos, Hofman, & Bosker, 2011; Jackl & Lougée, 2012).

Yet the value of a PLC rests not only in its ability to build educator capacity, but also in its grounding in *improvement science*. Improvement science is a disciplined approach to educational innovation, integrating problem analysis, research, solution development, measurement of processes and outcomes, and refinement of the change idea through repeated testing. Not all PLCs have an improvement science basis, but as the Carnegie Foundation for the Advancement of Teaching (2015) reports, a growing number of education professionals are recognizing that by leveraging these analytic thinking and systematic testing methods developed by the scientific community, they can achieve better outcomes more reliably

(Bryk, 2015). To do so, improvement science-based networks, also known as networked improvement communities (NICs), draw on the expertise of practitioners, researchers, designers, technologists, and others.

An external consultant typically provides guidance and coaching in improvement science methodology, while the education professionals participating in the network apply the methodology to their school or district's problem of practice. Once they've developed a solution, practitioners apply the change idea to their system and participate in plan-do-study-act (PDSA) cycles, akin to mini experiments, in which they rapidly refine and retest the change idea (Park, Hironaka, Carver, & Nordstrum, 2013). The improvement science methods utilized by NICs are valuable for scaling change for several reasons. First, this methodology requires that practitioners examine the school or district system that's already in place, and examine the many factors at play, before developing solutions. As a result, they can strategically craft solutions customized for their particular system. By developing measures of processes and outcomes, practitioners can more reliably measure the results of their testing. By refining and retesting the change idea, practitioners can further increase the likelihood of finding a solution that achieves the desired outcomes within their system. Finally, by developing this knowledge and expertise in improvement science — particularly with a cohort of colleagues from the same school or district — practitioners can apply these same principles to other problems within their system and, ideally, shift their institution's professional culture toward one of continuous improvement.

The shift toward data-driven decision-making, as well as empowering local leaders and educations to actively participate in driving system-wide improvement, offers unprecedented potential for effective resource allocation in public education systems nationwide. By leveraging practitioners' on-the-ground experience and local knowledge along with evidence-based, systematic improvement processes, decision-makers can optimize targeted alignment between resource allocation and student educational needs.

Assessing Resource Allocation

When assessing the effectiveness and efficiency of resource allocation, viewing the full timeline of resource flow can provide a fuller picture. In 2013, the Organisation for Economic Co-operation and Development (OECD) issued its *Review of Policies to Improve the Effectiveness of Resource Use in Schools*, which provides a helpful map of how resources flow and are implemented across all levels (primarily from district level to student level.) The OECD framework conceptualizes this resource flow into four stages: *resource governance*, *resource distribution*, *resource utilization*, and *resource management*. At each level within the system, the processes involved in each of these four stages can be assessed for effectiveness and efficiency.

Resource governance is where the resource flow originates, and this extends beyond the district level. Governance decisions include: the level of funding that will be available for education, the sources of revenue, the distribution of decision-making power across the school system, the definition of priorities and targets, and the implementation of policies. Naturally, much of this responsibility rests at the state level, with reverberating impacts throughout other levels.

Resource distribution occurs next. These decisions include: the distribution of school facilities and physical resources across the region; the distribution of resources among school levels (e.g., primary, secondary);

the distribution of teachers, administrators, leaders, and professional development programs between various schools; and the distribution of resources targeted toward specific student groups (e.g., special education, ELL.)

Resource utilization then refers to the organization and specific application of resources to meet the identified needs. This includes the allocation of teacher resources (e.g., class size, use of teacher time), the structuring of school schedules, and selection of programs to meet student needs.

Finally, resource management involves the ongoing monitoring of resource use, auditing systems, staff management, reporting requirements, and program evaluation.

Each of these stages supports the next, and so deficiencies in any stage, or between levels, can hinder the effectiveness or efficiency of those parts of the system that depend on it. For example, if resource governance provides too little decision-making power in the hands of local school leaders, this may restrict schools' ability to distribute resources in a way that effectively targets their specific student populations' needs. If resource distribution provides too few instructors for high-need schools, then when it comes to program utilization, classroom instruction will suffer. Thus, resource allocation requires coordination and communication between each stage and between each level. Moreover, resource allocation decisions can be assessed for effectiveness within each stage and level.

When it comes to assessing the effectiveness of resource allocation, there are several methods to utilize. If evaluating for both effectiveness and efficiency, it is important to consider both inputs, i.e., resources, and outputs, i.e., educational outcomes. Three methods that consider both inputs and outputs include *cost-effectiveness analysis*, *cost benefit analysis*, and *cost-utility analysis* (Hollands & Levin, 2017).

Cost-effectiveness directly compares the investment cost with its impact on outcomes. For example, if a supplementary reading program costs $4,000 per student and leads to an average increase of 5 points in ELA scores, the program's cost would be $800/point per student. This can be useful when comparing potential options with different costs and outcomes. For example, another reading program might cost $6,000 but leads to an increase of 10 points in ELA scores ($600/point per student.) The second program has a higher cost but is more cost-effective, and so if the district can afford both, the second program may be the more worthwhile investment.

A cost-benefit analysis is similar, although cost-benefit analyses assign a monetary value to the outcome measure. For example, if the $4,000 supplementary reading program raises student performance to grade level, it might avoid the necessity of providing an $8,000 intensive reading intervention for each student later on. From a purely financial standpoint, the cost-benefit analysis then determines that the program is worth the investment.

A cost-utility analysis resembles a cost-effectiveness analysis, except that the cost-utility analysis considers external factors which may not be quantifiable. For instance, along with assessing costs and student outcomes, this analysis might consider teacher concerns, parent preferences, and compatibility with the current curriculum. If a more cost-effective program presents major conflicts in these areas, then decision-makers may opt for a less cost-effective, but overall more compatible choice.

Bringing it All Together: A Framework for States

For school and district leaders to make effective spending decisions, the state must lead the way. We propose a four-part framework outlining how state leadership can enable districts to maximize effectiveness and efficiency throughout their school systems.

- **Flexibility:** For resource allocation to become more effective, changes to investment decisions must be possible at various levels of the system, including local levels. For example, California's accountability system, the Local Control Funding Formula (LCFF), allows substantial flexibility for districts to determine how best to allocate resources in order to meet the needs of underperforming student groups (California Department of Education, 2018).
- **Accountability**: Effective and efficient spending requires clear, system-wide expectations. While accountability systems should allow some flexibility, they should also set expectations that the *inputs*, *outcomes*, and *processes* are aligned with the state's standards for achievement and equity. For example, while inputs, i.e., funding, and outcomes, i.e., student performance goals, may already be outlined by the state, an optimal accountability system would also require evidence that districts are engaging in strategic, equity-focused continuous improvement processes.
- **Support:** Research strongly suggests that effective decision-making is a skill that must be developed and improved. It indicates, too, that local capacity to use data for school improvement efforts is still lacking. Support is needed at every level to guide schools and districts in planning strategically, utilizing data, participating in continuous improvement cycles, and focusing their financial flexibility where it will be most effective.
- **Transparency**: Public education spending affects a variety of stakeholders, and ultimately, decision-makers are responsible for allocating resources to effectively serve the educational needs of students in their community. It is therefore critical that these decisions be made transparent to key stakeholders. However, state-mandated transparency measures, such as required data collection and financial reporting, should focus on data that meaningfully informs strategic decision-making and resource use. Otherwise, districts may waste time and effort capturing specific data purely for compliance reasons, distracting them from the important work of strategic improvement.

Chapter 3: Translate Rose Standards to Measurable Outcomes in Kansas

One of the central themes present throughout the court documents in the *Gannon v. Kansas* adequacy case are references to the Rose standards. This section of the report aims to deconstruct the Rose standards to understand their alignment to the current state of the Kansas K-12 public education system including accompanying measures and thresholds of performance. In order to do this, this section recounts a brief history, summarizes actions by various Kansas state governmental bodies to respond to the court's references to the standards, reviews other states' experiences with the Rose standards, articulates a potential pathway from the standards to measurable outcomes, and discusses the importance of the proportion or cut points associated with these measurable outcomes.

History of the Rose Standards

The Rose standards were originally evoked in the 1989 Kentucky state supreme court ruling in *Rose v. Council of Better Education.* Among legal scholars, this was noted as one of several landmark cases that signaled a shift away from a focus on the inputs to education, e.g., resources, teachers, etc., and rather a focus on the outputs of education, e.g., students achieving a desired outcome. The lawsuit claimed, and the state supreme court agreed, that the standard upon which funding for schools should be determined is on the basis of students meeting minimum standards (adequacy theory and outcome-based) rather than students receiving just an amount of funding based on their need (equity argument and input-based) (Clinger & Hail, 2013).

Since then, various states, including Alabama, Arkansas, Idaho, Massachusetts, New Hampshire, North Carolina, South Carolina, and Texas,[xlvii] alongside Kansas, have referenced the Rose standards (referred to as Rose capacities in Kansas) as a means to set the benchmark for the outcomes of the state's public education students. In the Kansas Supreme Court's ruling on *Gannon v. Kansas (Gannon I),* the court specifically cited the Rose standards as a necessary element in determining the cost associated with funding the education system in Kansas. Specifically, the court wrote in their March 2014 decision: "More specifically the adequacy requirement is met when the public education financing system provided by the legislature for grades K-12 — through structure and implementation — is reasonably calculated to have all Kansas public education students meet or exceed the standards set out in Rose."[xlviii]

The Rose standards are a list of skills that were cited as necessary to allow all students in Kentucky to achieve an adequate education. These skills include:

- Sufficient oral and written communication skills to enable them to function in a complex and rapidly changing civilization.
- Sufficient knowledge of economic, social and political systems to enable them to make informed choices.

- Sufficient understanding of governmental processes to enable them to understand the issues that affect their community, state and nation.
- Sufficient self-knowledge and knowledge of their own mental and physical wellness.
- Sufficient grounding in the arts to enable them to appreciate their cultural and historical heritage.
- Sufficient training or preparation for advanced training in academic or vocational fields, to enable them to choose and pursue life work intelligently.
- Sufficient academic or vocational skills to enable them to compete favorably with their counterparts in surrounding states, in academics or in the job market.

Breaking down the Rose standards further, it is important to understand a bit more about the elements of the statements. The standards contain references to:

- **content**, e.g., economic, social and political systems
- **skill(s)**, e.g., oral and written communications, and
- **aspiration** of a standard.

In the table below, each of the standards are broken out into these various elements to discern a bit more about their aims:

Table 3. Rose Standards by Skill, Content, and Aspiration

#	Skill(s)	Content	Aspiration
1	**Oral and written communication skills**		To enable them to function in a complex and rapidly changing civilization
2	**Knowledge of**	economic, social and political systems	To enable them to make informed choices
3	**Understanding of**	governmental processes	To enable them to understand the issues that affect their community, state, and nation
4	**Self-knowledge and knowledge of**	their own mental and physical wellness	
5		Grounding in the arts	To enable them to appreciate their cultural and historical heritage
6	**Training or preparation**	for advanced training in academic or vocational fields,	To enable them to choose and pursue life work intelligently

#	Skill(s)	Content	Aspiration
7	**Academic or vocational skills**		To enable them to compete favorably with their counterparts in surrounding states, in academics or in the job market

The meaningfulness of understanding the elements that are content, skill, or aspiration is to understand how the Kansas K-12 education system can be structured and resourced to support those outcomes for students. Interestingly, the term of "enable" is present in six of the seven Rose standards. Merriam Webster's first listed definition of "enable" is: "to provide with the means or opportunity."[4] Most commonly, one encounters these words — "means" and "opportunity" — in the context of economic self-sufficiency. Meanwhile, the Cambridge dictionary's definition of enable is "to make someone or something able to do something by providing whatever is necessary to achieve that aim." In either instance, the word "enable" has two components: one party *providing*, and the other party, consequently, going on to *achieve*. One may interpret the Rose standards' language as thus alluding to public school funding as an *investment*, with upfront costs paying dividends in the form of productive citizens.

Other States' Experiences with the Rose Standards

Kentucky

The Rose standards originated from Kentucky's 1989 case, *Rose v. Council for Better Education*, which led to a full overhaul of Kentucky's school finance system, curriculum, and assessment procedures. The state had maintained a long history of keeping property taxes low, resulting in low levels of school funding (Day & Ewalt, 2013). By the 1980s, Kentucky's education outcomes were among the lowest in the United States and included: the highest percentage of illiterate citizens, lowest percentage of adults with a high school diploma, and ranking of forty-ninth in the nation for college attainment.[xlix]

In 1985, a veteran school administrator who had previously worked for the Kentucky Department of Education, Arnold Guess, organized a group of superintendents under the name Council for Better Education, and the council lobbied the General Assembly for increased funding and education reform. Alongside inadequate funding, the council identified major inequity across the state's school system. For example, the Kentucky Office of Education Accountability (OEA) reported 1989-90 disparities that included per-pupil expenditures for instruction ranging from $1,499 to $3,709, and the number of classroom teachers per 1,000 students ranging from 49.5 to 84.7 (Adams, 1993). The council then sued Governor Martha Layne Collins and the legislature in *Council for Better Education, et al. v. Martha Layne Collins, Governor, et al.* (Civil Action No. 85-CI-1759). In May 1988, Judge Raymond Corns of the Franklin

[4] *enable*. Retrieved February 26, 2018, from https://www.merriam-webster.com/dictionary/enable.

County Circuit declared the state's school funding system unconstitutional. The defendants then appealed and brought it to the Kentucky Supreme Court as *Rose v. Council for Better Education*.

In 1989, the Kentucky Supreme Court, led by Justice Robert F. Stephens, issued its ruling, which affirmed and expanded the lower court's opinion. While the lower court's ruling focused specifically on school finance and equity issues, the 1989 *Rose* ruling broadened its scope to include the school system's organization and curricula as well. The ruling drew upon Section 183 of the state constitution, which simply declares that the General Assembly shall "provide for an efficient system of common schools throughout the State."[l] The Court affirmed Judge Corns' definition of an "efficient" system as a "tax supported, coordinated organization, which provides a free, adequate education to all students throughout the state, regardless of geographical location or local fiscal resources."[li]

The Court added that an efficient school system is one "with no waste, no duplication, no mismanagement, and with no political influence" and must be continuously monitored.[lii] The Court emphasized that an "efficient" system also requires equal educational opportunities, and it determined that this is a "fundamental right" under the state constitution. The Court noted wide-ranging disparities between poorer and wealthier districts, including in student test scores, student-teacher ratios, and curricula offered, "particularly in the areas of foreign language, science, mathematics, music and art."[liii]

The Court cited a similar case, *Pauley v. Kelly* (1979) of West Virginia, in which the West Virginia Supreme Court not only addressed the plaintiffs' concerns about inadequate school funding, but also took the opportunity to outline the management, resources, and wide-ranging curricular goals for an adequate education system. *Pauley*'s eight curricular goals included government knowledge, self-knowledge, creative pursuits, and academic or vocational skills.[liv] The Kentucky Supreme Court then listed their own seven curricular goals, now known as the *Rose* standards. While some of these goals mirror those listed in *Pauley*, the Kentucky Supreme Court added detail to its standards, including justification for six out of the seven — that is, what each standard will "enable" its student citizenry to do.

In its conclusion, the Court reiterated that it found the "*entire system* of common schools is unconstitutional," with this decision applying to "the entire sweep of the system — all its parts and parcels."[lv] It declared that this required the General Assembly "to re-create, re-establish a new system of common schools" that would meet the financial, organizational, and educational requirements outlined in the ruling.[lvi]

In response, the General Assembly passed HB 940, the Kentucky Education Reform Act (KERA), in 1990. As required by the Court, KERA reformed not only the state's school finance system, but also its curriculum, assessment and accountability, district employment, and school governance (Day & Ewalt, 2013). With regard to finance, KERA implemented a new funding formula, the Support Education Excellence in Kentucky (SEEK) fund, which set out to equalize per-pupil expenditures. It set a base level of per-pupil funding and included additional funding for at-risk students, students with disabilities, and districts with higher transportation costs. While districts could raise additional funds through local tax effort, the state offered extra financial incentives for poorer districts to participate. The state also provided a guaranteed annual minimum increase in state funds (Hoyt, Jepsen, & Troske, 2008).

With regard to the Rose standards, KERA launched a major curricular reform, coupled with a high-stakes school accountability system. KERA translated the seven *Rose* standards into six "learning goals," which the Kentucky Department of Education (KDE) and Kentucky Board of Education (KBE) then elaborated upon, creating seventy-five "valued outcomes" that served as the state's educational standards. A few years later, KBE reduced these to fifty-seven outcomes, condensing some and determining that others, such as self-sufficiency, were too difficult to assess (Whitford & Jones, 2000). KERA and its learning goals emphasized new instructional approaches that focused on problem-solving, critical reasoning, and communication skills. Recognizing that this required many educators to radically revise their teaching methods, the state provided additional funding and school requirements for professional development programs.

Naturally, assessment of these outcomes required a more "performance based" form of testing. The state convened a committee with strong teacher representation, and the committee designed a new assessment system consisting of less conventional assessment methods, including group problem-solving tasks, open-response questions, and student portfolios showcasing writing and mathematics work.[lvii]

As required by the Court, the new assessment system, the Kentucky Instructional Results Information System (KIRIS), also included a strong accountability component. Assessment results were combined with noncognitive outcomes (e.g. attendance and graduation rates) to produce an accountability index for each school and district. The state defined the expected rate of improvement by prescribing a target or "threshold" score for each school, based on a two-year cycle. Every two years, the school would either be rewarded for meeting its threshold score or sanctioned for failing to do so. Rewards came in the form of financial bonuses for full-time, certified staff. Sanctions included state-mandated improvement plans and the assignment of a "distinguished educator" to coach or help manage the school, or, if the school continued to struggle, sanctions could include dismissal of tenured teachers and state takeover of the school (Hopkins, 2008).

While KERA has undeniably reshaped the state's education system, various components have been more well-received than others. The accountability system, in particular, received immediate criticism from practitioners, with educators citing a more stressful climate due to the fear of sanctions and noting that extrinsic rewards are not major motivators within their profession (Kannapel, Coe, Aagaard, & Moore, 1996). Teachers also felt that the time required to put together portfolios detracted from time to teach basic skills, which were not emphasized in the assessments.[lviii] There were also concerns, including among state officials and external evaluators, about the reliability and validity of the assessment, given the non-traditional format of the portfolios and group tasks (Kannapel, Aagaard, Coe, & Reeves, 2000).

In response, the General Assembly passed HB 53 in 1998, replacing KIRIS with the new Commonwealth Accountability Testing System (CATS), which continued to undergo periodic revisions. While still substantially similar to KIRIS, the new accountability system addressed many of the aforementioned concerns. The performance-based tasks and portfolios were de-emphasized, for example, and the new reward structure acknowledges schools that made progress, even if they fell short of their threshold goals.[lix] Outside of the accountability system, in 1996, the state also adopted the nationally normed Comprehensive Test of Basic Skills (CTBS), so Kentucky students' scores could be compared to those in other states, though these scores were not used for accountability purposes.[lx]

Regardless of the criticism, studies consistently showed that a majority of education stakeholders believed that KERA improved the state's education system. A statewide survey for the Kentucky Institute on Education Research (KIER) in 1996 found that the majority of school board members, school administrators, teachers, and parents who have served on school councils agreed that schools have changed for the better as a result of KERA, and fewer than 20% wanted to return to pre-KERA assessment practices (Wilkerson & Associates, Ltd., 1997). In another 1996 study, many principals, teachers, and parents praised the assessment system's strong emphasis on writing, and educators reported that KERA prompted improvement in instructional practice as well as students' writing, creative thinking, and critical reasoning skills (Kannapel, Aagaard, & Coe, 1997).

Within the first five years, KERA's new school finance system also resulted in both higher and more equitable school funding. According to the state's Office of Education Accountability, average per-pupil revenue from state and local sources increased from $3,049 in 1989-1990 to $4,628 in 1994–1995. Furthermore, the difference in average per-pupil revenue between school districts in the lowest wealth quintile compared to the highest quintile decreased from $1,380 in 1989–1990 to $764 in 1993–1994 (Office of Education Accountability, 1996).

KERA and then its successor, CATS, remained in place until 2009, when the General Assembly passed SB 1, implementing its new accountability system, called Unbridled Learning, in the 2011-12 school year. But in the two decades following the passage of KERA, national rankings already reflected tremendous improvement in Kentucky's educational outcomes. In October 2007, the Kentucky Long-Term Policy Research Center found that based on its interpretation of various national rankings, Kentucky's overall national ranking rose from 43rd in 1992 to 34th in 2005 (Watts, 2007). Similarly, *Education Week*'s Quality Counts 2007 Achievement Index ranked Kentucky 34th (Education Week Research Center, 2007) and a 2011 study by the University of Kentucky's Center for Business and Economic Research found that the state's ranking on the Index of Educational Progress moved up to 33rd from 48th in 1990 (Prichard Committee for Academic Excellence, 2016). The index included the percentage of Kentucky residents with high school diplomas or college degrees, ACT scores, high school dropout rates, AP scores, and national scores in reading, math, and science. According to this index, Kentucky's ranking rose more than nearly any other state during these two decades.

Arkansas

While the Rose standards officially came to Arkansas in 2002 with the ruling of *Lake View School District No. 25 v. Huckabee (Lake View III)*, an important precedent was set in 1983 with the Arkansas Supreme Court's ruling of *DuPree v. Alma School District No. 30*. In the *Dupree* case, the Court concluded that the inequality in funding among school districts violated the equal protection clause of the Arkansas Constitution and that the State failed in its constitutional duty to provide a "general, suitable, and efficient education."[lxi] In doing so, the Court indicated a constitutional requirement for both equity and adequacy. At that time, it did not outline a specific definition for what a "suitable" or "adequate" education involved, though it did provide the opportunity for then-Governor Bill Clinton to push a wave of education reforms, including higher taxes, though the Arkansas General Assembly and State Board of Education.[lxii]

The *Lake View* case began in 1992 in trial court and eventually rose to the Arkansas Supreme Court in 2000, arguing that the state's school system was again neither adequate nor equitable. The State contended that the school funding system should not fall under the judicial branch's purview, but the Court disagreed, citing the precedent set by *DuPree* and adding that the Arkansas Constitution specifically charges the entire state government, not just the General Assembly, with maintaining a suitable and efficient school system.[lxiii] The State also argued that "adequacy is impossible to define."[lxiv] The Court responded by noting that the Equitable School Finance System Act of 1995, one of the bills passed in response to *Lake View*'s initial trial court case, had directed the State Board of Education to review minimum standards and "seek public guidance in defining an adequate education," but the Board of Education had failed to do so.[lxv]

The Court then took it upon itself to define an adequate or "efficient" education. The *Lake View* trial courts had cited the *Rose* standards as a definition, and the Arkansas Supreme Court affirmed this definition. The Court noted that these standards were already "adopted by our General Assembly with Act 1108 and Act 1307 in 1997."[lxvi] Act 1108 indeed included an adaptation of the Rose standards, including requirements for language arts, mathematics, science, social studies, practical and vocational skills, physical education and health, and visual and performing arts.[lxvii]

The Court stayed its order until January 1, 2004, pending legislation to resolve the adequacy and equity issues.[lxviii] The General Assembly first passed Act 1467 of 2003, the Quality Education Act or "Omnibus Act," which established accreditation standards and authorized the State to monitor, audit, and sanction districts that failed to maintain its standards. However, this legislation focused primarily on the district level and on implementing the federal requirements of *No Child Left Behind.* To focus specifically on the Lake View concerns, the General Assembly convened a special session starting December 8, 2003 (McKenzie & Ritter, 2005).

The key issues discussed during the Special Session included school consolidation, student assessment and accountability, teacher salaries, the revised school funding formula, and plans to generate the revenue required for the adopted education reforms. A new school funding formula came out of the Special Session, guaranteeing $5,400 in per-pupil base funding from the state for the 2004-05 fiscal year, with additional funding for at-risk students, students with disabilities, and English Language Learners, as well as professional development and various other programs.[lxix]

To address *Lake View*'s adequacy requirements, the General Assembly passed Act 35, Arkansas Student Assessment and Educational Accountability Act. The legislation required the State Board of Education to establish specific academic content standards and include "periodic review and revision" by various public stakeholders including outside content standard experts, higher education and workforce education professionals, community members, and teacher committees.[lxx] The legislation also required the establishment of a five-level school rating system based on student assessment scores, and any school failing to meet acceptable levels of performance would have to participate in a school improvement plan. The improvement plan must specifically examine whether achievement gaps exist between student groups, and if so, how to address them. Additionally, the legislation enacted requirements for student-level accountability, as any student failing to achieve acceptable levels of individual performance would

be required to participate in an academic improvement plan developed by the student's parents and teachers.

Furthermore, while the General Assembly ordered an adequacy study in 2003, the legislature also acknowledged that the requirements for an adequate and equitable education may shift over time.[lxxi] To address this, it passed Act 57 of 2004, the Continuing Education Adequacy Evaluation Act. This act set up a system to evaluate and monitor "the entire spectrum of public education" and provide an annual report assessing whether it offered an adequate and equitable education. This included reviewing and evaluating teacher salaries, adequacy costs, per-pupil expenditures, the effectiveness of individual programs, and "what constitutes an adequate education."[lxxii] Mirroring the Kansas courts' concerns about stagnation in both the *Montoy* and *Gannon IV* cases, the Arkansas General Assembly recognized that demographics, student needs, and requirements to succeed in a twenty-first century workforce are subject to change, and so the education system must adapt accordingly.

Efforts by Kansas to Incorporate the Rose Standards

Following the March 2014 ruling by the Kansas Supreme Court, the Legislature passed HB 2506, adopting the Rose standards into law.[lxxiii] Specifically, the legislation directed the State Board of Education to "design subjects and areas of instruction to achieve the goal established by" each of the Rose standards.

The Kansas State Department of Education (KSDE) and Kansas State Board of Education (KSBE) sought to link this new law to the practical elements that construct the sequence of learning for students by grade and subject. The primary vehicle is the set of Common Core-aligned standards adopted by KSBE, known as the Kansas College and Career Ready Standards (Common Core in Kansas, 2013). According to KSBE, "College and Career Ready means an individual has the academic preparation, cognitive preparation, technical skills, and employability skills to be successful in postsecondary education, in the attainment of an industry recognized certification or in the workforce, without the need for remediation." Such a definition mirrors many of the skills referenced in the Rose standards. As the Kansas Association of School Boards noted, the Rose standards "broaden student expectations in the areas of citizenship, the arts, and health" compared with Kansas's previous requirements.

For example, in addition to typical academic standards, the Kansas College and Career Ready Standards include curricular standards in non-assessed areas, including Counseling; Social, Emotional, and Character Development; Health; Physical Education; Library, Media, and Technology; and the Arts. These standards directly address Rose standards 4 (physical and mental health), 1 (communication for a rapidly changing civilization), 5 (academic/vocational training), 6 (academic/vocational skills), and 4 (arts and cultural appreciation).

Some of these curricular areas closely resemble those implemented by Kentucky in its wide-sweeping curricular reform through KERA. For example, Kansas's Social, Emotional, and Character Development standards provide a detailed framework for schools to "learn, practice and model essential personal life habits that contribute to academic, vocational, and personal success," including problem-solving, healthy decision-making, empathy, and interpersonal skills (Kansas State Board of Education, 2012). Similarly,

KSDE developed a detailed framework for Civic Engagement education, coupled with a Civic Advocacy Network. The Civic Advocacy Network was launched after KSDE hosted over 287 focus groups in twenty communities across the states, asking, "What are the characteristics, qualities, abilities and skills of a successful 24-year old Kansans?" Results indicated that among education professionals and non-education professionals alike, soft skills — i.e., interpersonal skills, like teamwork, and intrapersonal skills, like perseverance — were overwhelmingly listed as the top priorities. The Civic Advocacy Network aims to promote civic engagement opportunities for Kansas students in all grades, particularly through sharing exemplary practices from schools across the state (Kansas State Department of Education, 2017).

This curricular emphasis on interpersonal communication, teamwork skills, and applied problem-solving mirrors Kentucky's curricular reform's focus on soft skills and critical reasoning, which had been praised by educators, the public, and the courts alike. Furthermore, Kansas has arguably learned from Kentucky's mistakes, as Kansas has chosen to forgo the controversial, non-traditional assessment methods initially instituted by KERA. For skills that are not already evaluated by standardized assessments, Kansas has included the relevant subjects as graduation requirements, rather instituting additional annual assessments.

Along with requiring the incorporation of the Rose standards into the state's education system goals, HB 2506 issued several other important directives to state and local education agencies. These largely focused on specific efforts to support the implementation of the new and existing academic standards, as well as to support educational equity.

First, the legislation directed that, "every accredited school in the state of Kansas shall teach the subjects and areas of instruction adopted by the state board of education," including these new areas. In practice, the implementation of such curricula requires hiring and placing appropriately credentialed and able teachers in each Kansas classroom. Indeed, research has shown that teacher quality is the most important in-school factor influencing student achievement. In particular, teacher characteristics shown to have a positive effect on student learning include: content knowledge, pedagogical knowledge, verbal ability, at least a few years of teaching experience, and degrees in science or mathematics (when teaching those subjects) (Rice, 2003). Further research has revealed that the effectiveness of a teacher, as defined by his or her previous students' performance, is a strong indicator of the academic outcomes for the teacher's future students (Sanders & Rivers, 1996). Longitudinal evidence also indicates that having either a very high-performing or low-performing teacher for one year can affect a student's performance for several years afterward (Jordan, Mendro, & Weerasinghe, 1997). Thus, effective teachers are undoubtedly a crucial resource for all Kansas classrooms to fulfill this requirement.

Second, the legislation directed that "every accredited high school in the state of Kansas also shall teach the subjects and areas of instruction necessary to meet the graduation requirements adopted by the state board of education." This requirement assumes that each Kansas high school will develop a master schedule that both allows students to complete a course of study that fulfills graduation requirements and also offers the necessary support to students who need additional assistance. Third and finally, the Legislature noted that, "nothing in this section shall be construed as relieving the state or school districts from other duties and requirements imposed by state or federal law including, but not limited to, at-risk programs for pupils needing intervention, programs concerning special education and related services

and bilingual education."[lxxiv] In particular, this ensures that local education agencies should ensure that there is an expressed and clear need to continue to serve students from disadvantaged backgrounds that require additional time, attention, and resources in order to succeed in the Kansas school system.

Responding to these latter two directives, KSDE has fully aligned their Multi-Tier System of Support (MTSS) toward achievement of the Kansas College and Career Ready Standards. The Kansas MTSS provides a framework for how to implement research-based curricula to help Kansas students achieve each of the standards, including for students who require supplementary (Tier 2) or intensive (Tier 3) support. The MTSS recommends this additional support take the form of small group instruction in addition to the core classroom instruction. Interventions are based on individual students' needs, as determined by diagnostic assessment, and are designed to complement and reinforce core classroom instruction (Kansas State Department of Education, Division of Learning Services, 2013). KSDE has outlined required components for a school's Tiered System of Supports, including family engagement; a master schedule providing for assessment, core, intervention, and collaborative team time; and regular evaluation of the system (Kansas State Department of Education, 2016).

Finally, SB 19 was notable for its requirement that the state continue to monitor its education finance system for adequacy and equity throughout years to come. Specifically, the legislation requires the Division of Legislative Post Audit to perform several statewide performance audits from 2019 through 2026. This includes evaluations every three years to determine the current costs required for meeting KSDE's student performance outcomes, with additional cost studies focusing on at-risk education, bilingual education, transportation, and best practices of successful schools.[lxxv] This mirrors Arkansas's passing of the Continuing Education Adequacy Evaluation Act, a significant effort to ensure not only that the state's public education system will meet the needs of today's students, but that it will continue to meet the needs of students in years to come.

Rose Standards Crosswalk to Measures of Student Outcomes

The following is a crosswalk, created by the Kansas State Department of Education, matching the seven Rose standards to the corresponding curricular standards and measures that Kansas has in place to address them. These include the Kansas College and Career Ready Employability Skills (though these have recently been replaced with the very similar Kansas College and Career Ready Standards), as well as the statewide, standardized measures of student outcomes. There have been several other published documents that attempt to convey this alignment in policy, regulation, and implementation of the Kansas public education system with the Rose standards.[lxxvi]

This crosswalk goes further in identifying the applicable measures of standard, statewide measures of student outcomes to each of the Rose standards. Of note, those listed measures are just those that were used in this study. The researchers recognize that other standard, statewide measures of student outcomes are available and aligned to the Rose standards. However, for either methodological or other reasons they were not included in the study. For a further discussion on this please see Chapter 4.

Table 4. Rose Standards Crosswalk to Standard, Statewide Measures of Student Outcomes

Rose Standards	Applicable Kansas College and Career Ready Employability Skills (KCCRES)[lxxvii] and the 21st Century Accreditation (Accreditation)[lxxviii]	Applicable Minimum Standards for Schools to Teach or Graduation Requirements	Applicable Measures of Standard, Statewide Measures of Student Outcomes
Communication and Basic Skills			
Standard 1: Sufficient oral and written communication skills to enable them to function in a complex and rapidly changing civilization.	**KCCRES:** These basic skills encompass reading, listening, speaking, and performing math computations. **Accreditation**: The Relevance Rubric defines the criteria for Technology in a school district. Those criteria include having a vision for 21st Century learning and being able to apply digital learning through the use of technology. Districts much have the infrastructure necessary to support technology needs in the district, provide the professional learning essential to addressing the needs of learners, use technology for systemic improvement, plan strategically for the district's needs and gather data through the use of surveys to all stakeholders about technology and its use.	**Elementary schools must teach:**[lxxix] reading, writing, spelling, English grammar and composition, arithmetic (and) such other subjects as the state board may determine. **Elementary and secondary schools must provide:** language arts; library services; computer literacy; counseling services; mathematics; science; services for students with special learning needs. **For graduation:**[lxxx] English language arts (4 units), including reading, writing, literature, communication, and grammar; Science (3 units), including physical, biological, and earth and space science concepts and at least 1 unit as a lab course; and Math (3 units) including algebraic and geometric concepts.	**State assessments** (as required by the federal Every Student Succeeds Act (ESSA) reauthorizing the Elementary and Secondary Act of 1965) [5][lxxxi] **English Language Arts and Mathematics (and alternate)** Grades: 3-8, 11 **Science (and alternate)** Grades: 4, 7, 11 (to 2015) Grades: 5, 8, 11 (2016 on)
Civic and Social Engagement			

[5] TARGETS: At the state, district, school and subgroup level, 75% of students score in performance levels 3 and 4 combined on the Kansas state assessments in English language arts and math by 2030.

Standard 2: Sufficient knowledge of economic, social and political systems to enable them to make informed choices.	**KCCRES:** Subset of Critical Thinking Skills, Interpersonal Qualities and Career Interest Development. These sets of skills address critical thinking through development of decision-making skills; thinking creatively about ideas and solutions, making decisions and using a problem-solving process; developing interpersonal qualities such as social and self-awareness; and, exploring and planning for career interest. **Accreditation:** The Relevance Rubric defines the criteria for Curriculum and Instruction in a school district. Criteria include implementing the Kansas College and Career Ready Standards, using resources that reflect the culture and community of the district and providing professional learning about curriculum and instruction. Content area knowledge of teachers is evaluated in an ongoing manner in order to provide authentic learning experiences and personalized instruction for all students.	**Elementary schools must teach:**[lxxxii] geography, history of the United States and of the state of Kansas, civil government and the duties of citizenship, and instruction concerning the original intent, meaning, and importance of the declaration of independence and the United States constitution, including the bill of rights. **High schools must teach:** a course of instruction concerning the government and institutions of the United States, and particularly of the constitution of the United States. **For graduation:**[lxxxiii] History and government: 3 units, including world history; U.S. history; U.S. government, including the Constitution of the United States; concepts of economics and geography and, a course of instruction in Kansas history and government.	**State assessments**
Standard 3: Sufficient understanding of governmental processes to enable them to understand the issues that affect their community, state and nation.	**KCCRES:** Subset of Interpersonal Qualities. The Interpersonal Qualities addresses being self-aware through communication with others in a variety of settings, working well with others including those from diverse backgrounds and exercising leadership. Being aware of civics at many levels can promote success in post-secondary choices. **Accreditation:** The Relationships Rubric defines the criteria for students in a school district. Criteria include implementing policies and	**See above.**	**State assessments**

	practices that encourage and empower students as well as demonstrating student involvement with community.		
Physical and Mental Health			
Standard 4: Sufficient self-knowledge and knowledge of their own mental and physical well-ness.	**KCCRES:** Subset of Interpersonal Qualities. Skill specifically addresses students' abilities to self-manage their own thoughts, feelings and behaviors and promotes self-awareness to develop positive self-worth and self-confidence. **Accreditation:** Criteria include the Social, Emotional and Character Development Model Standards. Student survey target self-efficacy for empowerment and involvement and their relationships with peers, teachers, families and community. The Responsive Culture Rubric defines criteria for District Climate. Criteria include surveying stakeholders about the physical and emotional well-being of students, evaluating academic and social engagement and providing a safe and supportive environment for students, families and community.	**Elementary schools must teach:**[lxxxiv] health, hygiene **Elementary and secondary schools must teach:** physical education, shall include instruction in health and human sexuality. **For graduation:**[lxxxv] Physical education: 1 unit, including health and which may include safety, first aid, or physiology. (May be waived for health or religious reasons.)	**High school graduation**[6][lxxxvi]
Arts and Cultural Preparation			

[6] Targets: Long-term goal of 95% in the four-year adjusted cohort will be applied to each subgroup and, as a result, will require interim measures of progress.

Standard 5: Sufficient grounding in the arts to enable them to appreciate their cultural and historical heritage.	**KCCRES:** Subset of Critical Thinking Skills, specifically asking students to engage in creative thinking and being able to generate new ideas and find solutions to problems. Subset of Interpersonal Qualities also expect students will work with others from diverse backgrounds and experiences allowing for appreciation of their own in process. **Accreditation:** Students, Families, and Community include developing positive relationships w/ students and families, fostering systemic family engagement within the district and the school and investing in community partnerships. Relevance Rubric defines the criteria for Content Area Knowledge ensuring that teachers are able to advance student learning, creativity and innovation.	**Elementary and secondary schools must teach:** fine arts. **For graduation:**[lxxxvii]**:** Fine arts: 1 unit, which may include art, music, dance, theatre, forensics, and other similar studies selected by a local board of education.	High school graduation[lxxxviii]
Postsecondary and Career Preparation			
Standard 6: Sufficient training or preparation for advanced training in academic or vocational fields, to enable them to choose and pursue life work intelligently.	**KCCRES:** Subset of Interpersonal Qualities and Career Interest Development. Through access to information and building relationships, students explore and plan for their interests and career preferences in order to be successful in post-secondary settings. **Accreditation:** Criteria include integrating career and technical education with academics throughout the curriculum, forming partnerships with stakeholders for the purpose of career exploration and preparation and an established curriculum focused on careers. In	**Secondary schools must teach:** business; family and consumer science; foreign language; and industrial and technical education **For graduation:**[lxxxix] 1. English: 4 units of approved courses including reading, writing, and literature. 2. Mathematics: 3 units completed[xc] 3. Natural science: 3 units[xci] 4. Social science: 3 units[xcii]	**State assessments** **ACT College Readiness Test** **High school graduation**

	addition, an Individual Plan of Study is advocated for every student.	5. 6 units of elective courses for a total minimum of 21 units of credit.	
Standard 7: Sufficient academic or vocational skills to enable them to compete favorably with their counterparts in surrounding states, in academics or in the job market.	**KCCRES:** College and career ready advocates for academic and cognitive prep, technical and employability skills so that all Kansas students are well rounded and prepared for pathways to post-secondary education or careers. **Accreditation:** CTE and Technology in a school district. Criteria include long-term planning through the collection, analysis and use of data focused on economic and work force trends state-wide and nationally. Addressing students' individual academic and career goals while addressing education priorities with community state and national workforce needs is a priority.	**See above.**	**State assessments** **ACT College Readiness Test** **High school graduation**

Thresholds for Identified Measures Relative to the Rose Standards

One of the important considerations for each of the identified student assessments and graduation requirements aligned to the Rose standards above is the threshold — for both individual students and populations of students — by which a determination of having achieved the skill or knowledge is reached. The following section discusses each of the student outcome measures used in the cost function analysis and sets a determinate adequacy threshold by individual student and in aggregate for the student population. The following measures are discussed below: annual, statewide assessments in English language arts (ELA) and math; and high school graduation rates. Other student performance measures that were identified but not used are discussed in Chapter 4.

In setting thresholds for performance, it was important to consider several factors. First, the measures should capture the experience of existing schools within the system in their current state. To achieve these ends, the study team reviewed recent ELA and math assessment data, along with graduation rates, to identify current performance thresholds for those school districts at the 90th percentile.

Second, it was also important to capture the desired aspirations of the public education system. While it is important to consider the current, observable levels of performance in the system, it is also important to consider the motivation and aspiration of the state and its education system. The study team relies primarily on the state's approved plan under the federal Every Student Succeeds Act (ESSA) by the U.S. Department of Education.[xciii] This plan provides both the identification and commitment of the state to ensure students reach a defined level of performance. It outlines the performance goals for the Kansas Assessment Program (KAP) in ELA and math as well as graduation rates. This serves as the aspiration and a trajectory of growth in performance that the study team can match with the two other factors.

The third and final factor was to consider past performance of the state's education system and conditions under which that performance occurred. Most significantly, there was a period in which the courts had ruled that the state had met their constitutional obligation to adequately fund the education system. Observing the growth in student performance over that time period also contributed to setting the performance thresholds.

Annual, Statewide Assessments in ELA and Math

In assessing a threshold of performance on the annual, statewide assessments in ELA and math, it was important to acknowledge the evolution of the standards and assessments used throughout Kansas and most importantly, the significant shift that occurred starting in the 2010-11 school year with the move to more rigorous standards, followed by the rollout of aligned assessments beginning in the 2014-15 school year. The new assessments, included under the Kansas Assessment Program (KAP) administered the first statewide assessment that was publicly reported in the 2014-15 school year starting with English and math, followed closely by science.[xciv] In order to ensure that the student assessments were equated to the more rigorous academic standards, the assessment changed not only the content of the exam to test the new standards but also establishes scale scores that imply that certain higher levels of achievement

signal that the student is on track to be college ready. The new assessments administered in Kansas are validated not only through the construction of the test[xcv] but also by equating levels of performance to the ACT, a nationally administered standardized exam that is used by many colleges and universities for admission to a post-secondary institution.[xcvi]

When making these changes in the standard, assessment, and accountability system some states have cautioned against the comparison of individual, building, and school district level results as it would be inappropriate to equate scores from one assessment to another because they are fundamentally testing different knowledge and skills for students. However, it is important in this study to translate historically how Kansas has referenced the threshold of student performance as a measure of adequacy discussed in trial proceedings to the current standards and assessment system. As such, the study team considered the similarities and differences between these two standards and assessment systems to identify a threshold of performance under the new standards and assessment system that could be set to estimate the cost to achieve an adequate level of funding.

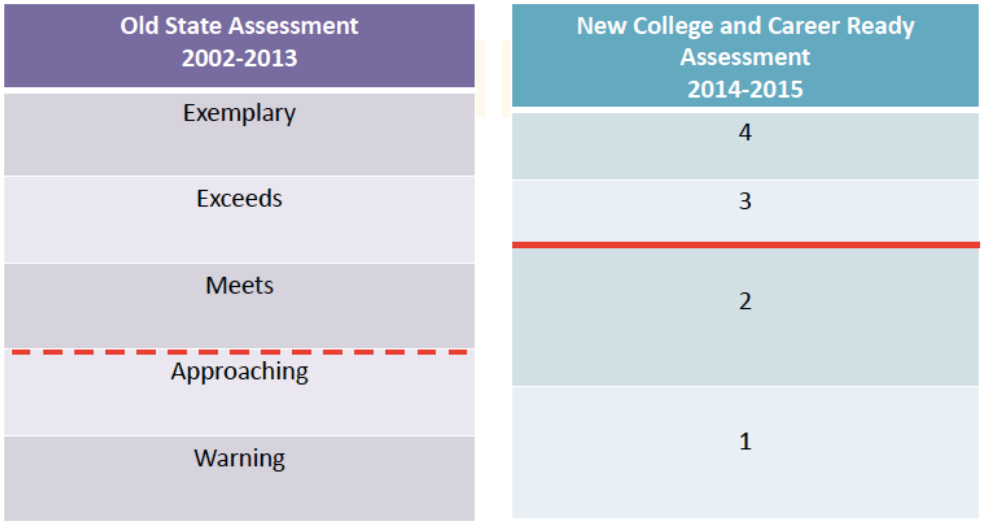
Under the previous standard and assessment system there were five, defined performance levels ranging from academic warning to exemplary. Under the KAP, there are now four performance levels. The table below offers some basic descriptions between these assessment systems.

Table 5. Description of performance levels for the assessment system under NCLB and KAP

State assessment system under No Child Left Behind (NCLB) Law	Kansas Assessment Program (KAP) and new College and Career Ready Assessment
Exemplary: student is performance beyond grade-level expectations. Exceeds Standard: student is performing above grade-level expectations. **Meets Standard: student is performing at grade-level and is considered proficient.** Approaching Standard: student is approaching the standard for grade-level performance. Academic Warning: student is in need of intervention to support getting back to grade level.	Level 4: indicates that the student is performing above expectations for that grade level and is on track to being college ready. **Level 3: indicates that the student is performing at academic expectations for that grade level and is on track to being college ready.** Level 2: indicates that the student is doing grade-level work found in the standards but not at the depth or level of rigor to be considered on-track for college readiness. Level 1: indicates that a student is not performing at grade level standards, and additional supports are needed.

The language used under the respective assessment systems alone point to measurement of a different level of standard for students with designations of college ready in the KAP. Also of noticeable difference is the minimum thresholds set out by the assessment systems. The table below offers a picture of this which was presented by KSDE to the Legislature in 2015 during testimony on assessment changes in Kansas.

Table 6. Identified, minimum level for proficient students for the assessment system under NCLB and KAP



It can be observed that under the old state assessment those students scoring in the meets, exceeds, or exemplary performance level were considered proficient. The new college and career ready assessment considers level 3 and 4 to be proficient or college ready which increases both the rigor of the standards, that is the content and skill demonstration by students. The new college and career ready assessment would reasonably be better aligned to the Rose standards in helping to gauge the progress and performance of students particularly for Rose standards six and seven (the two Rose standards addressing postsecondary and career preparation.) In order to bridge the change in the standards and assessment system as a measure of performance the cost estimates will include a threshold of performance equivalent to the old assessment system as well as the definition of proficiency under the current standards and assessment system.

Method for Threshold Identification

When considering how to set benchmark thresholds, the research team considered the overall threshold of achievable performance as well as the year-over-year anticipated growth. The importance of recognizing absolute performance as well as growth in performance reflects the necessity to hold the education system to a high standard of performance while acknowledging the practicalities of schools and school districts to make the appropriate investments to reach those levels of performance over time. That

is, it is not practical to make a one-time, significant investment in a statewide public education system and expect at the end of that school year to see dramatic movement from current performance to the aspiration targets. Alternatively, making ongoing investments in the system with established targets may be more realistic.

In this regard, the study team used various reference points to establish the overall threshold of performance and annual targets, included: (1) previous court documents discussing the overall threshold of performance, (2) the state's ESSA plan submission to the U.S. Department of Education, (3) previous performance of the Kansas school system during years in which the court regarded the system to have been fully funded (2006-07 to 2008-09), and (4) observed, actual performance of students currently in the system.

Overall Threshold of Performance

The study team looked at several sources in identifying the overall threshold of performance. The Kansas Every Student Succeeds Act (ESSA) approved state plan submission captures the state's commitment to the federal government for how it will hold itself accountable to achieve some set of student outcomes. Specifically, the plan cites the desired outcome for its students in English and math to ensure 75% of all students are proficient by the year 2030 based on the current assessments used in the KAP. Is it important to note that this definition of proficient references the summation of levels 3 and 4 of the English and math assessment.

Another reference point is to consider the discussion that occurred during the trial for *Gannon v. State* in which equivalent to the old assessment the absolute threshold for performance was 87%. This would be equivalent in the new assessment system to performance levels 3, 4, and a large proportion of 2. For the purposes of cost estimates, the thresholds of performance in levels 2, 3, and 4 were used for English and math. When looking at the total percentage of students proficient this would equate to approximately 90% of all students having met either levels 2, 3, or 4 under the new assessment.

Annual Targets of Performance

As was mentioned, achieving those absolute thresholds of performance over a one-year period is not possible and further acknowledged by the state in its ESSA plan as it sets out various targets between its baseline year, 2016-17 and its target year in 2030. As such, the research team used various other reference points to derive average annual growth that would be achieved on an annual basis. Specifically, the research team looked at three sources: (1) the average annual growth identified in the state's approved ESSA plan, (2) previous observable growth during the years in which the court regarded the Kansas education system to be adequately funded, and (3) current, observable performance in Kansas school districts. The research team chose a 5-year time period in which to estimate costs.

The approved ESSA state plan for the KAP assessment in ELA identifies a baseline of 42% of all Kansas students in the 2016-17 school year and in Appendix A identifies its projected measure of interim progress to be 2.53 percentage points growth annually until 2030 in which all students in Kansas would achieve a proficiency rate of 75%.[xcvii] The approved ESSA state plan for the KAP assessment in math identifies a baseline of 33% of all Kansas students in the 2016-17 school year and in Appendix A identifies its projected measure of interim progress to be 3.23 percentage points growth annually until 2030 in which all students

in Kansas would achieve a proficiency rate of 75%.[xcviii] Since the time period in which this cost study is looking out is 5 years, calculating the annual growth from a base of 42% would result in a proficiency rate in ELA of 54.65% and 49.15% for math by 2021-22.

Table 7. Proficiency targets by school year for ELA math; All students identified in ESSA state plan

School Year	Proficiency Target for ELA, All Students (%)	Proficiency Target for Math, All Students (%)
2016–2017 (baseline)	42.00	33.00
2017–2018	44.53	36.23
2018–2019	47.06	39.46
2019–2020	49.56	42.69
2020–2021	52.12	45.92
2021–2022	54.65	49.15

The study team also considered previous growth in the states ELA and math assessments. In particular, the team looked at student academic growth during school years in which the court regarded the system to have been adequately funded. The table below identifies the growth in ELA and math assessments for all students in Kansas. The 2005-06 school year is used as a baseline and the 2006-07 school year was the first of three years in which the Legislature had fundamentally reformed the school funding formula following a ruling by the court in July 2005 that the state had met its obligation under the constitution.[xcix] Table 8 presents the outcome results from the years between 2005-06 and 2008-09.

Table 8. Percent proficient by school year for ELA and math; All students (old state assessment)

School Year	ELA Percent Proficient (%)	Change in ELA Percent Proficient	Math Percent Proficient (%)	Change in Math Percent Proficient
2005–2006	78.0		72.5	

School Year	ELA Percent Proficient (%)	Change in ELA Percent Proficient	Math Percent Proficient (%)	Change in Math Percent Proficient
2006–2007	82.5	+ 4.5	80.1	+ 7.6
2007–2008	84.1	+ 1.6	81.0	+ 0.9
2008–2009	85.7	+ 1.6	82.8	+ 1.8
Total	**+ 8.3**	**+ 2.6 / annually**	**+ 9.4**	**+ 3.4 / annually**

Finally, the study team investigated the actual levels of student performance across school districts in Kansas. Among those higher performing school districts (performing at the 90th percentile) that they were achieving proficiency rates for all students in their system of 58.32% in ELA and 58.05% in math. These proficiency rates use the same scale score cut-offs as established under KAP.[c]

Annual Targets of Performance Under Different Thresholds

The study team decided to look at performance thresholds under a scenario of achieving college ready (levels 3 and 4) as well as under a scenario of levels 2, 3, and 4. Under the scenario of achieve college ready (levels 3 and 4) a target of 60% performance was set to be achieved at the end of the 2021-22 school year which would keep Kansas on track to hit the 75% performance threshold for ELA and math identified in the ESSA state plan. This means that students across all tested grades are achieving the threshold if they are reaching a scale score of at least 300 on the ELA and/or math assessments. This translates into applying a 3.6 percentage point growth trajectory for ELA and a 6.0 percentage point growth trajectory for math over that five-year period. Using the 2016-17 school year are the base year the resulting growth is reflected in the table below.

Table 9. Proficiency targets by school year for ELA, math; All students identified for cost study

School Year	Proficiency Target for ELA, All Students (%)	Proficiency Target for Math, All Students (%)
2016–2017 (baseline)	42.0	33.0
2017–2018	45.2	38.0
2018–2019	48.4	43.0

School Year	Proficiency Target for ELA, All Students (%)	Proficiency Target for Math, All Students (%)
2019–2020	51.6	48.0
2020–2021	54.8	53.0
2021–2022	60.0	60.0

Under the scenario of achieve levels 2, 3, and 4 a target of 90% performance was set to be achieved at the end of the 2021-22 school year. This means that students across tested grades are achieving the threshold if they are at or above a scale score of between 265 and 277 on the ELA assessment and at or above a scale score of between 266 and 276 on the math assessment depending on their grade level. For a list of scale score cut scores by grade see the Cut Scores for KAP Summative Assessments document.[ci] This translates into applying a 3.5 percentage point growth trajectory for ELA and a 6.0 percentage point growth trajectory for math over that five-year period. Using the 2016-17 school year are the base year the resulting growth is reflected in the table below.

Table 10. Proficiency targets by school year for ELA, math; All students identified for cost study

School Year	Proficiency Target for ELA, All Students (%)	Proficiency Target for Math, All Students (%)
2016–2017 (baseline)	72.6	72.4
2017–2018	76.1	75.9
2018–2019	79.6	79.4
2019–2020	83.1	82.9
2020–2021	86.6	86.4
2021–2022	90.0	90.0

High School Graduation

The study team took a similar approach in looking at high school graduation rates — another student outcome measures used in the cost analysis. The approved ESSA state plan for graduation rates identifies a baseline of 86.1% of all Kansas students in the 2016-17 school year and in Appendix A identifies its projected measure of interim progress to be 0.68 percentage points growth annually until 2030 in which all students in Kansas would achieve a high school graduation rate of 95%.[cii] Since the time period in which this cost study is looking out is 5 years, calculating the annual growth from a base of 86.1% would result in a graduation rate of 89.5% by 2021-22.

Table 11. High school graduation targets by school year, All students in Kansas ESSA state plan

School Year	High School Graduation Rate, All Students (%)
2016–2017 (baseline)	86.10
2017–2018	86.78
2018–2019	87.46
2019–2020	88.14
2020–2021	88.82
2021–2022	89.50

Finally, the study team investigated the actual levels of student performance across school districts in Kansas. Higher performing school districts, performing at the 90th percentile, have a graduation rate of 91%.

The study team set a target of 95% performance to be achieved at the end of the 2021-22 school year, which is consistent with the state goal to reach the 95% performance threshold for high school graduation identified in the ESSA state plan. Using the 2016-17 school year are the base year the resulting growth is reflected in the table below. Note that a 95% graduation rate for the state as a whole is a much easier standard to meet than a 95% graduation rate for each district. The research team evaluated the cost of meeting a 95% graduation rate in each district, recognizing that such an achievement would lead to a statewide graduation rate well in excess of 95%.

Chapter 4: Education Cost Function Variables and Methods

This section of the report provides a simple explanation of the education cost function method, the primary statistical technique used by the study team to conduct the costing out study for the state of Kansas. It also summarizes the variables, data and measures used in the education cost function analysis, and a discussion of measures that could not be incorporated into the analysis.

As discussed in prior sections, there are three reasons why spending differs across school districts including outcome, cost, and economies of scale. This study addresses those differences in cost along all three of these dimensions to advance an estimated cost to adequately fund Kansas public schools.

Education Cost Function Method

This analysis follows Taylor et al. (2017) and uses stochastic frontier analysis (SFA) to estimate an educational cost function for Kansas. A cost function specifies the minimum cost necessary to achieve certain outcomes with specified inputs and specified environmental factors. In the SFA, this cost function is regarded as a frontier, a minimum cost of attaining given outputs with given inputs including environmental factors. Spending may then deviate from this cost frontier, exceeding this minimum cost. Thus, the SFA starts with a basic cost function and adds the assumption that spending exceeds the cost frontier due to random errors or inefficiency. This approach accounts for the idea that schools or districts can at best be on the cost frontier, if they are fully efficient, and if they are inefficient this is captured in the model.

The per-pupil SFA is more commonly applied in education than a total cost function (e.g., Andrews, Duncombe and Yinger, 2002; Gronberg, Jansen, Karakaplan, & Taylor, 2015). The cost frontier estimates indicate the cost of achieving certain educational outcomes after controlling for cost and other environmental factors. The educational outcomes include a quantity dimension—the number of students served—and a quality dimension. The quality dimensions considered here are conditional normal curve equivalent scores (a measure of growth) and graduation rates.

An important feature of the decision-making environment facing school officials is the competitiveness of the district's relevant education market. Indeed, the literature finds that competition is one factor that can influence a school district's cost inefficiency.[7] The argument is that competition serves to discipline the tendency of districts to engage in excessive spending. This implies a negative relationship between the competitiveness of a district's education market and the magnitude of that district's cost inefficiency.

[7] For example, see Belfield & Levin (2002); Dee (1998); Gronberg et al. (2015); Grosskopf, Hayes, Taylor & Weber (2001); Kang & Greene (2002); or Millimet & Collier (2008).

The literature also suggests that voter monitoring can lead to increased school district efficiency (Grosskopf et al. 2001). Factors that influence the motivation or ability of citizens to monitor their local school district—such as the educational attainment of the population, the share of homeowners or the fraction of the population that is elderly—have also been linked to school district efficiency (Duncombe & Yinger 2005). The stochastic cost frontier framework can accommodate models of how these factors impact spending inefficiency.

For a more detailed description of the SFA used in this study see Appendix A.

Variables, Measures, and Data Sources

The data for this analysis come from administrative files and public records of the Kansas State Department of Education (KSDE), the National Center for Education Statistics (NCES), the U.S. Bureau of Labor Statistics (BLS), the U.S. Department of Housing and Urban Development (HUD) and the U.S Census Bureau. The analysis covers the two-year period from 2015–16 through 2016–17.

The study team requested data sets from Kansas that were important to include in the analysis in constructing cost variables and estimates. What follows is an explanation of the data that was incorporated into the analysis. These include the several components to the educational cost function analysis; the unit of analysis, expenditures, student outcomes, input prices, and environmental factors. These key components are summarized in Table 11 and described in the following sections. See Appendix A for a technical description of the cost function analysis.

Table 12. Key components of the educational cost function

Component	Measured by
Units of Analysis	All standard buildings in traditional public school districts in the State of Kansas Two most recent school years (2015–2016 through 2016–2017)
Expenditures	School-level operating expenditures excluding food, transportation, capital outlay for construction, community service, debt service, fund transfers and adult education.
Outcomes	Average conditional NCE score on state assessments (ELA and mathematics) School- and district-level graduation rates
Input Prices	Teacher Salary Index Rural Indicator

Component	Measured by
Environmental Factors	Number of students enrolled at the district level Building Percentage of Economically Disadvantaged Students Building Percentage of English Language Learner Students Building Percentage of Special Education Students Building Type Population Density
Controls for Inefficiency	Stochastic Frontier Analysis Methodology Efficiency factors: Educational competition Percent college educated Percent owner occupied housing Percent elderly households

The decision to use only the most recent data was made primarily due to the change in state assessments implemented after the 2013-14 school year. Representatives from the KSDE and other state governing bodies expressed strong reservations about the quality of the test data prior to this change, suggesting that the results of the analysis would be viewed as less accurate and reliable if these data were used. Given these concerns, the study team chose to use only test scores data after the 2013-14 school year.

The unit of analysis is the traditional public school building. Alternative schools, charter schools, virtual schools and special schools have been excluded because they may have different cost structures than other buildings. Buildings that lack reliable data on student performance (such as elementary schools that serve no students in tested grades, or very small schools) have also been excluded. A complete list of the included districts is provided in Appendix D.

Table 14 provides means and standard deviations for the variables use in this analysis. Enrollment, the teacher salary index, and population density enter the stochastic frontier regression in logs, while variables already in percentages and the indicator variables are not logged before entering the stochastic frontier regression.

Table 13. Descriptive statistics for buildings in Kansas, 2015-16 and 2016-17

	Mean	Std. Dev.	Minimum	Maximum
Per-pupil operating expenditure	$9,696	$1,961	$5,137	$20,844
Average Conditional NCE	0.50	0.05	0.30	0.76

	Mean	Std. Dev.	Minimum	Maximum
Graduation rate	0.89	0.07	0.60	1.00
Teacher salary index	1.41	0.11	1.00	1.59
Rural county indicator	0.27	0.45	0.00	1.00
District enrollment	7.70	1.58	4.26	9.90
% Economically disadvantaged	0.41	0.21	0.00	0.96
% English Language Learners	0.10	0.16	0.00	0.82
% Special education	0.15	0.06	0.00	0.63
Elementary grade indicator	0.75	0.44	0.00	1.00
High school grade indicator	0.26	0.44	0.00	1.00
Herfindahl Index	0.38	0.25	0.13	1.00
Share of spending unallocated	0.34	0.09	0.00	0.91
Potential employers in building zip code	327	388	0.00	1,646
County unemployment rate	4.26	0.97	2.00	7.50

Note: Virtual schools, alternative schools, charter schools, and special schools have been excluded, as have all buildings with fewer than 10 students for whom conditional normal curve equivalent (NCE) scores could not be calculated.

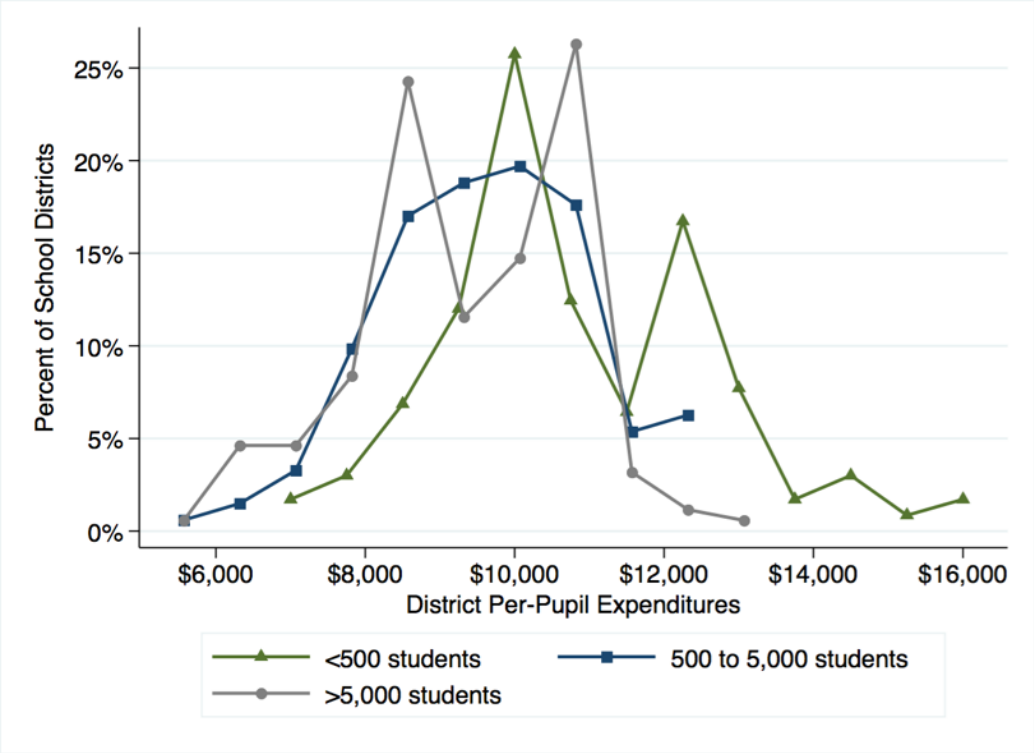
The Dependent Variable (Per-pupil expenditures)

For each district, the researchers identified total operating expenditures for food, student transportation and all other operating functions. As described in Appendix C, operating expenditures include the day-to-day expenses of school districts, such as salaries, benefits, purchased services, and supplies and materials. Debt service, construction expenditures and fund transfers are not considered operating expenditures. In turn, the category of all other operating functions includes the normal functions of school districts: instruction, student support services, administration, and the operation and maintenance of the district's facilities.

A complicating factor is that Kansas school districts regularly rely on special education co-operatives or inter-local agreements to provide special education services. With a special education co-operative, one district collects contributions from the other members of the co-operative, and hires teachers or purchases supplies on their collective behalf. To account for those expenditures, the researchers used the Kansas Education Directory to identify the members of each co-operative, and shared out the spending of each cooperative (i.e. the spending from fund 78) to the member districts according to each district's share of the special education students served by the co-operative. Payments to the inter-local (from funds 564 and 565) were the best available measure of spending by the members of an interlocal. However, we note that special education cooperatives and inter-locals can also receive revenues from other sources (such as the federal government); such revenues are accounted for in the expenditures of districts that do not participate in an inter-local agreement or special education cooperatives, and in the expenditures from fund 78 by special education cooperatives, but cannot be accounted for with the available data for the districts participating in inter-local agreements.

Figure 3 displays the distribution of 2016-17 average per-pupil district-level expenditures from the estimation sample. As can be seen below average per-pupil spending ranged from $5,935 to $17,083 in 2016-17.

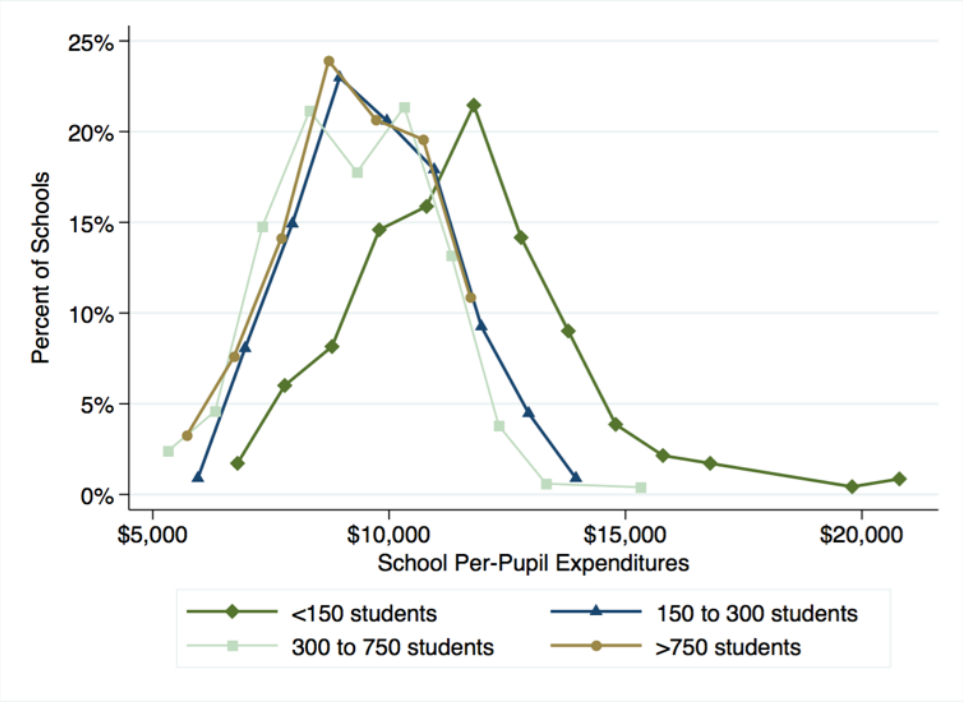
Figure 2. Distribution of per pupil spending in Kansas by district size, 2016-17



The study team then followed five steps to distribute the district-level current operating expenditures to the building level:

1. Using data on certified personnel assignments and earnings, calculate total assigned salaries for each building each year.
2. Calculate total payroll (salaries and benefits) for each building by adjusting the building-level salaries by the district-specific benefits ratio.
3. Assign the remaining payroll expenditures for the district to the buildings on a per-pupil basis.
4. Assign all non-payroll expenditures–excepting special education funds—for the district to the building on a per-pupil basis.
5. Assign all non-payroll special education expenditures for the districts to the building on a per-special education-student basis.

Figure 3. Distribution of per pupil spending in Kansas by school size, 2016-17

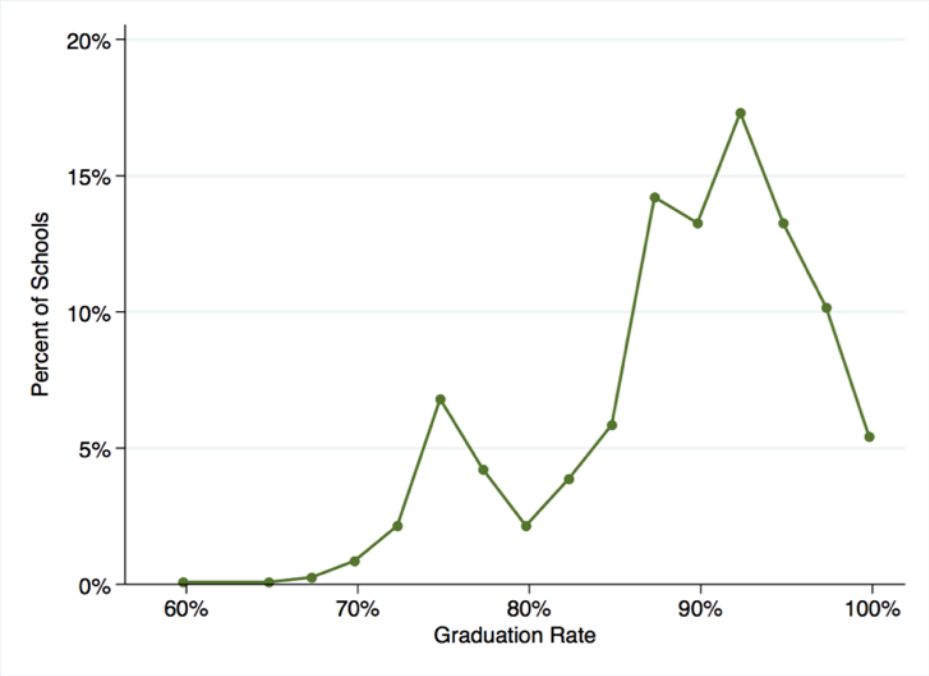


Outputs (Student Outcomes)

As noted above, the analysis uses two measures of quality—levels and growth. The levels measure is the ultimate, summative evaluation of high school achievement—graduation rates. We were provided with school-level graduation rates which represent the percentage of each longitudinal cohort that graduated within four years. We also received the variables used to calculate these rates including total number of graduates and the total number of students in the four-year cohort.

To calculate district-level graduation rates, we divided the sum of total graduates in a given year and district by the sum of students in the corresponding cohort. In some cases, the graduation rate data were suppressed due to concerns about student privacy. For buildings in which all or some of their graduation data was suppressed, we imputed values using school averages across years of available data or imputed district rates at the school-level. For a detailed description of our imputation method see Appendix A. As can be seen in Figure 4 below, in 2016-17 the average graduation rate in the estimation sample was 0.89, ranging from 0.59 to 1.00.

Figure 4. Distribution of school graduation rates in the estimation sample, 2016-17



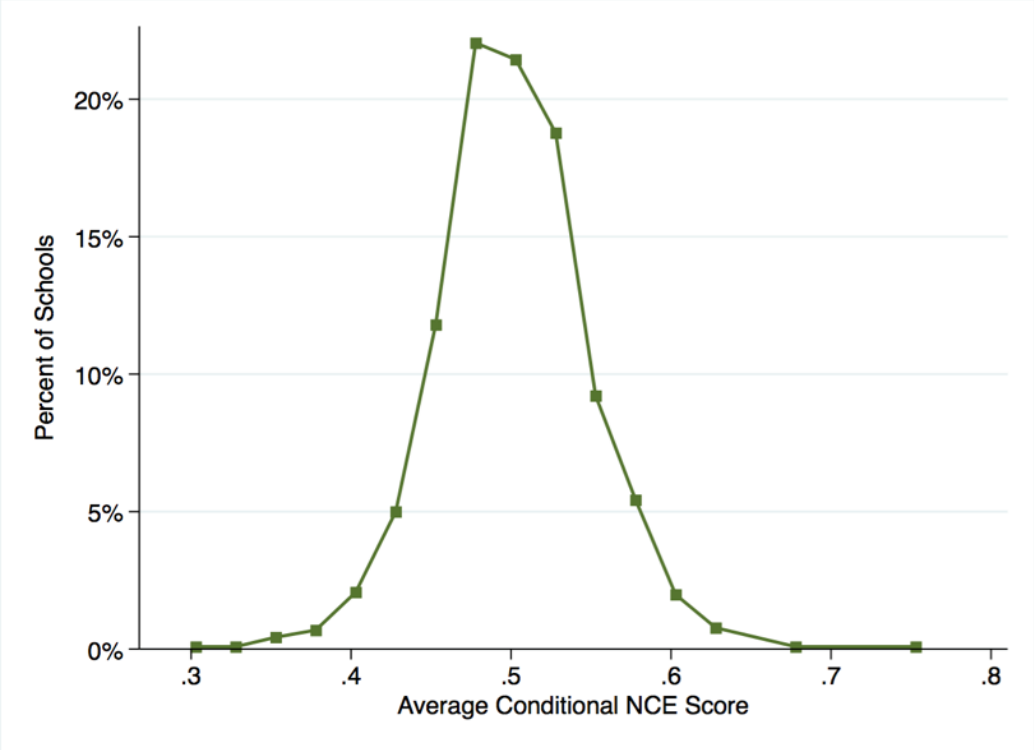
The growth measure is a normalized gain score indicator of student performance on the Kansas Assessment Program (KAP) summative evaluations in reading and mathematics in grades 3–8. Although schools clearly produce unmeasured outcomes that may be uncorrelated with mathematics and reading test scores, and standardized tests may not measure the acquisition of all important higher-order skills, these are performance measures for which districts are held accountable by the state, and the most common measures of school district output in the literature (e.g., Duncombe and Yinger, 2005; Gronberg, Jansen & Taylor, 2011a, 2011b, 2017 or Imazeki & Reschovsky, 2006). Therefore, they are reasonable output measures for cost analysis.

KAP scores can be difficult to compare across years, grade levels and test subjects. Therefore, this analysis relies on normalized (or equivalently, standardized) test scores. The normalization follows Reback (2008) and measures the extent to which individual students perform better (or worse) than would have been expected given their prior test scores. For ease of exposition and estimation, the normalized score were further transformed into Conditional Normal Curve Equivalent (NCE) scores (which are defined as 50+21.06*z-score). A student who performs exactly as expected — i.e., exhibits normal growth from one year to the next — would have a Conditional NCE score of 0.50; a student who performs one standard deviation above expectations would have a Conditional NCE score of 0.7106; and a student who performs one standard deviation below expectations would have a Conditional NCE score of 0.2894. The Conditional NCE scores can also be interpreted as percentile ranks, with an NCE of 0.50 representing the 50th percentile.

Conditional NCE scores are calculated at the student level in ELA and math. (Similar growth scores cannot be calculated for science because the test is not administered in consecutive grades, so annual growth in science cannot be calculated.) Averaging those Conditional NCE scores at the building or district level

yields the measures of performance used in this analysis. Figure 5 displays the distribution of average Conditional NCE scores for ELA and mathematics in 2016-17. The average Conditional NCE score had a mean of 0.50 with a minimum of 0.30 and a maximum of 0.76. As seen in the figure, the distribution for both subjects is bell-curved with most schools seeing average scores of between 0.40 and 0.60.

Figure 5. Distribution of Conditional NCE scores, 2016-17



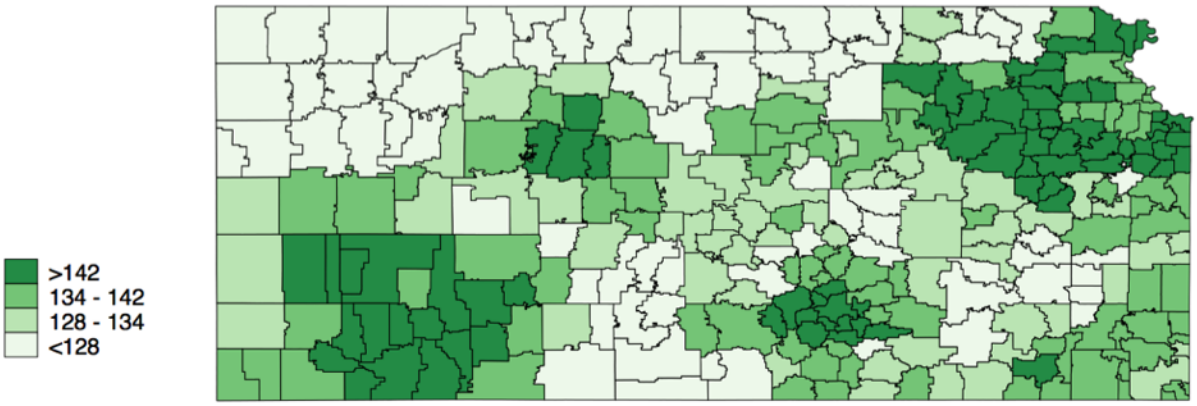
Input Prices

The most important education inputs are teachers, and the cost function model includes the required teacher wage variable. Public schools take differing approaches to hiring teachers. If there were a teacher type hired by all unified school districts — for example, a teacher with a bachelor's degree from a selective university and two years of experience — then arguably the model should use the wages paid to those teachers as the labor price measures. However, it is not possible to identify a teacher type that is hired by all the school districts under analysis, and any observed average wage — such as the average salary for beginning teachers — reflects school and district choices about the mix of teachers to hire and the salaries offered to teachers in the hiring process.

This issue can be dealt with using a wage index that is independent of school and district choices. Such an index is constructed here by estimating a hedonic wage model for teacher salaries and using that model to predict the wages each school would have to pay to hire a teacher with constant characteristics (see

Appendix B). The resulting teacher price index, which reflects the systematic variation in teacher salary that is related to cost factors outside of school district control, ranges from 1.00 to 1.59 and indicates that the cost of hiring teachers is more than 50% higher in some of parts of Kansas than it is in others.

Figure 6. Map of Kansas Teacher Salary Index, 2016-17



In an ideal situation, the estimated cost function would include direct measures of local prices for instructional equipment and classroom materials. Such data are, unfortunately, not available to researchers. However, prices for pencils, paper, computers, and other instructional materials are largely set in a competitive market (and therefore unlikely to vary across schools), and prices for nonprofessional labor or building rents are largely a function of school location. Therefore, the cost analysis includes an indicator for whether or not the district is located in a rural county. A rural county is one that is not part of either a metropolitan area or a micropolitan area as designated by the U.S. Office of Management and Budget.[8]

Other Environmental Factors

The cost model includes indicators for a variety of environmental factors that influence district cost but which are not purchased inputs. A major environmental factor in this study is district enrollment. In general, there are typically three ways to measure student enrollment. The first of these is simply a count of students enrolled on a particular day during the school year. The second is average daily membership (ADM), which is typically measured over the course of the school year. The third measure is average daily

[8] Miles to the center of the metropolitan area for each building was calculated as-the-crow-flies using latitude and longitude information. The latitude and longitude of metro centers come from the U.S. Census Bureau. Where available, latitude and longitude information for buildinges are taken from the NCES' Common Core Database. The remaining buildinges are assigned latitudes and longitudes according to the zip codes at their street address.

attendance (ADA) which is based on actual attendance rates, rather than number enrolled. These measures could also be used as head counts or represent a measure of full-time equivalence (i.e. half-time students would be counted as .5). For this study, we used state head count student enrollment taken on a single day at the start of the school year. This measure was used primarily because the assessment data required the use of head counts, and thus it was only measure consistently available. These data were provided by the Kansas State Department of Education. In the estimation sample district enrollment averaged 1,851 students, with a minimum of 110 and a maximum of 50,566.

Another key environmental factor is population density, measured as the population per square mile. School buildings are likely to be smaller (all else equal) in districts with larger geographic footprints, where the time costs of transporting students to scale-efficient buildings could be prohibitive.

To capture variations in costs that derive from variations in student needs, the cost function includes the percentages of students in each district who were identified as English Language Learners, special education, and economically disadvantaged. The English Language Learner and economically disadvantaged data were suppressed requiring imputation and a detailed description of the imputation methods used can be found in Appendix A.

To allow for the possibility that the education technology differs according to the grade level of the school, the cost model includes indicators for whether or not the school serves elementary grades (i.e., grades PK-6), and whether or not the school serves high school grades (i.e. grades 9-12).

Finally, fixed effects for year control for inflation and other time trends in Kansas education.

Efficiency Factors

Stochastic frontier analyses allow for the possibility that some schools spend their available resources more efficiently than others. School spending is therefore thought to depend on more than educational costs, but also on a number of factors that theory suggests may explain differences in school efficiency. Prior research has demonstrated that competition can reduce inefficiency in public education (e.g., Belfield & Levin, 2002; Millimet & Collier, 2008; Gronberg et al. 2015), and so can ease of voter monitoring (Grosskopf et al. 2001). Therefore, analysis includes a combination of five factors that might influence spending efficiency—the degree of educational competition in the metropolitan area or county; an indicator for whether or not the district is located in a metropolitan area that spans state lines (because the level of competition is imperfectly measured in those education markets using only Kansas data); the percentage of household that are owner-occupants, the percentage of the population with at least a bachelor's degree and the percentage of households wherein no residents are over 60 years of age. We note that the latter three variable were also treated as efficiency factors in Duncombe and Yinger (2005).[9] As is common in the literature, the degree of educational competition is measured with a Herfindahl index

[9] By assumption, the one-sided error term has a half-normal distribution. Jenson (2005) finds that specifying a half-normal distribution for the inefficiency term generates more reliable estimates of technical efficiency than other assumptions about the distribution of inefficiency.

of enrollment concentration. A detailed description of this measure, and how it was used in this analysis can be found in Appendix A.

Data Observed but Not Included

ACT College Readiness Assessment

Scores on the ACT college readiness assessment were considered as a possible student outcome measure. These scores are a reasonable proxy for college readiness, and thus may have served as an appropriate measure of student performance.

However, there was a concern among the study team, and evidence in the literature, that access to the ACT itself is not universal (citation). That in fact, scores may reflect the extent to which a student has access to the test rather than their performance due to this variation in access.

Advanced Placement Exam Results

Another measure of student performance considered were advanced placement (AP) exam results. However, it is even more likely that these results reflect access more than actual performance. Simply put, not all students even have access to the curriculum which would prepare them to take the test, let alone the ability to take the test through their school. For this reason, the study team decided not to include this measure.

Participation and Successful Completion of Post-secondary Degree and/or Certification

Postsecondary data was also made available at the district level including success rates and effective rates and their component parts. These data are aligned to the sixth and seventh Rose capacity and were thus considered as student outcome measures. However, ultimately these data could not be included for two reasons. First, during the initial years of data collection, data reported did not include students attending community colleges and thus under-reports those students that Kansas school districts successfully sent on to post-secondary pursuits. Second, the most current year of these data available, 2014-15, lags two school years behind 2016-17, the most current year available in other key data sources such as the enrollment data and assessment data. In order to conduct the analysis there needs to be parallel datasets (i.e., assessment scores and post-secondary rates in the same year). Moreover, the study team does not have a statistically reliable method to forecast these data two years forward (i.e. 2015-16 and 2016-17) that would have made it possible to include such data in the analysis.

Attendance Rate

Finally, the study team considered including attendance rates, as this is included in the state accountability system, and thus a relevant as a measure of school performance. However, as noted in Duncombe and Yinger (2005), attendance rate data have very little variation making it difficult to detect a relationship between these rates and school spending. Therefore, attendance rates were not included in the analysis.

Chapter 5: Education Cost Function Variables and Methods

This chapter reviews the results of the cost function analysis for Kansas that includes the coefficient estimates that inform the pupil weights and estimated, additional costs for Kansas to adequately fund its public education system.

Cost Function Estimates

Table 17 presents coefficient estimates and standard errors from the cost function analysis. As the table illustrates, the analysis finds a strong, positive relationship between educational outcomes and educational costs, once differences in scale, need and price are taken into account. Consider first the Conditional NCE scores. The estimation indicates that a one percentage point increase in academic performance is associated with a 5 percent increase in cost. Similarly, a one percentage point increase in the graduation rate is associated with an 1.2 percent increase in cost at lower grades and a 1.9 percent increase in cost at the high school level.

Table 14. Cost Model Coefficient Estimates

LABELS	Baseline
Normal Curve Equivalent	5.295*** (-0.607)
Graduation Rate	1.244*** (-0.262)
Graduation Rate * High School	0.696*** (-0.0995)
District Enrollment	-1.444*** (-0.0568)
District Enrollment squared	0.0991*** (-0.00378)
Salary index (log)	1.373*** (-0.279)
Rural indicator	0.0505*** (-0.0112)
% Economically Disadvantaged	0.886*** (-0.078)
% English Language Learner	0.226*** (-0.0667)
% Special Education	2.157*** (-0.226)
Population Density	0.166***

LABELS	Baseline
	(-0.018)
Elementary grades served	-0.129***
	(-0.016)
High school grades served	-0.508***
	(-0.0909)
% English Language Learner, sq	-0.623***
	(-0.109)
% Special Education, sq	-6.135***
	(-0.674)
Population density* Salary Index	-0.510***
	(-0.0414)
AYP Schoolyear = 2016	-0.0364***
	(-0.00591)
First stage Residuals, NCE	-5.102***
	(-0.609)
First stage residuals, Graduation	-1.454***
	(-0.271)
Herfindahl Index, log	0.797***
	(-0.249)
Border metro	2.320***
	(-0.372)
% Owner occupied	7.293***
	(-1.321)
% Over 60	-2.316
	(-1.496)
% College	-12.06***
	(-1.542)
Constant	9.644***
	(-0.357)
Usigma	-7.214***
	(-0.958)
Vsigma	-4.095***
	(-0.0418)
Observations	2,310

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

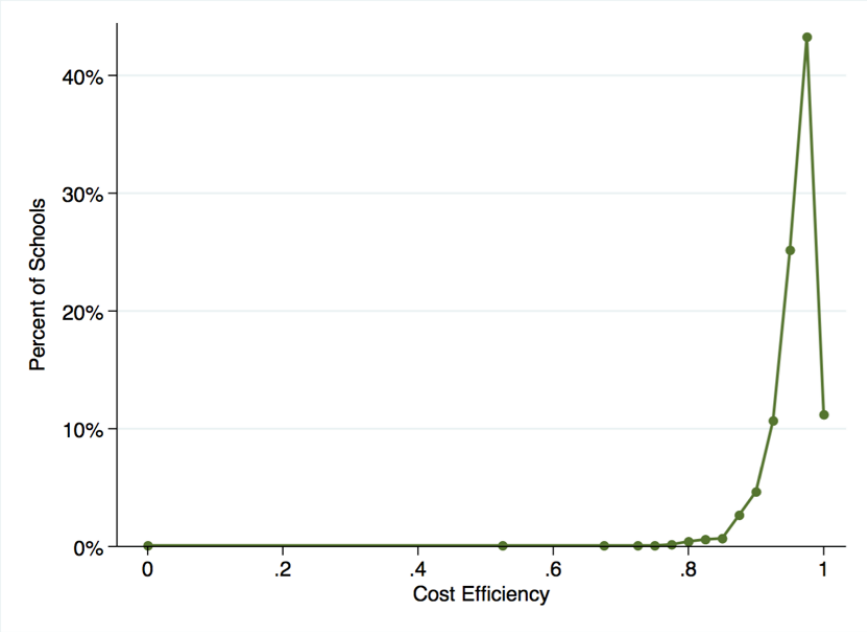
The remaining coeffiicents in the cost model align with reasonable expectations about the relationships among inputs, outcomes and environmental factors in education. Costs fall with district size, but only up to a point. Costs rise with district size for school districts with more than xx students. Costs rise as population density rises and as teacher salaries increase, but the interaction between wage levels and population density is negative, suggesting that the higher costs associated with sparsity trump the lower wage costs in sparsely populated areas. Rural schools have higher costs than otherwise equivalent

nonrural scools. Costs rise with student need, but the effects are generally non-linear, suggesting for example, that the additional cost associated with increasing the share of ELL students becomes smaller as the student population reaches a critical mass.[10]

Finding #1: Efficiency Results

An important part of this study was the estimation of cost efficiency, or inefficiency. Figure A8 graphs the distribution of cost efficiency for the baseline model.[11] In Model 1, the average cost efficiency score was 0.956, indicating that buildings were producing nearly 96% of their potential output, on average.

Figure 7. Distribution, cost efficiency for the cost model



Given that inefficiency in this context means unexplained expenditures, not necessarily waste, and that many buildings may have been producing outcomes that were not reflected in test scores, the average efficiency level was quite high. However, the minimum efficiency scores were below 50%, suggesting that some buildings spend much more than could be explained by measured outcomes, input prices or student need. The analysis demonstrates that enhancing school efficiency also enhance factors that enhance the ability of voters to monitor school and school district behavior. Inefficiency rises as the Herfindahl Index increases as the percent over 60+ college grads increase efficiency. The amount of unexplained spending

[10] Researchers examined a model in which the relationship between the percentage of free lunch students and cost was quadratic, but such a specification was rejected at any reasonable level of statistical significance. See Technical Appendix A.

[11] Cost efficiency was estimated following Battese and Coelli (1995).

rises as the percent owner occupied suggests that unexplained cost may represent unobservable outcomes.

Finding #2: Estimating the Base and Compensatory Cost Per Pupil

Using the coefficient estimates the study team can now predict the level of necessary spending for individual school district and the state overall will need to achieve the performance thresholds identified in Chapter 3 of this study. As a brief review, the table below recalls the performance thresholds across the ELA and math assessments as well as graduation rates for school districts under the "approaching on track for college readiness" and "on track for college readiness."

Table 15. Percentage of students meeting performance thresholds under two different scenarios

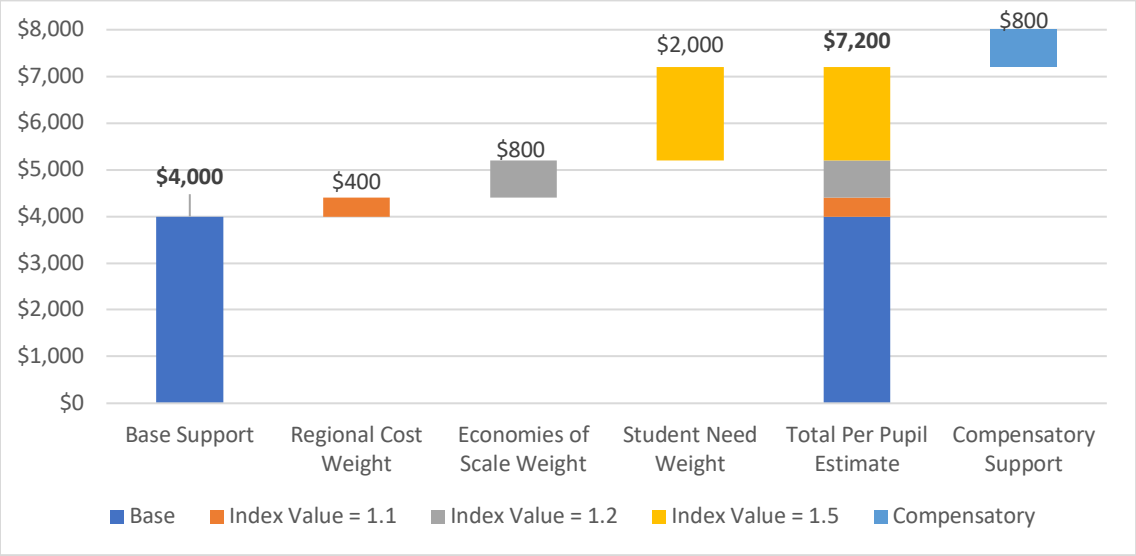
	ELA Assessment (Level 2+)	Math Assessment (Level 2+)	ELA Assessment (Level 3+)	Math Assessment (Level 3+)	Graduation Rate
Scenario A: Approaching on track	90%	90%			95%
Scenario B: On track			60%	60%	95%

Scenario A is approximately equivalent to the threshold of performance used in the former assessment under the No Child Left Behind (NCLB) law. Scenario B has re-benchmarked student readiness to identify those on-track for college and career readiness. This scenario reflects the updated Kansas standards and a more difficult performance threshold for students to achieve, hence the overall lower total percentage of students achieving that level or better. For further discussion of this rationale, see Chapter 3.

Estimated Cost to Reach Performance Thresholds

For each district in Kansas, the research team generated an estimate of the base costs associated with meeting the designated performance goals, plus appropriate adjustments for student demographics, regional differences in cost and economies of scale. The graphic below illustrates simply the cumulative nature of these calculations. For the purposes of this graph, the values listed below are for an example school district in Kansas.

Figure 8. Illustrative example to calculate cost estimates for maintenance funding



Attaining these thresholds of performance requires three initial calculations. The first calculation is generating a cost estimate for a Conditional NCE score of 0.50 (I.e. normal academic progress) and a graduation rate of 95% growth, assuming that the school had the least costly combination of regional cost, student demographics and scale. Consider this "base support" to ensure school districts and the students they serve continue to make progress year after year. This base support differs according to the grade configuration of the school, with the lowest base cost ($3,395) associated with elementary schools and the highest base cost ($4,500) associated with high schools. The estimated base cost for any given district is a pupil-weighted average of the base costs for the district's existing mix of school buildings.

The second calculation estimates the adjustments for demographics, regional costs and economies of scale. Each of these calculations yields an index describing the increasing cost associated with each of these cost factors.

The final calculation estimates the amount of necessary, additional resources for school districts and the state overall to close the gap between current and desired performance. Notably, this requires that school districts currently achieving at lower levels than others accelerate student growth at a faster pace (consider this "compensatory support"). Districts that are currently outperforming the thresholds and those growing faster than necessary to reach the targets within five years are held harmless in this calculation, so that the compensatory support estimate includes the funds required to at least maintain current levels of annual progress in all districts.

Finding #3: Student Need Weights

One of the advantages of the cost function method for costing out studies, as discussed earlier, is the ability to estimate the marginal costs (i.e., additional spending associated with factors such as student characteristics or school characteristics) for the school system. This can be particularly useful in the

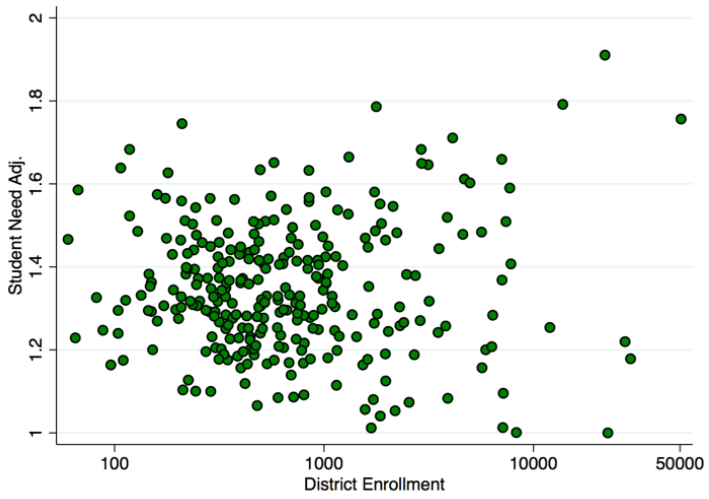
context of state funding formulas. Kansas, like many other states, assign funding that goes above and beyond the based spending to certain student groups either implicitly (e.g., double counting for more needy student populations or explicitly, creation of a categorical program which assigns a certain amount of funding directed to support a specific student population). In either case, Kansas has created a 'weight' or an additional amount of money that is directed to certain student populations. A simple illustration of this is, if the base allocation per pupil is $1,000 and the weight for a low-income student is 0.80 this would apply an additional 80% in allocation, or $1,800 for this student.

The utility to this study is that Kansas can compare its current allocation of resources to these other student populations in comparison to the estimated weights generated through the cost function. The cost function generates as one of its outputs coefficients. Coefficients are particularly useful in isolating variables and determining their impact on the dependent variable (spending) while holding all other factors constant. That is, the coefficients generated for student groups such as low-income, English learners, and students with disabilities are effectively the weights necessary to support those student groups to achieve the defined performance threshold. Kansas most recently modified their weights for several of these student need categories, including low-income students and English learner students.[ciii]

The student need weights are calculated using several steps. First, an estimated base cost for the general education student is selected as described in the table above. This estimated base cost is then multiplied by the aggregate weight for student need characteristics incorporating students that are low-income, English learners or special education. The weighting values range from 1.0 to 1.91 in which lower values represent an overall lower student need in that school district versus those with higher values reflect higher overall student need in the school district.

For each school district, the average student need weights vary dependent on the concentration of the student population served. The figure below illustrates this point where we see a much larger variation in the low-income weight as compared to the English learner or special education weight.

Figure 9. Distribution of student need weights by district enrollment



These student need weights are used in helping to generate the final cost estimates for Kansas by individually applying these weights to the base cost for each district multiplied by the number of students in each of those need categories.

The first of three student need weights are the most straight forward. The poverty weight is 0.89 which is a substantial increase from the current weight of 0.48. It is not quadradic in any way and increases with concentrations of poverty.

The second of three weights are for English learners. We can observe a substantial weight at the outset at 0.2 but will drop as the concentration of these students increases. This is logical because for those schools or school district with a small number of English learner students the associated cost is related as much to the cost as it is for economies of scale. The study team also identified that the weight for English learners is highly collinear with poverty. It is also worth noting that Duncombe & Yinger (2005) produced essentially a weighting of 0.00 for English learner students.

The third of three weights are for special education. In this case we see a negative weight. That is a decrease in cost associated with an increase in the proportion of the population at the school district. The study team believes the reason for this may be an interaction with interlocal special education co-operatives. That is, the model incorporates spending of special education but is unable to incorporate a substantial amount of resources made available to the interlocal thereby creating a potential effect of when school districts have larger proportions of special education students they access more interlocal services and those spending on behalf of those students were not captured in the analysis.

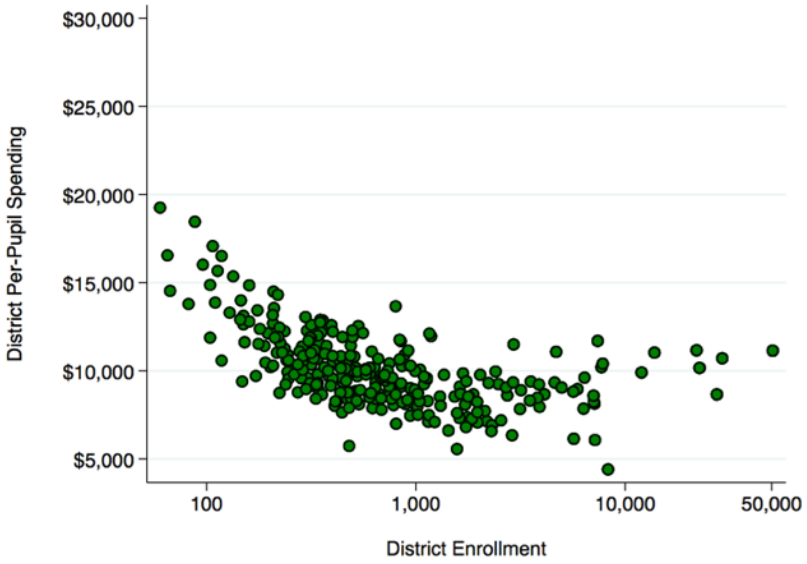
Finding #4: Regional Cost Index

Analysis from the study also showed the wide variation in prices associated with the cost of education. The factors that primarily drive this index include measures of sparsity such as population density and the rural indicator as well as the teacher cost index. As described in chapter 4 there are substantial differences in regional cost, some of which are quite significant over even a smaller geographic area. The regional cost index is composed of three variables which include the teacher salary index, and measures of sparsity including population density and the rural indicator. The index value, ranging from 1.05 to 1.94 identifies the amount that the base per pupil amount needs to be adjusted in order to account for the differences in prices and the costs associated with sparsity across communities in Kansas.

Finding #5: Economies of Scale Index

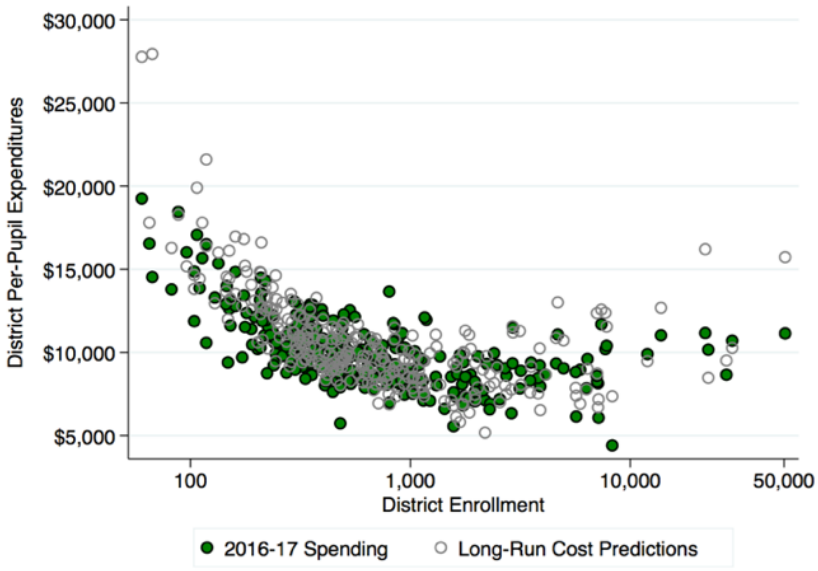
The impact of economies of scale is quite large on Kansas in large part due to the sparsity of its population across a larger geographic area compared to other states in the country. This implies that a larger amount of money is necessary for some schools and school districts at the tails of the distribution of enrollment. The figure below offers an example of this in which we can observe a U-shaped curve across the distribution implying much higher costs per pupil for smaller districts and a gradual increase as school district get significantly larger (i.e., larger than 10,000 students).

Figure 10. 2016-17 school district per pupil spending by enrollment



When comparing the actual 2016-17 spending per pupil as compared to the generated cost estimates we see a U-shape for the cost estimates the mimics a shape in which the tails of the U have a steeper slope than that of the actual 2016-17 spending. This can be observed in the figure below. This implies that the actual 2016-17 spending per pupil does not account as well for economies of scale as the generated cost estimates from this study.

Figure 11. 2016-17 school district per pupil spend by enrollment compared to cost estimates



The economies of scale index functions similarly to the previous index in how it is applied to adjust the base per pupil amount. Specifically, this index ranges from 1.0 to 2.75 and the index values recognize the higher or lower associated costs with the total overall enrollment of the school district.

The result is the total per pupil estimate to ensure maintenance of continuing to attain the thresholds of performance mentioned earlier in this section. In addition to these associated costs, the researchers also calculated the amount necessary to close the gaps on the ELA and math assessments in addition to maintaining one year's approximately growth, referred to as compensatory cost estimates. This amount is expressed as a per pupil allocation that would be added to the total per pupil estimate.

Based on data provided for this study, Kansas spent approximately $4.652 billion on its education system in the 2016-17 fiscal year serving 489,795 students (based upon headcount enrollment) or $9,313 in actual expenditures per student. The total spending figure was calculated according to the inclusion and exclusion criteria detailed in Appendix D. Of those students, the table below offers some descriptive statistics on the proportion of those students in various need categories.

Table 16. Kansas overall student and student need enrollment and percentages, 2016-17

	Enrollment Counts	Percentage of Total Enrollment
Total Enrollment	*489.795*	*n/a*
Low-income*	190.158	38.8%
English Learners	56.759	11.5%
Special Education	69.013	14.1%

* This count is reflective of the number of students eligible for free lunch under the National School Lunch Program.

Table 17. Overall investment for base and compensatory support under two scenarios

	Cost Estimate ($)	Percent Increase Over Current	Per Pupil Cost Estimate ($)
Current K-12 Spending	$4.652 billion	n/a	$9,313
No compensatory support	$5.103 billion	9.7%	$10,419
Compensatory support for Scenario A	$6.438 billion	38.4%	$13.144
Compensatory support for Scenario B	$6.719 billion	44.4%	$13,717

The cost estimates in the second column above are the investments each year, in total, for the K-12 education system for the next five years that would close the gap between current performance and the established thresholds of performance.

Finding #6: Phase-in funding increases over time with targets

The cost estimates noted above are also important to put in the context of how the education system is able to appropriately use those investments over time. That is, it is not practical to make a one-time, significant investment in a statewide public education system and expect at the end of that school year to see dramatic movement from current performance to the aspiration targets. Alternatively, making ongoing and incrementally larger investments in the system over time with established targets may be more practical for practitioners to plan and determine the appropriate ways to invest the funding.

One consideration is to consider these investments over a 5-year period of time.

Finding #7: Consider "how well" alongside "how much"

It is important to keep in mind that while adequate funding is necessary for achieving desired student outcomes, funding alone is not sufficient; the funds must also be put to effective use. After all, schools with similar student populations, receiving similar funding, can have vastly different student outcomes due to differences in local policies and practices (Williams, Kirst, Haertel, et al., 2005). Thus, if one fails to consider *how well* resources are used, then increasing *how much* resources are provided may have a limited effect on student outcomes.

As noted earlier in Chapter 2 there are various avenues in which a state education system and associated school district organizations can design, build and implement structures that encourage such investigations at the individual, team and even organization level. Yet, we must recognize that the complexity and scale increase exponentially moving along a continuum from an individual to an organization wide attempt to markedly improve 'how well' resources are being used to improve student outcomes.

This consideration is done in a manner that considers holistically the findings identified in this study that would bring together the additional, necessary resources along with the transformative structural changes in the school system that would allow for the most effective use of those additional dollars invested in public education.

Finding #8: Increase the transparency and availability of data

Kansas, among all states in the country, is recognized as a leading state in its data systems and availability as recognized by the Data Quality Campaign. And, the state can continue to improve and learn from how other states have continued to evolve educational data available to professionals and the general public at large. In particular, the availability of data can help to facilitate the investigation and improvement of the system on a wide variety of topics from increasing the efficiency of transportation routes to improving instruction in the classroom with a diverse group of learners.

The state hosts most of its publicly available data through a web portal named Data Central (http://datacentral.ksde.org). The portal offers a wide variety of reports and data including building report card information, school finance reports, educational directory reports, special education reports, and child nutrition information. Some of the data posted on the public portal is available in static formats such as Microsoft Word or PDF. Other datasets through the Kansas K-12 Reports offer more flexible datasets in formats such as Microsoft Excel that also draw from the entire school and school district population. And, some of the reports lack context necessary for education professionals or the general public to understand the context of the information or the source of information.

Data is a critical component to any improvement effort and provided with the right data to, at the least, ignite a conversation for change can be powerful. One example that Kansas may look to is Texas. The Texas Smart Schools project (http://txsmartschools.org) provides school and school district leaders the ability to benchmark themselves against similar matched peers that provide initial insight into how others are doing. Such a data system facilitates easier access to information that removes a significant barrier for practitioners to access information.

Finding #9: Pair support strategies with accountability measures

As discussed in Chapter 2, the state framework for increasing effective resource use relies on numerous tenants that are in tension with one another, e.g., accountability and support for example. To encourage districts to use resources efficiently – that is, cost-effectively – federal and state agencies have implemented a number of accountability systems over the decades. The concept of an accountability system still holds tremendous value, particularly in advancing educational equity. Both through rewards and sanctions and through the public reporting of school progress, accountability systems can be a powerful tool in focusing resource allocation toward improving outcomes for disadvantaged students. Furthermore, after years of practitioners' vocal dissatisfaction with previous accountability measures, the landscape of federal and many states' policy has been shifting toward more flexible accountability systems. For example, many states have reformed their accountability systems to measure success indicators beyond standardized test scores, such as graduation rates and other college and career

indicators, and to offer comprehensive support systems to low-performing schools, rather than merely rewards and sanctions (Center for American Progress and the Council of Chief State School Officers, 2014).

It is the consideration of these current shifts in the national landscape that afford a tremendous opportunity for Kansas to re-evaluate its orientation and function in relation to school districts. One potential point of leverage is the efficiency reviews authorized by the Legislature. The reports, comprehensive in their approach, develop a rich set of information that is valuable not only to the school district going through the review but also potential to other school districts based on what insights are surfaced. This value can be identified in a few key ways:

- The analytical and comparative techniques used by staff in the Legislative Post Audit have applicability in other environments and forums;
- The insights reached – although mostly oriented towards compliance with the law – surface matters of process, culture and performance important for any organization to consider; and
- The school district's response represents one way in which to engage in an exchange with an independent outside observer that may offer perspective valuable to the organization.

Further, that state may create an opportunity for support to the school district to either work with the state or their peers to identify pathways to implementing the recommendations outlined in the review. This is discussed in Chapter 2 with the development and implementation of networks. The orientation of the networks can shift around the topic, but their rigor and attentiveness to the learning of the professionals is paramount and can contribute to the school system experiencing even greater degree of effectiveness in the future.

Finding #10: Consider streamlining various funding programs

Kansas, like many other states, has developed school finance formulas over time in which elements have been added but not necessarily considered as a whole. Even as the school finance formula has been reformed throughout the school finance litigation history in Kansas, there remain numerous and complicated calculations to generate the funding amount for school districts. Two observations underlie this point. First, in calculating the amount of state aid, there exist at least fifteen enrollment and weighting categories. Second, there exist over thirty different funds – each with their own governing rules and regulations for how to spend those dollars. While the intention in developing any one of these programs was positive, seeking to best serve the purpose or students it aimed to impact, the cumulative effect for the school systems that have to manage these various funding streams is difficult.

Further, the ability to engage in effective and productive decision-making is limited by the boundaries that outline these various programs. This may prevent more thoughtful consideration of how resources can be used in combination and coordination with one another to target and positively impact the most vulnerable and underserved student populations. As was discussed in Chapter 2, effective decision-making is a skill that can be developed, and which strongly benefits from utilizing proven strategies. While

several of these strategies were discussed in earlier findings, the non-linear nature of the Kansas school finance formula can create a barrier for education professionals and the general public to understand the motivation and intent of the state and where it places its priorities for the public education system.

Technical Appendix A: Cost Model Methodology

This analysis follows Taylor et al. (2017) and uses stochastic frontier analysis (SFA) to estimate an educational cost function for Kansas. A cost function — a cost frontier — specifies the minimum cost necessary to achieve certain outcomes with specified inputs and specified environmental factors. A standard empirical cost function can be written as:

$$C = C(Z \mid \beta) \cdot e\exp(\varepsilon) \quad (1)$$

where C is cost, $C(Z \mid \beta)$ is the cost function or cost frontier, $Z = \{w_1, \dots, w_k;\ z_1, \dots, z_m; y\}$ is a vector of variables affecting the frontier level of cost, where, w_l are input prices, z_j are quasi-fixed inputs including environmental factors, y is a vector of outcomes, β is the cost parameter vector to be estimated, and ε is a random noise component representing exogenous random shocks (e.g., a rainy testing day). The error term, ε, indicates random deviations from the cost frontier due to measurement error and unforeseen random changes in cost due to factors not modeled in the cost function, $C(Z \mid \beta)$.

In the stochastic frontier approach, the cost function in (1) is regarded as a frontier, a minimum cost of attaining given outputs with given inputs including environmental factors. Spending may then deviate from this cost frontier, exceeding the minimum cost specified in the cost frontier. Thus the stochastic frontier approach starts with (1) and adds the assumption that spending exceeds the cost frontier due to random errors or inefficiency. The stochastic frontier approach basically takes equation (1) and assumes that the random error, ε, consists of two parts, a standard two-sided random error that can be positive or negative and on average is zero, and a one-sided error that is always positive (or at least not negative). The one-sided error captures the idea that schools or districts can at best be on the cost frontier, if they are fully efficient, and if they are inefficient this is captured or modelled by the one-sided error. The larger the one-sided error, the further a school/district is from the frontier, and hence the more inefficient it is.

To model this, equation (1) is altered to specify the error term, ε, as consisting of two components, *v* plus *u*. The two-sided error is *v*, and the one-sided error is *u*. Because inefficiency increases cost above the frontier (i.e., above the minimum possible cost), $u_i \geq 0$, where i is the specific decision-making unit.

The stochastic frontier cost function is given as:

$$E = C(Z \mid \beta) \cdot \exp(v + u), \quad (2)$$

where E is actual or observed spending and $C(Z \mid \beta)$ is the cost frontier as described above. Here v is a random noise component representing an exogenous random shock (e.g., a rainy testing day) and u is a one-sided error term that captures cost inefficiency. Cost efficiency defined as $CE_i = \exp(-u_i) \leq 1$.

The per-pupil stochastic frontier model is more commonly estimated in education than a total cost function (e.g., Andrews, Duncombe and Yinger, 2002 or Gronberg, Jansen, Karakaplan and Taylor 2015). It can be expressed as:

$$E^* \equiv \frac{E}{N} = \frac{C(w_1, \ldots, w_k;\ z_1, \ldots, z_m;\ S, N \mid \beta) \cdot \exp(v+u)}{N} \quad (3)$$

Taking natural logarithms of equation (3) gives

$$\ln E^* = \ln C(\cdot) - \ln N + v + u \quad (4)$$

The cost frontier estimates indicate the cost of achieving certain educational outcomes after controlling for cost and other environmental factors. The educational outcomes include a quantity dimension—the number of students served—and a quality dimension. The quality dimensions considered here are conditional normal curve equivalent scores (a measure of growth) and graduation rates.

An important feature of the decision-making environment facing school officials is the competitiveness of the district's relevant education market. Indeed, the literature finds that competition is one factor that can influence a school district's cost inefficiency.[12] The argument is that competition serves to discipline the tendency of districts to engage in excessive spending. This implies a negative relationship between the competitiveness of a district's education market and the magnitude of that district's cost inefficiency.

The literature also suggests that voter monitoring can lead to increased school district efficiency (Grosskopf et al. 2001). Factors that influence the motivation or ability of citizens to monitor their local school district—such as the educational attainment of the population, the share of homeowners or the fraction of the population that is elderly—have also been linked to school district efficiency (Duncombe and Yinger 2005).

The stochastic cost frontier framework can accommodate models of how factors impact the one-sided error term (u). In particular, suppose that

$$u = u(x, \delta), with\ u \geq 0 \quad (5)$$

where x includes factors impacting inefficiency, such as a measure of competition, and δ is a parameter vector. Substituting (5) into the per pupil expenditure equation (4) yields

$$\ln E^* = \ln C(\cdot) - \ln N + v + u(x, \delta) \quad (6)$$

Endogeneity Concerns

Because school quality is frequently thought of as a choice variable for school district administrators, the possible endogeneity, or correlation between explanatory variables and errors terms, of school quality

[12] For example, see Belfield & Levin (2002); Dee (1998); Gronberg et al. (2015); Gronberg, Jansen, Taylor & Karakaplan (2010); Grosskopf, Hayes, Taylor & Weber (2001); Kang & Greene (2002); or Millimet & Collier (2008).

indicators is a common concern for researchers estimating educational cost functions. (For example, see the discussion in Duncombe & Yinger (2005, 2011); Imazeki & Reschovsky (2004); or Gronberg et al. (2011a).) This analysis follows Gronberg et al. (2015) and Gronberg, Jansen and Taylor (2017) by adopting a control function approach to the potential endogeneity of the outcome measures.

Data

The data for this analysis come from administrative files and public records of the Kansas State Department of Education (KSDE), the National Center for Education Statistics (NCES), the U.S. Bureau of Labor Statistics (BLS), the U.S. Department of Housing and Urban Development (HUD) and the U.S Census Bureau. The analysis covers the two-year period from 2015–16 through 2016–17.

The unit of analysis is the traditional public school building. Alternative schools, charter schools, virtual schools and special schools have been excluded because they may have different cost structures than other buildings. Buildings that lack reliable data on student performance (such as elementary schools that serve no students in tested grades, or very small schools) have also been excluded.

Table 19 provides means and standard deviations for the variables use in this analysis. Enrollment, the teacher salary index, and population density enter the stochastic frontier regression in logs, while variables already in percentages and the indicator variables are not logged before entering the stochastic frontier regression.

Table 18. Descriptive statistics for buildings in Kansas, 2015-16 and 2016-17

	Mean	Std. Dev.	Minimum	Maximum
Per-pupil operating expenditure	$9,696	$1,961	$5,137	$20,844
Average Conditional NCE	0.50	0.05	0.30	0.76
Graduation rate	0.89	0.07	0.60	1.00
Teacher salary index	1.41	0.11	1.00	1.59
Rural county indicator	0.27	0.45	0.00	1.00
District enrollment	7.70	1.58	4.26	9.90
% Economically disadvantaged	0.41	0.21	0.00	0.96
% English Language Learners	0.10	0.16	0.00	0.82
% Special education	0.15	0.06	0.00	0.63
Elementary grade indicator	0.75	0.44	0.00	1.00
High school grade indicator	0.26	0.44	0.00	1.00
Herfindahl Index	0.38	0.25	0.13	1.00
Share of spending unallocated	0.34	0.09	0.00	0.91
Potential employers in building zip code	327	388	0.00	1,646
County unemployment rate	4.26	0.97	2.00	7.50

Note: Virtual schools, alternative schools, charter schools, and special schools have been excluded, as have all buildings with fewer than 10 students for whom conditional normal curve equivalent (NCE) scores could not be calculated.

The Dependent Variable

For each district, the researchers identified total operating expenditures for food, student transportation and all other operating functions. As described in Appendix C, operating expenditures include the day-to-day expenses of school districts, such as salaries, benefits, purchased services and supplies and materials. Debt service, construction expenditures and fund transfers are not considered operating expenditures. In turn, the category of all other operating functions includes the normal functions of school districts: instruction, student support services, administration, and the operation and maintenance of the district's facilities.

A complicating factor is that Kansas school districts regularly rely on special education co-operatives or inter-local agreements to provide special education services. With a special education co-operative, one district collects contributions from the other members of the co-operative, and hires teachers or purchases supplies on their collective behalf. To account for those expenditures, the researchers used the Kansas Education Directory to identify the members of each co-operative, and shared out the spending of each cooperative (i.e. the spending from fund 78) to the member districts according to each district's share of the special education students served by the co-operative. Payments to the inter-local (from funds 564 and 565) were the best available measure of spending by the members of an interlocal. However, we note that interlocals can also receive revenues from other sources (such as the federal government) that cannot be accounted for with the available data.

The following algorithm was used to calculate building-level expenditures for any given academic year:[13]

- Calculate total district expenditures using the certified personnel files, identify the buildings to which each educator was assigned, and attribute that educator's salary to that building. If educators were assigned to multiple buildings, share their salaries out across their assignments according to the shares of total FTE. Thus, if an educator worked 80% of an FTE in building A and 20% of an FTE in building B, then 80% of their salary would be assigned to building A and 20% of their salary would be assigned to building B.
- Cumulate the salaries for each building.
- Calculate total payroll (salaries and benefits) for each building by adjusting the building-level salaries by the district-specific benefits ratio. In other words, if the benefits paid by district A were 25% of salary, then adjust upward by 25% the building-level salaries in for all buildings in district A.
- Assign the remaining payroll expenditures for the district to the building on a per-pupil basis.
- Assign all non-payroll expenditures –excepting special education funds—for the district to the building on a per-pupil basis.
- Assigning all non-payroll special education expenditures for the districts to the building on a per-special education-student basis.

[13] Gronberg, Jansen & Taylor (2012) and Grosskopf, Hayes, Taylor & Weber (2013) used a similar approach.

Outputs

As noted above, the analysis uses two measures of quality — levels and growth. The levels measure is the ultimate, summative evaluation of high school achievement — graduation rates. We were provided with school-level graduation rates which represent the percentage of each longitudinal cohort that graduated within four years. We also received the variables used to calculate these rates including total number of graduates and the total number of students in the four-year cohort. To calculate district-level graduation rates, we divided the sum of total graduates in a given year and district by the sum of students in the corresponding cohort. As described in Chapter 4, schools with suppressed counts of graduates (i.e. less than 10) were filled in with imputed values. Our approach to imputing values for these suppressed schools was conducted in three steps.

- First, for those districts with suppressed data for some schools and not others, a weighted average district graduation rate weighted on the number of students in the graduation cohort was imputed as that district's graduation rate.
- Second, for a separate subset of districts, some schools had partial graduation data. Specifically, the total number of students in the graduation cohort was available but the number of graduates was not. In these cases, a weighted average school graduation rate across available years was calculated (weighted on the cohort total) and this average was used to estimate the number of graduates in schools missing this information and fill in the school-level graduation rate. The district graduation rate was then re-calculated for districts with these schools using the imputed data.
- Finally, district graduation rates were imputed as school graduation rates for those schools still missing this information.

The growth measure is a normalized gain score indicator of student performance on the Kansas Assessment Program (KAP) summative evaluations in reading and mathematics in grades 3–8. Although schools clearly produce unmeasured outcomes that may be uncorrelated with mathematics and reading test scores, and standardized tests may not measure the acquisition of all important higher-order skills, these are performance measures for which districts are held accountable by the state, and the most common measures of school district output in the literature (e.g., Gronberg, Jansen & Taylor, 2011a, 2011b, 2017 or Imazeki & Reschovsky, 2006). Therefore, they are reasonable output measures for cost analysis.

KAP scores can be difficult to compare across years, grade levels and test subjects. Therefore, this analysis relies on normalized (or equivalently, standardized) test scores. The normalization follows Reback (2008) and yields gain score measures of student performance that are not biased by typical patterns of reversion to the mean.[14]

[14] All students in the state, not just those in CBSAs were included in the calculation of standardized scores.

The calculation of normalized gain scores proceeds in three steps. First, transform the scores of individual students into conditional z-scores. Denote the test scores for student (i), grade (g), and time or year (t), as S_{igt}, and measure each student's performance relative to others with same prior score in the subject as:

$$Y_{igt} = \frac{S_{igt} - E(S_{igt}|S_{i,g-1,t-1})}{[E(S_{igt}^2|S_{i,g-1,t-1}) - E((S_{igt}|S_{i,g-1,t-1})^2]^{.5}} \quad (10)$$

For example, consider all Grade 6 students who had a score of 300 on the prior year's Grade 5 KAP in Mathematics. For this subgroup of students with a Grade 5 score of 300, calculate the mean and standard deviations of the Grade 6 scores for KAP Mathematics. The mean is the expected score in Grade 6 ($E(S_{igt}|S_{i,g-1,t-1})$) for someone with a Grade 5 score of 300; the standard deviation is the denominator in equation (10). Thus, the variable Y_{ijgt} measures individual deviations from the expected score, adjusted for the variance in those expected scores. This is a type of z-score. Transforming individual KAP scores into z-scores in this way allows researchers to aggregate across different grade levels and test subjects despite the differences in the content or scaling of the various tests.

Second, calculate the average conditional z-score (i.e., the average Yigt) across all required mathematics and reading tests for all of the students attending each school.[15] An average conditional z-score of 1 indicates that, on average, the students at Little Elementary scored one standard deviation above the expected score for students with their prior test performance. An average conditional z-score of -1 indicates that, on average, the students scored one standard deviation below expectations.

Finally, for ease of interpretation, transform the z-scores into conditional normal curve equivalent (NCE) scores. NCE scores (defined as 50+21.06*z) are a monotonic transformation of z-scores that are commonly used in the education literature and can be interpreted as percentile ranks.[16] A Conditional NCE score of 50 indicates that (on average) the students performed exactly as expected given their prior test performance; and a Conditional NCE score of 90 indicates that (on average) they performed as well or better than 90% of their peers.

For estimation purposes, the Conditional NCE scores are expressed as percentages. As Table 1 documents, the building-level average Conditional NCE score had a mean of 0.50 with a minimum of 0.30 and a maximum of 0.76.

Input Prices

The most important education inputs are teachers, and the cost function model includes the required teacher wage variable. Public schools take differing approaches to hiring teachers. If there were a teacher

[15] Only students in the accountability subset (i.e., students who attended the same building in the fall of the academic year as they did in the spring) are included in the building average.

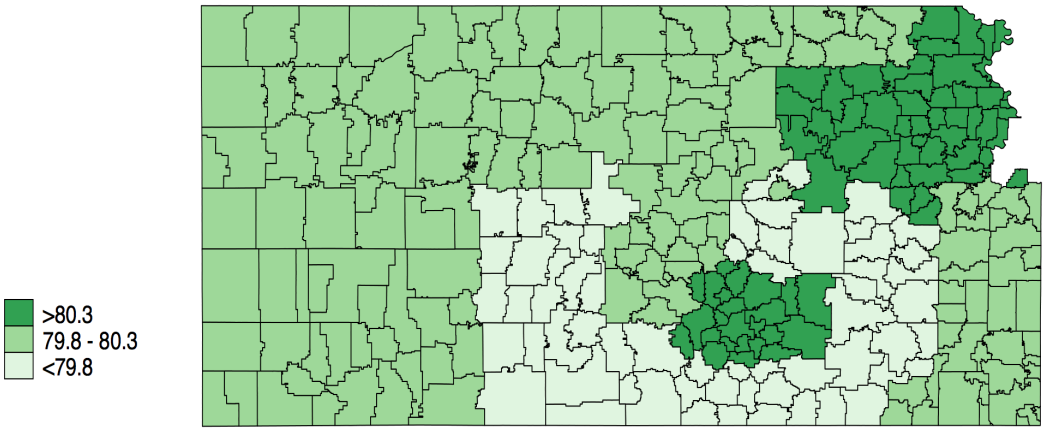
[16] Technically, this interpretation only holds if the scores are normally distributed. Given the large number of students tested each year in Kansas, normality is a reasonable assumption.

type hired by all unified school districts — for example, a teacher with a bachelor's degree from a selective university and two years of experience — then arguably the model should use the wages paid to those teachers as the labor price measures. However, it is not possible to identify a teacher type that is hired by all the school districts under analysis, and any observed average wage — such as the average salary for beginning teachers — reflects school and district choices about the mix of teachers to hire and the salaries offered to teachers in the hiring process.

This issue can be dealt with using a wage index that is independent of school and district choices. Such an index is constructed here by estimating a hedonic wage model for teacher salaries and using that model to predict the wages each school would have to pay to hire a teacher with constant characteristics (see Appendix B). The resulting teacher price index, which reflects the systematic variation in teacher salary that is related to cost factors outside of school district control, ranges from 1.00 to 1.59 and indicates that the cost of hiring teachers is more than 50% higher in some of parts of Kansas than it is in others.

The study team considered using a comparable wage index (CWI) to measure regional variation in labor cost. This approach uses comparable non-teacher salaries under the assumption that if these salaries are higher in a given region the salaries of teachers must also be higher. The main advantage of using this approach over a hedonic model is that it does not rely on the researcher to identify controllable and uncontrollable factors in the price to hire teachers. Simply put, districts cannot control the locally prevailing wage for college graduates. This approach is also used in the education finance context, and examples of it in practice may be found in Florida, Massachusetts, Missouri, New Jersey, New York, and Virginia (Taylor 2011a). Unfortunately, the best available data on non-educator wages and salaries — the American Community Survey — lacks the level of geographic detail needed. However, one of the most well-known comparable wage indices is the Comparable Wage Index (CWI) created by the National Center for Education Statistics (NCES).

Figure 12. Map of Kansas CWI from 2016

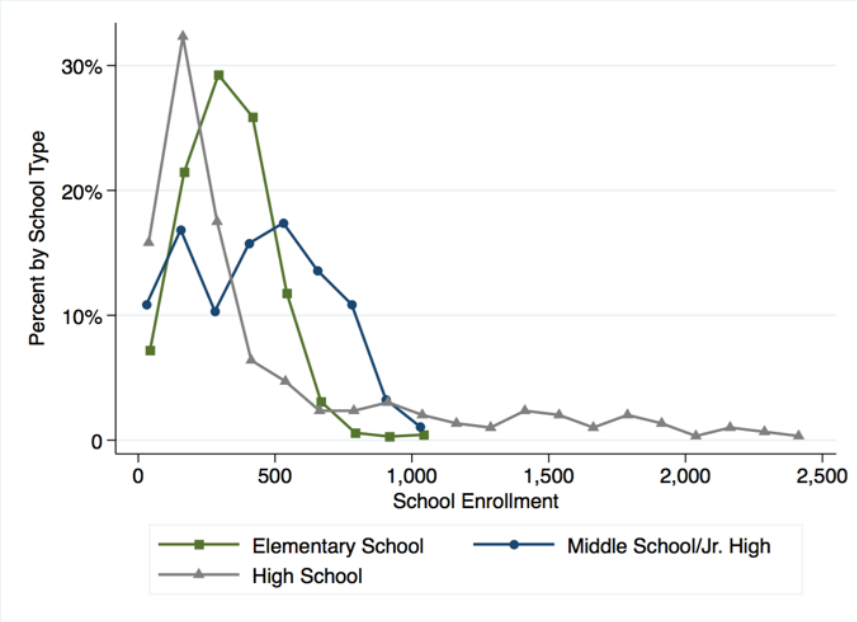


Other Environmental Factors

The model includes indicators for a variety of environmental factors that influence district cost but which are not purchased inputs. A major environmental factor in this study is district enrollment. In the estimation sample district enrollment averaged 8,697 students, with a minimum of 60 and a maximum of 50,988.

The figure below displays the distribution of school enrollment in 2016-17 by school type. As illustrated school enrollment in 2016-17 ranged from 30 students to 2,487, with an average of 308 and a standard deviation of 319.6. This reflects the fact that the distribution is asymmetrical, with the majority of schools clustered around the mean at the low end of the range. Only a few very large schools were one standard deviation above the mean or more. School size varied slightly by school type, with elementary schools smallest on average, followed by middle schools, and then high schools. For example, the largest four schools are all high schools and well above the average size including Andover eCademy at 3,005, Olathe North Sr. High School at 2,487, East High School in Wichita at 2,263, and Olathe Northwest High School at 2,258.

Figure 13. School enrollment for standard buildings in traditional school districts, 2016-17



Another key environmental factor is population density (which we measure as the population per square mile). School buildings are likely to be smaller (all else equal) in districts with larger geographic footprints, where the time costs of transporting students to scale-efficient buildings could be prohibitive. Therefore, the geographic size of the district is a credible instrument for building size.

To capture variations in costs that derive from variations in student needs, the cost function includes the percentages of students in each district who were identified as English Language Learners, special education, and economically disadvantaged.

The measure used to identify economically disadvantaged students was the percentage of students eligible for free or reduced-price lunch. This is based on eligibility for the National School Lunch Program administered by the U.S. Department of Agriculture which provides students from poor families free or reduced price school lunches. Eligibility for free lunches is determined by a student's family income and size, though students may be "categorically eligible" if enrolled in other federal assistance programs.[17] This alternative was considered primarily because there is a stronger reliance in the literature on free and reduced-price lunch eligibility. However, percent eligible for free lunch alone was ultimately determined to be a more relevant measure in Kansas (National Center for Education Statistics, 2018). This is because it is used to allocate funding for at-risk students in the general aid formula (Kansas State Department of Education, 2017).

In Kansas, English language learners are identified in Kansas through a three-step process. First, the student's Home Language Survey must indicate a language other than English. Any student for whom this is the case must then be assessed on a state-approved English-language proficiency assessment. If a student is found to be limited in any domain of English proficiency will receive English for Speakers of Other Languages (ESOL) services and is identified as an English Language Learner.[18]

Data on special education students include students who have been identified as "exceptional children" through a two-pronged eligibility determination. Specifically, in Kansas a student must meet the definition of one of the categories of exceptionality, and in need of special education and related services as a result of that exceptionality.[19]

As with the graduation data, the available demographic data were suppressed for counts of fewer than 10 students resulting in an incomplete data set. To address this issue we imputed the median value within the range of possible values for each of the suppressed observations (i.e. 5). Other approaches were considered, including the approach taken to impute graduation rates. However, since student demographics are less stable over time than graduation rates, the research team decided against using an approach that assumes an average over time is an effective estimate for any particular year. Ultimately, there are no perfect options, but the chosen method has the benefit of balancing the potential measurement error at +/-4 students, as well as being more simple to understand, and thus more transparent.

[17] More information on this program and eligibility requirements can be accessed here: https://fns-prod.azureedge.net/sites/default/files/cn/NSLPFactSheet.pdf.

[18] More information on the identification of English Language Learners can be found at http://www.ksde.org/Portals/0/Title/ESOL/ESOLProgramGuidance.pdf.

[19] More information on this eligibility determination can be found at http://www.ksde.org/Portals/0/SES/misc/iep/EligibilityIndicators.pdf.

Finally, to allow for the possibility that the education technology differs according to the grade level of the school, the cost model includes indicators for whether or not the school serves elementary grades (i.e., grades PK-6), and whether or not the school serves high school grades (i.e. grades 9-12). Fixed effects for year control for inflation and other time trends in Kansas education.

Efficiency Factors

The error terms for all frontier specifications depend on a number of factors that theory suggests may explain differences in school efficiency. Prior research has demonstrated that competition can reduce inefficiency in public education (e.g., Belfield & Levin, 2002; Millimet & Collier, 2008; Gronberg et al. 2015), and so can ease of voter monitoring (Grosskopf et al. 2001). Therefore, the one-sided variance function is modeled as a linear combination of five variables—the degree of educational competition in the metropolitan area or county; an indicator for whether or not the district is located in a metropolitan area that spans state lines (because the level of competition is imperfectly measured in those education markets using only Kansas data); the percentage of household that are owner-occupants, the percentage of the population with at least a bachelor's degree and the percentage of households wherein no residents are over 60 years of age. We note that the latter three variable were also treated as efficiency factors in Duncombe and Yinger (2005).[20]

As is common in the literature, the degree of educational competition is measured with a Herfindahl index of enrollment concentration. A Herfindahl index (which is defined as the sum of the squared enrollment shares) increases as the level of enrollment concentration increases. A Herfindahl index of 1.00 indicates a metropolitan or micropolitan area with a single local education agency (LEA); a Herfindahl index of 0.10 indicates a metropolitan or micropolitan area with 10 LEAs of equal size. Table A1 reports the mean value for the Herfindahl index in the sample is .38, with a minimum value of .13 and a maximum of 1, indicating that some counties in Kansas are served by a single unified school district.

Heteroskedasticity in the two-sided error may also arise. To capture such a possibility, the two-sided variance is modeled as a function of the share of building expenditures that was not specifically allocated to the building by the expenditures file. This variable has been included because measurement error in the dependent variable (a common source of heteroskedasticity) is likely to be a function of the extent to which the dependent variable was imputed.

Instrumental Variables

The key to implementing the control function corrections is the identification of viable instruments for school quality. Human capital theory suggests that local labor market conditions can influence the

[20] By assumption, the one-sided error term has a half-normal distribution. Jenson (2005) finds that specifying a half-normal distribution for the inefficiency term generates more reliable estimates of technical efficiency than other assumptions about the distribution of inefficiency.

demand for educational quality and the opportunity cost of staying in school so, as in Gronberg, Jansen and Taylor (2015) and Taylor, Gronberg and Jansen (2017), this analysis uses labor market conditions in the vicinity of the building as instruments for the Conditional NCE scores and graduation rates. The indicators of labor market conditions—the number of employers in the building zip code, the unemployment rate in the county-- and the number of those employers that are restaurants—reflect industrialization and the availability of the types of jobs most commonly held by teenagers and comes from the ZIP Business Patterns produced by the Census Bureau. The set of instrumental variables also includes a measure of the likely demand for educational services in the community—the ratio of students to working age adults.

Results

Table 17 describes the first-stage independent variable coefficient estimates along with their standard errors. Results for both of the student outcome measures – growth scores and graduation rates – suggest robust results. More specifically, changes in NCE showed to be associated with changes in district enrollment, the percentage of the population that is low-income, and for elementary grades served. For graduation rates we can observe that changes in the rate are associated with changes in district enrollment as well but also the salary index, rural indicator, student demographic characteristics and various other explanatory variables. Crucially, the instrumental variables are well correlated with the outcome measures. The first stage F-statistics are 12.25 and 38.55 for the Conditional NCE and graduation rate, respectively.

Table 19. First-Stage IV Coefficient Estimates

LABELS	NCE	Graduation Rate
District Enrollment	0.0380**	0.0649***
	(-0.016)	(-0.023)
District Enrollment squared	-0.0023**	-0.0054***
	(-0.001)	(-0.002)
Salary index (log)	-0.0275	0.137
	(-0.087)	(-0.101)
Rural indicator	-0.0053	0.0109***
	(-0.003)	(-0.004)
% Economically Disadvantaged	-0.0888***	-0.1874***
	(-0.019)	(-0.026)
% English Learners	-0.0006	-0.1101***
	(-0.023)	(-0.026)
% Special Ed.	-0.1039	-0.2162**
	(-0.072)	(-0.093)
Population density	-0.005	-0.0105
	(-0.005)	(-0.007)
Elementary grades served	0.0155***	-0.0051

	(-0.004)	(-0.007)
High school grades served	-0.004 (-0.004)	-0.0133* (-0.007)
% Economically Disadvantaged, squared	0.0111 (-0.021)	0.0386 (-0.026)
% English Learners, squared	-0.002 (-0.034)	0.2132*** (-0.036)
% Special Ed., squared	0.3860** (-0.191)	0.6742*** (-0.253)
Population density* Salary Index	0.0158 (-0.013)	0.0457*** (-0.015)
AYP Schoolyear = 2017	-0.0005 (-0.002)	-0.0035 (-0.002)
Enrollment per estimated adult	-0.0784*** (-0.016)	0.1111*** (-0.02)
Zip Total Establishments	-0.0031** (-0.001)	-0.0093*** (-0.002)
County annual avg. unemployment rate	0.4207*** (-0.059)	0.8054*** (-0.082)
Constant	-0.0784*** (-0.016)	0.1111*** (-0.02)
Observations	2,310	2,310
Adjusted R-squared	0.18	0.466

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14 presents two versions of the cost function coefficients. The first model is the preferred specification; the second is presented to demonstrate that certain modeling decisions are not driving the results. As the second column illustrates, top-coding district enrollment and excluding the quadratic term for percent economically disadvantaged are both clearly appropriate.

Table 20. Cost Model Coefficient Estimates

LABELS	Baseline	Alternative Model
Normal Curve Equivalent	5.295*** (-0.607)	5.287*** (-0.629)
Graduation Rate	1.244*** (-0.262)	1.271*** (-0.26)
Graduation Rate * High School	0.696*** (-0.0995)	0.682*** (-0.0999)

LABELS	Baseline	Alternative Model
District Enrollment	-1.444*** (-0.0568)	-1.454*** (-0.0588)
District Enrollment squared	0.0991*** (-0.00378)	0.0998*** (-0.00396)
Salary index (log)	1.373*** (-0.279)	1.369*** (-0.276)
Rural indicator	0.0505*** (-0.0112)	0.0507*** (-0.0112)
% Economically Disadvantaged	0.886*** (-0.078)	0.901*** (-0.105)
% English Language Learner	0.226*** (-0.0667)	0.225*** (-0.0656)
% Special Education	2.157*** (-0.226)	2.146*** (-0.229)
Population Density	0.166*** (-0.018)	0.167*** (-0.0181)
Elementary grades served	-0.129*** (-0.016)	-0.129*** (-0.0161)
High school grades served	-0.508*** (-0.0909)	-0.496*** (-0.0914)
% Economically Disadvantaged, sq		-0.0131 (-0.0627)
% English Language Learner, sq	-0.623*** (-0.109)	-0.619*** (-0.108)
% Special Education, sq	-6.135*** (-0.674)	-6.136*** (-0.684)
Population density* Salary Index	-0.510*** (-0.0414)	-0.515*** (-0.0416)
District Enrollment* Big District Indicator		-0.000512 (-0.0016)
AYP Schoolyear = 2016	-0.0364*** (-0.00591)	-0.0366*** (-0.00591)
First stage Residuals, NCE	-5.102*** (-0.609)	-5.099*** (-0.63)
First stage residuals, Graduation	-1.454*** (-0.271)	-1.477*** (-0.268)
Herfindahl Index, log	0.797*** (-0.249)	0.748*** (-0.249)
Border metro	2.320*** (-0.372)	2.281*** (-0.368)
% Owner occupied	7.293*** (-1.321)	7.556*** (-1.323)

LABELS	Baseline	Alternative Model
% Over 60	-2.316 (-1.496)	-1.963 (-1.473)
% College	-12.06*** (-1.542)	-11.65*** (-1.531)
Constant	9.644*** (-0.357)	9.654*** (-0.398)
Usigma	-7.214*** (-0.958)	-7.667*** (-0.991)
Vsigma	-4.095*** (-0.0418)	-4.105*** (-0.0437)
Observations	2,310	2,310

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Adequacy calculations

One calculates the costs associated with various performance standards by using the coefficient estimates in the above table to predict the excpenditures associated with the designated performance metrics and the observed characteritics of districts. Such calculations are very straightforward with respect to the Conditional NCE and the graduation rate. To calculate the expected cost of increasing the graduation rate to 95%, one replaces the observed graduation rate with 95% and generates the model predictions.

It is a bit trickier to go from Conditional NCE scores—a measure of growth – to performance levels consistent with the Rose Standards. As discussed above, one could interpret the Rose Standards as requiring 90% of the students to score at level 2 or above on the KAP, or one could interpret the Rose Standards as requiring 60% of the students to score at level 3 or above. In neither case can one simply forecast the cost associated with a common Conditional NCE score. After all, if everyone grows at the same rate, existing performance gaps will never close.

If a student is lagging her peers in reading, she needs to grow faster than they do to close the gaps. Therefore, the research team calculated the number of standard deviations of growth required for each student to achieve the cut scores for level 2 and level 3 on the KAP. Then, assuming that all of the students in a district would experience the same number of standard deviations of growth, they calculated the district growth rate that would lead 90% of the students to meet the cut scores for level 2 and the district growth rate that would lead 60% of the students to meet the cut scores for level 3. The cost projections for closing the gaps are based on these estimates. In other words, the researchers estimated the cost associated with each district posting the amount of growth necessary to have a reasonable expectation that the designated percentage of students will make enough progress to meet the appropriate cut scores.

Technical Appendix B: Estimating the Teacher Salary Index

For more than 30 years, economists have used hedonic wage models and regression analysis to explain why labor costs differ from one school district to another. Those analyses suggest that differences in average teacher salaries can be explained by differences in teacher characteristics (such as their educational attainment and years of experience), job characteristics (such as the characteristics of the students being served), and locational characteristics (such as the local cost of living).[21]

The hedonic wage model used in this analysis, which updates the hedonic wage model used in Taylor et al (2014), describes wages as a function of labor market characteristics, job characteristics, observable teacher characteristics, and unobservable teacher characteristics. Formally, the model can be expressed as:

$$ln\,(W_{idjt}) = D_{dt}\beta + T_{it}\delta + M_{jt} + \varepsilon_{idjt} \qquad (1)$$

where the subscripts i,d,j and t stand for individuals, districts, labor markets and time, respectively, W_{idjt} is the teacher's full-time-equivalent monthly salary, D_{dt} is a vector of job characteristics that could give rise to compensating differentials, T_{it} is a vector of individual teacher characteristics that vary over time, and M_{jt} is a vector of labor market characteristics. The ε_{idjt} are random effects for individuals, which are presumed to follow the autoregressive pattern found in the data.[22] (An autoregressive pattern to teacher salaries means that if a teacher earns more than the model predicts in one year, he or she will probably earn more than the model predicts the next year too.)

The data on teacher salaries and individual teacher characteristics come from the Kansas Department of Education. The hedonic wage analysis covers the nine-year period from 2008-09- through 2016–17). As in the cost function analysis, data from open-enrollment charter campuses, virtual campuses and all alternative education campuses have been excluded. All teachers with complete data who worked at least half time for a traditional public district have been included in the analysis.

The measure of teacher salaries that is used in this analysis is the total, full-time equivalent (FTE) annual salary. It is calculated as the observed total salary divided by the percent FTE. Full-time equivalent salaries less than 50% of the state's statutory minimum were deemed implausible and treated as missing. In addition, the

[21] For more on the use of hedonic wage models in education, see Chambers (1998); Chambers & Fowler (1995); Goldhaber (1999); Stoddard (2005); or Taylor (2008a, 2008b, 2010, 2011).

[22] See Drukker (2003) and Wooldridge (2002).

Table 20 presents the coefficient estimates and standard errors for the hedonic wage model. As the table illustrates, the hedonic model includes controls for teacher experience (the log of years of experience, the square of log experience and an indicator for first-year teachers) and indicators for the teacher's educational attainment (no degree, bachelor's degree, specialist degree, master's degree, or doctorate).

Job characteristics in the analysis include indicators for teaching assignment (general elementary, language arts, mathematics, science, social studies, health and physical education, foreign languages, fine arts, computers, vocational/technical subjects, special education, standardized-tested subjects, early childhood, English for speakers of other languages, and other instructional duties). Any given teacher could have multiple teaching assignments (such as an individual teaching both mathematics and science) or serve multiple student populations (such as kindergarten and pre-kindergarten).

Other job characteristics in the analysis include an indicator for whether or not the individual was assigned to multiple buildings and indicators for whether or not the teacher had additional duties as a department head, administrator, team sports, support staff, tutor, study skills, gifted, and other non-teaching duties.

Finally, the hedonic wage model also includes eight variables that describe various aspects of local labor market conditions. The ACS Comparable Wage reflects the prevailing wage for college graduates, the U.S. Department of Housing and Urban Development's estimate of Fair Market Rents for a two-bedroom apartment (in logs) reflects deviations in the cost of living, while the U.S. Bureau of Labor Statistic's measure of the metropolitan area unemployment rate reflects job prospects outside of teaching, U.S. Census indicator for whether or not the school district is located in a major metropolitan area (with 50,000 or more population) and another indicator for a metropolitan area with more than 10,000 but less than 50,000 population), miles to the nearest metro or micro area, and miles to a micro area reflect urbanicity. Distance to the nearest school in another state reflects access to employment opportunities outside of Kansas.

The Teacher Salary Index (TSI) for each building is based on the predicted wage for a teacher with 10 years of experience and a Master's degree, holding all other teacher characteristics and job characteristics constant at the statewide mean, but leaving the building and labor market characteristics unchanged.

Table 21. Hedonic wage model coefficient estimates

	Coefficients	Standard Errors
Years of experience (log)	-0.0222***	(0.00259)
Years of experience (log), sq.	0.0296***	(0.000659)
Teacher Educational Attainment		
No degree	-0.0972	(0.0756)
Bachelor's degree	-0.0531**	(0.0265)
Specialist/Management Specialists	0.121***	(0.00772)

	Coefficients	Standard Errors
Master's degree	0.0874***	(0.00165)
Doctoral degree	0.000	
Teacher Assignment		
Assigned multiple buildings	-0.0179***	(0.00200)
First year teacher	-0.0608***	(0.00210)
Special education	-0.0202***	(0.00292)
Language arts teacher	-0.0202***	(0.00161)
Mathematics teacher	-0.0129***	(0.00182)
Computer science	-0.00207	(0.00290)
Science	-0.0120***	(0.00188)
Social science	-0.0112***	(0.00187)
Fine arts	0.00372**	(0.00271)
Foreign language	0.00284	(0.00512)
Health and physical education	-0.0161***	(0.00283)
General elementary teacher	0.0103***	(0.00163)
Early childhood	-0.0646***	(0.00560)
English for speakers of other languages	-0.00321	(0.00727)
Vocational/technical	0.00486**	(0.00245)
Other instructional duties	-0.0699***	(0.00507)
Administrator	0.300***	(0.00352)
Support staff	0.00389***	(0.00134)
Department head	0.0249***	(0.00494)
At risk	-0.0115***	(0.00355)
Study skills	-0.000232	(0.00216)
Gifted	0.00313	(0.00750)
Tutoring	-0.00198	(0.00349)
Team sports	0.00994	(0.0101)
Other non-teaching duties	0.000219	(0.00129)
School Location Characteristics		
Miles to the nearest metro or micro area	0.000957***	(2.86e-05)
Miles to the nearest metro area	-0.00478***	(8.84e-05)
Fair market rent (log)	-0.109***	(0.00848)
Unemployment rate	-0.00164***	(0.000505)

	Coefficients	Standard Errors
Metro indicator	0.0735***	(0.00360)
Micro indicator	-0.0399***	(0.00331)
ACS-CWI	0.712***	(0.0257)
Distance to a neighboring school in another state	-0.000437***	(3.77e-05)
School year		
School year 2008-09	-0.140***	(0.00241)
School year 2009-10	-0.121***	(0.00253)
School year 2010-11	-0.105***	(0.00241)
School year 2011-12	-0.0730***	(0.00219)
School year 2012-13	-0.0760***	(0.00218)
School year 2013-14	-0.0550***	(0.00175)
School year 2014-15	-0.0356***	(0.00140)
School year 2015-16	-0.0290***	(0.00120)
School year 2016-17	0.0000	
Observations	326,154	
Number of teachers	59,133	

Note: Asterisks indicate a coefficient that is statistically significant at the 1%*** 5%** or 10%* levels.

Estimating the Comparable Wage Index

The ACS-CWI for this analysis is based on an analysis of public use micro-data from the 2014, 2015 and 2016 American Community Surveys (ACS)[23]. The ACS, which is conducted annually by the U.S. Census Bureau, has replaced the decennial census as the primary source of demographic information about the U.S. population. It provides information about the earnings, age, occupation, industry, and other demographic characteristics for millions of U.S. workers. The ACS-CWI measures earnings differences for college graduates and has been modeled after the baseline analysis used to construct the National Center for Education Statistics' (NCES) CWI (Taylor and Fowler, 2006).

Like the NCES CWI, the ACS-CWI comes from regression analyses of individual earnings data. Workers with incomplete data and workers without at least a bachelor's degree were excluded from the estimation sample, as was anyone who had a teaching or educational administration occupation or who was employed in the elementary and secondary education industry. Self-employed workers were excluded because their reported earnings may not represent the market value of their time. Individuals who

[23] The analysis is based on annual files for each survey administration, and not on the combined three-year file.

reported working less than half time or for more than 90 hours a week were also excluded, as were workers under the age of 18 and over the age of 80. Finally, individuals employed outside the United States were excluded because their earnings may represent compensation for foreign travel or other working conditions not faced by domestic workers.

The ACS-CWI was estimated from nationwide data because the national sample is much larger and yields much more precise estimates of wages by industry and occupation than could be generated using only the ACS data for the state of Kansas. For similar reasons, the analyses combines data from the three most recent administrations of the ACS.

Table 23 presents the results from the regression analysis. The dependent variable is the log of annual wage and salary earnings. Key independent variables include the age, sex, race, educational attainment, language ability, and amount of time worked for each individual in the national sample. The model includes the interaction between sex and age, to allow for the possibility that men and women have different career paths, and therefore different age-earnings profiles. In addition, the estimation includes indicator variables for occupation and industry for each year. This specification allows wages to rise (or fall) more slowly in some occupations or industries than it does in others. Such flexibility is particularly important because the analysis period includes the period immediately after the "Great Recession" and some industries and occupations recovered more slowly than others. Finally, each regression includes indicator variables for each labor market area.

The labor markets are based on "place-of-work areas" as defined by the Census Bureau. Census place-of-work areas are geographic regions designed to contain at least 100,000 persons. The place-of-work areas do not cross state boundaries and generally follow the boundaries of county groups, single counties, or census-defined places (Ruggles et al. 2012). Counties in sparsely-populated parts of a state are clustered together into a single Census place-of-work area. All local communities in the United States are part of a place-of-work area. Individuals can live in one labor market, and work in another. Their wage and salary earnings are attributed to their place of work, not their place of residence. The labor markets used in these analyses are either single places of work, or a cluster of the places-of-work that comprise a metropolitan area.[24]

As Table 24 illustrates, the estimated model is consistent with reasonable expectations about labor markets. Wage and salary earnings increase with the amount of time worked per week and the number of weeks worked per year. Earnings also rise as workers get older, but the increase is more rapid for men than for women (perhaps because age is not as good an indicator of work experience for women as it is for men). Workers with advanced degrees earn systematically more than workers with a bachelor's degree. Whites earn systematically more than apparently comparable individuals from other racial groups. Workers who do not speak English well earn substantially less than other workers, all other things being equal.

[24] Place of work areas were matched to counties and aggregated into core based statistical areas using data from the Missouri Census Data Center's MABLE/Geocorr12: Geographic Correspondence Engine.

The predicted wage level in each labor market area captures systematic variations in labor earnings while controlling for demographics, industrial and occupational mix, and amount of time worked [25]. Dividing each local wage prediction by the corresponding national average yields the ACS-CWI.

Table 22. Estimating the ACS-CWI

Explanatory Variables	ACS-CWI Model	
	Estimate	Std. Error
USUAL HRS. WORKED PER WEEK	0.944	0.003
WORKED 27-39 WEEKS	-0.553	0.004
WORKED 40-47 WEEKS	-0.251	0.003
WORKED 48-49 WEEKS	-0.103	0.004
FEMALE	0.308	0.013
AGE	0.086	0.000
AGE, SQUARED	-0.001	0.000
FEMALE*AGE	-0.016	0.001
FEMALE*AGE, SQUARED	0.000	0.000
NOT AN ENGLISH SPEAKER	-0.482	0.021
BACHELOR'S DEGREE	-0.217	0.003
MASTER'S DEGREE	-0.099	0.003
PROFESSIONAL DEGREE	0.000	
DOCTORAL DEGREE	0.059	0.004
HISPANIC	-0.100	0.002
AMERICAN INDIAN OR ALASKA NATIVE	-0.060	0.010
BLACK	-0.127	0.002
CHINESE	-0.081	0.003
JAPANESE	-0.084	0.008

[25] Formally, the predicted wage level in each market is the least-squares mean for the market fixed effect. The least-squares mean (or population marginal mean) is defined as the expected value of the mean for each effect (in this context, each market) that you would expect from a balanced design holding all covariates at their mean values and all classification variables (such as occupation or sex) at their population frequencies.

Explanatory Variables	ACS-CWI Model	
	Estimate	Std. Error
OTHER ASIAN/PACIFIC ISLANDER	-0.078	0.002
OTHER RACE, N.E.C.	-0.065	0.005
MIXED RACE	-0.061	0.004
WHITE	0.000	
INDUSTRY*YEAR INDICATORS?	Yes	
OCCUPATION*YEAR INDICATORS?	Yes	
LABOR MARKET INDICATORS?	Yes	
NUMBER OF OBSERVATIONS	**853,143**	

Source: Ruggles et al. (2015) and author's calculations.

Technical Appendix C: Expenditure Definition

In Chapter 4 of this report a summary of the expenditure definition was discussed including the allocation of costs from the school district to the school. This technical appendix provides additional detail on the items that were included and excluded from the fiscal analysis for this cost study for fiscal years 2017, 2016, and 2015. This technical appendix draws on the most recent Accounting Manual published by the Kansas State Department of Education (KSDE).[civ] The accounting manual is the handbook used by each Kansas school district that guides the classification and assignment of its funds, either revenue, expenditures, transfers or other activity. The tables below identify those expenditures that were included and excluded from the cost function analysis according to the classification of either fund (table 25, function (table 26) or object (table 27). Note that the corresponding fund, function or object number is included in parentheses next to the category title.

Table 23. Included and Excluded Funds from Cost Function Analysis[cv]

Funds	Categories That Have Been Included or Excluded from the Cost Function Analysis
Included	***General Fund (06), Supplemental General Fund (08)*** ***Special Revenue Funds*** • Special Liability Expense (42) • Bilingual Education (14) • Virtual Education (15) • Driver Training (18) • Professional Development (26) • Parent Education Program (28) • Summer School (29) • Special Education (30) • Vocational Education (34) • Area Vocational School (36) • Textbook & Materials Revolving (55) • Risk Management (50) • Capital Outlay (16) • Worker's Compensation (52) • Educational Excellence Program (20) • Extraordinary School Program (22) • Extraordinary Growth Facility (45) • Coop Special Education (78) • Federal Funds (07) • At Risk (4-year-old) (11) • At Risk (K-12) (13) • Declining Enrollment (19) • Tuition Reimbursement (57) • KPERS Special Retire Contribute (51) • Cost of Living (33) ***Trust Agency Funds*** • School Retirement (44) • Special Reserve Fund (47) • Recreation Commission (84) • Recreation Comm Employee Benefit (86) • Library Board (82) • Contingency Reserve Fund (53) • Gifts and Grants (35) ***Internal Service Funds***

Funds	Categories That Have Been Included or Excluded from the Cost Function Analysis
	• Activity (56)
Excluded	***Special Revenue Funds*** • Adult Education (10) • Adult Education Supplemental (12) • Food Service (24) ***Capital Project Funds*** ***Debt Service Funds*** • Bond & Interest (62, 63) • Special Assessment (67) • No-Fund Warrants, Temp Notes (66)

Table 24. Included and Excluded Functions from Cost Function Analysis[cvi]

Function	Categories That Have Been Included or Excluded from the Cost Function Analysis
Included	***Instruction (1000)*** ***Support Services*** • Students (2100) • Instruction (2200) • General Administration (2300) • School Administration (2400) • Central Services (2500) • Other Central Services (2600) • Other Support Services (2900) ***Operation of Non-Instructional Services*** • Enterprise Operations (3200)
Excluded	***Support Services*** • Student Transportation (2700) ***Operation of Non-Instructional Services*** • Food Service (3100) • Community Service (3300) ***Facilities Acquisition and Construction*** • Land Acquisition (4100) • Land Improvement (4200) • Architecture and Engineering (4300) • Educational Specs Development (4400) • New Building Acquisition (4500) • Site Improvement (4600) • Building Improvements (4700) • Other Facilities Acquisition Cons. (4900)

Function	Categories That Have Been Included or Excluded from the Cost Function Analysis
	Debt Service • Debt Service (5100) • Fund Transfers (5200)

Table 25. Included and Excluded Objects from Cost Function Analysis[cvii]

Objects	Categories That Have Been Included or Excluded from the Cost Function Analysis
Included	***Personal Services – Salaries*** • Regular Certified Salaries (110) • Regular Non-Certified Salaries (120) • Additional Compensation (150) ***Employee Benefits*** • Group Insurance (210) • Social Security Contribution (220) • On-Behalf Payments (240) • Tuition Reimbursement (250) • Unemployment Compensation (260) • Worker's Compensation (270) • Health Benefits (280) • Other Employee Benefits (290) ***Purchased Professional and Technical Services*** • Official/Admin Services (310) • Professional-Education Services (320) • Professional Employee Training (330) • Other Professional Services (340) • Technical Services (350) ***Purchased Property Services*** • Utility Services (410) • Cleaning Services (420) • Repairs and Maintenance Services (430) • Rentals (440) • Construction Services (450) • Repair of Buildings (460) • Other Purchased Property Srvcs (490) ***Other Purchased Services*** • Insurance Services (520) • Communication (530) • Advertising (540) • Printing & Binding (550) • Tuitions (560) • Staff Travel (580) • Interagency Purchased Services (590) ***Supplies and Materials*** • Gen'l Supplies and Materials (610) • Energy (620) • Food and Milk (630) • Books and Periodicals (640) • Supplies-Tech Related (650) • Merchandise Purchased for Resale (660) • Testing Supplies and Materials (670) • Miscellaneous Supplies (680)

Objects	Categories That Have Been Included or Excluded from the Cost Function Analysis
Excluded	***Other Purchased Services*** • Student Transportation (510) • Food Service Management (570) ***Property*** • Land and Improvement (710) • Building (Existing Buildings) (720) • Equipment (730) • Infrastructure (740) • Depreciation (790) ***Debt Service*** • Dues and Fees (810) • Judgments Against the LEA (820) • Debt-Related Expenditures (830) ***Other Items*** • Fund Transfers (930-980)

Technical Appendix D: School District Characteristics

Drawing from the findings discussed in Chapter 5 of this report, below is a list of each school district in Kansas that had sufficient data to generate an estimated General Fund revenue allocation for the current and subsequent four years. The numbers presented in columns 4-6 are expressed as decimals and when multiplied by 100 equal the percentages of the student population for those need categories.

Table 26. List of school district characteristics and index values by each Kansas school district

District ID	District Name	Total Enroll (#)	Percentage Poverty (%)	Percentage ELL (%)	Percentage Special Ed (%)	Teacher Cost Index
D0435	Abilene	1,635	0.36	0.01	0.17	1.30
D0387	Altoona-Midway	177	0.46	0.00	0.19	1.30
D0385	Andover	8,281	0.08	0.03	0.08	1.45
D0359	Argonia Public Schools	191	0.40	0.00	0.26	1.33
D0470	Arkansas City	2,912	0.60	0.17	0.22	1.30
D0220	Ashland	196	0.31	0.14	0.13	1.36
D0377	Atchison Co Comm Schools	527	0.40	0.01	0.19	1.39
D0409	Atchison Public Schools	1,743	0.55	0.01	0.22	1.35
D0511	Attica	172	0.34	0.00	0.23	1.16
D0437	Auburn Washburn	6,323	0.25	0.03	0.12	1.52

D0402	Augusta	2,295	0.33	0.01	0.14	1.41
D0348	Baldwin City	1,431	0.26	0.00	0.18	1.51
D0254	Barber County North	485	0.38	0.01	0.20	1.15
D0223	Barnes	445	0.24	0.11	0.15	1.27
D0458	Basehor-Linwood	2,549	0.12	0.01	0.13	1.36
D0508	Baxter Springs	1,022	0.53	0.04	0.17	1.37
D0357	Belle Plaine	641	0.32	0.00	0.18	1.40
D0273	Beloit	801	0.30	0.03	0.18	1.26
D0229	Blue Valley	22,640	0.05	0.03	0.10	1.56
D0384	Blue Valley	225	0.16	0.00	0.20	1.45
D0205	Bluestem	490	0.44	0.01	0.24	1.37
D0204	Bonner Springs	2,733	0.39	0.07	0.12	1.49
D0314	Brewster	148	0.37	0.00	0.18	1.06
D0459	Bucklin	239	0.43	0.02	0.18	1.40
D0313	Buhler	2,306	0.29	0.02	0.13	1.27
D0454	Burlingame Public School	299	0.34	0.02	0.25	1.44
D0244	Burlington	858	0.30	0.01	0.19	1.25

D0369	Burrton	246	0.46	0.02	0.17	1.41
D0360	Caldwell	241	0.41	0.00	0.14	1.36
D0436	Caney Valley	766	0.40	0.02	0.09	1.34
D0419	Canton-Galva	349	0.30	0.00	0.22	1.33
D0285	Cedar Vale	189	0.58	0.00	0.32	1.33
D0462	Central	316	0.48	0.02	0.24	1.34
D0288	Central Heights	559	0.53	0.01	0.18	1.33
D0112	Central Plains	531	0.34	0.00	0.18	1.34
D0397	Centre	480	0.14	0.00	0.10	1.21
D0413	Chanute Public Schools	1,851	0.52	0.03	0.15	1.28
D0361	Chaparral Schools	848	0.51	0.09	0.21	1.17
D0473	Chapman	1,093	0.34	0.00	0.13	1.34
D0284	Chase County	347	0.24	0.00	0.11	1.29
D0401	Chase-Raymond	160	0.58	0.03	0.26	1.31
D0286	Chautauqua Co Community	374	0.53	0.00	0.19	1.31
D0268	Cheney	797	0.22	0.00	0.12	1.43
D0247	Cherokee	489	0.45	0.00	0.17	1.34

D0447	Cherryvale	911	0.50	0.00	0.12	1.37
D0505	Chetopa-St. Paul	438	0.42	0.00	0.15	1.35
D0103	Cheylin	129	0.48	0.29	0.12	1.00
D0102	Cimarron-Ensign	655	0.35	0.21	0.14	1.44
D0375	Circle	1,971	0.19	0.01	0.11	1.41
D0379	Clay Center	1,363	0.31	0.00	0.20	1.24
D0264	Clearwater	1,154	0.23	0.00	0.18	1.49
D0224	Clifton-Clyde	316	0.29	0.00	0.17	1.19
D0445	Coffeyville	1,777	0.68	0.11	0.12	1.38
D0315	Colby Public Schools	886	0.27	0.06	0.15	1.07
D0493	Columbus	987	0.46	0.00	0.17	1.32
D0300	Comanche County	323	0.31	0.02	0.28	1.26
D0333	Concordia	1,094	0.34	0.03	0.16	1.23
D0356	Conway Springs	535	0.21	0.00	0.13	1.38
D0476	Copeland	96	0.31	0.41	0.05	1.46
D0479	Crest	223	0.43	0.02	0.16	1.27
D0332	Cunningham	160	0.29	0.03	0.16	1.37

D0232	De Soto	7,137	0.09	0.04	0.08	1.51
D0216	Deerfield	210	0.68	0.40	0.12	1.54
D0260	Derby	7,073	0.37	0.10	0.14	1.49
D0471	Dexter	145	0.32	0.00	0.19	1.35
D0482	Dighton	230	0.33	0.02	0.19	1.34
D0443	Dodge City	7,054	0.70	0.57	0.12	1.47
D0111	Doniphan West Schools	339	0.37	0.00	0.11	1.44
D0396	Douglass Public Schools	736	0.26	0.01	0.21	1.43
D0410	Durham-Hillsboro-Lehigh	599	0.27	0.03	0.17	1.26
D0449	Easton	609	0.24	0.00	0.16	1.42
D0490	El Dorado	1,968	0.45	0.01	0.20	1.35
D0283	Elk Valley	118	0.69	0.00	0.28	1.34
D0218	Elkhart	1,147	0.17	0.10	0.10	1.39
D0307	Ell-Saline	464	0.21	0.05	0.15	1.34
D0355	Ellinwood Public Schools	503	0.35	0.00	0.14	1.31
D0388	Ellis	473	0.24	0.00	0.17	1.44
D0327	Ellsworth	641	0.25	0.01	0.13	1.28

D0253	Emporia	4,598	0.48	0.34	0.13	1.34
D0101	Erie-Galesburg	525	0.49	0.01	0.18	1.35
D0491	Eudora	1,736	0.29	0.01	0.16	1.51
D0389	Eureka	661	0.52	0.01	0.14	1.18
D0310	Fairfield	286	0.52	0.06	0.18	1.31
D0492	Flinthills	273	0.32	0.00	0.20	1.31
D0234	Fort Scott	1,881	0.50	0.01	0.13	1.34
D0225	Fowler	150	0.37	0.03	0.19	1.44
D0484	Fredonia	682	0.44	0.00	0.14	1.34
D0249	Frontenac Public Schools	940	0.31	0.01	0.10	1.34
D0495	Ft Larned	943	0.42	0.02	0.23	1.31
D0207	Ft Leavenworth	1,681	0.04	0.04	0.13	1.38
D0499	Galena	849	0.53	0.01	0.17	1.35
D0457	Garden City	7,701	0.60	0.47	0.12	1.54
D0231	Gardner Edgerton	5,914	0.23	0.02	0.16	1.52
D0365	Garnett	992	0.36	0.00	0.17	1.35
D0475	Geary County Schools	7,802	0.40	0.09	0.15	1.35

D0248	Girard	1,024	0.39	0.02	0.12	1.41
D0265	Goddard	5,679	0.18	0.04	0.15	1.49
D0411	Goessel	273	0.22	0.02	0.16	1.29
D0316	Golden Plains	180	0.57	0.18	0.23	1.12
D0352	Goodland	939	0.38	0.12	0.13	1.03
D0281	Graham County	365	0.34	0.00	0.21	1.32
D0428	Great Bend	2,928	0.58	0.26	0.14	1.36
D0200	Greeley County Schools	251	0.37	0.29	0.16	1.28
D0291	Grinnell Public Schools	82	0.35	0.00	0.13	1.18
D0440	Halstead	771	0.33	0.03	0.15	1.39
D0390	Hamilton	60	0.47	0.00	0.22	1.25
D0312	Haven Public Schools	892	0.31	0.06	0.13	1.27
D0474	Haviland	104	0.32	0.00	0.19	1.23
D0489	Hays	3,177	0.32	0.07	0.17	1.50
D0261	Haysville	5,648	0.46	0.04	0.16	1.52
D0468	Healy Public Schools	67	0.54	0.21	0.22	1.34
D0487	Herington	487	0.49	0.00	0.21	1.29

D0460	Hesston	802	0.17	0.04	0.09	1.42
D0415	Hiawatha	933	0.41	0.01	0.17	1.37
D0227	Hodgeman County Schools	292	0.25	0.06	0.16	1.39
D0431	Hoisington	753	0.44	0.01	0.17	1.40
D0363	Holcomb	1,018	0.45	0.17	0.09	1.58
D0336	Holton	1,128	0.34	0.03	0.12	1.44
D0412	Hoxie Community Schools	392	0.26	0.00	0.19	1.19
D0210	Hugoton Public Schools	1,047	0.50	0.37	0.08	1.41
D0258	Humboldt	805	0.28	0.00	0.11	1.26
D0308	Hutchinson Public Schools	4,677	0.55	0.06	0.19	1.30
D0446	Independence	2,137	0.51	0.03	0.19	1.44
D0477	Ingalls	212	0.27	0.13	0.02	1.42
D0448	Inman	431	0.20	0.00	0.15	1.29
D0257	Iola	1,305	0.50	0.00	0.19	1.23
D0346	Jayhawk	577	0.49	0.02	0.15	1.31
D0339	Jefferson County North	464	0.23	0.00	0.19	1.50

D0340	Jefferson West	861	0.21	0.00	0.16	1.42
D0500	Kansas City	21,937	0.78	0.40	0.13	1.54
D0321	Kaw Valley	1,182	0.27	0.00	0.21	1.45
D0331	Kingman - Norwich	979	0.32	0.01	0.21	1.38
D0347	Kinsley-Offerle	349	0.45	0.18	0.21	1.35
D0422	Kiowa County	420	0.16	0.00	0.14	1.30
D0483	Kismet-Plains	708	0.65	0.67	0.11	1.50
D0395	LaCrosse	289	0.36	0.00	0.17	1.33
D0506	Labette County	1,574	0.46	0.00	0.15	1.41
D0215	Lakin	636	0.43	0.26	0.10	1.48
D0469	Lansing	2,698	0.21	0.02	0.17	1.34
D0497	Lawrence	11,969	0.28	0.09	0.13	1.54
D0245	LeRoy-Gridley	208	0.32	0.00	0.18	1.23
D0453	Leavenworth	3,873	0.49	0.02	0.16	1.37
D0243	Lebo-Waverly	428	0.30	0.01	0.17	1.30
D0467	Leoti	400	0.44	0.35	0.16	1.39
D0502	Lewis	118	0.48	0.22	0.14	1.26

D0480	Liberal	4,971	0.71	0.64	0.11	1.48
D0298	Lincoln	353	0.41	0.01	0.16	1.34
D0444	Little River	315	0.21	0.02	0.19	1.31
D0326	Logan	150	0.31	0.03	0.16	1.23
D0416	Louisburg	1,720	0.15	0.02	0.09	1.36
D0421	Lyndon	436	0.28	0.00	0.15	1.44
D0405	Lyons	847	0.59	0.23	0.25	1.28
D0351	Macksville	236	0.48	0.36	0.17	1.24
D0386	Madison-Virgil	219	0.40	0.00	0.21	1.30
D0266	Maize	7,173	0.14	0.02	0.12	1.48
D0383	Manhattan-Ogden	6,388	0.29	0.07	0.17	1.44
D0456	Marais Des Cygnes Valley	220	0.49	0.00	0.29	1.48
D0408	Marion-Florence	521	0.33	0.00	0.19	1.20
D0256	Marmaton Valley	287	0.44	0.00	0.16	1.29
D0364	Marysville	747	0.31	0.01	0.20	1.29
D0342	McLouth	488	0.32	0.00	0.19	1.40
D0418	McPherson	2,404	0.29	0.02	0.19	1.37

D0226	Meade	408	0.27	0.05	0.18	1.43
D0219	Minneola	244	0.51	0.02	0.18	1.48
D0330	Mission Valley	497	0.28	0.00	0.21	1.46
D0371	Montezuma	236	0.37	0.12	0.08	1.43
D0417	Morris County	733	0.34	0.03	0.13	1.29
D0209	Moscow Public Schools	175	0.61	0.35	0.07	1.46
D0423	Moundridge	401	0.19	0.00	0.15	1.28
D0263	Mulvane	1,797	0.31	0.01	0.15	1.47
D0115	Nemaha Central	603	0.14	0.02	0.11	1.22
D0461	Neodesha	697	0.48	0.01	0.12	1.38
D0303	Ness City	312	0.38	0.14	0.20	1.27
D0373	Newton	3,539	0.43	0.06	0.16	1.37
D0309	Nickerson	1,139	0.43	0.03	0.14	1.31
D0335	North Jackson	367	0.31	0.00	0.22	1.46
D0251	North Lyon County	395	0.44	0.00	0.14	1.29
D0239	North Ottawa County	616	0.32	0.00	0.20	1.35
D0246	Northeast	496	0.58	0.01	0.20	1.36

D0212	Northern Valley	146	0.39	0.00	0.16	1.19
D0211	Norton Community Schools	665	0.31	0.01	0.17	1.18
D0274	Oakley	409	0.38	0.00	0.17	1.16
D0294	Oberlin	340	0.32	0.00	0.13	1.15
D0233	Olathe	29,029	0.21	0.11	0.13	1.53
D0322	Onaga-Havensville-Wheaton	302	0.33	0.00	0.23	1.39
D0420	Osage City	685	0.35	0.01	0.20	1.43
D0367	Osawatomie	1,161	0.53	0.00	0.23	1.41
D0392	Osborne County	278	0.38	0.00	0.18	1.24
D0341	Oskaloosa Public Schools	612	0.41	0.00	0.21	1.40
D0504	Oswego	461	0.49	0.00	0.18	1.35
D0403	Otis-Bison	246	0.40	0.00	0.11	1.38
D0290	Ottawa	2,479	0.42	0.01	0.11	1.34
D0358	Oxford	444	0.25	0.01	0.15	1.41
D0269	Palco	88	0.27	0.00	0.18	1.39
D0368	Paola	2,029	0.27	0.01	0.14	1.38

D0399	Paradise	113	0.37	0.04	0.26	1.41
D0503	Parsons	1,314	0.60	0.01	0.17	1.37
D0496	Pawnee Heights	152	0.25	0.03	0.11	1.25
D0398	Peabody-Burns	262	0.47	0.00	0.22	1.20
D0343	Perry Public Schools	745	0.29	0.01	0.19	1.46
D0325	Phillipsburg	621	0.26	0.00	0.17	1.20
D0426	Pike Valley	223	0.40	0.02	0.20	1.17
D0203	Piper-Kansas City	2,186	0.13	0.04	0.09	1.48
D0250	Pittsburg	3,143	0.57	0.10	0.18	1.33
D0270	Plainville	340	0.28	0.00	0.18	1.44
D0344	Pleasanton	359	0.46	0.00	0.23	1.29
D0113	Prairie Hills	1,125	0.27	0.00	0.16	1.27
D0362	Prairie View	919	0.38	0.01	0.18	1.36
D0382	Pratt	1,229	0.40	0.08	0.14	1.21
D0311	Pretty Prairie	244	0.25	0.00	0.05	1.30
D0293	Quinter Public Schools	304	0.24	0.05	0.22	1.29
D0105	Rawlins County	335	0.33	0.10	0.18	1.08

D0206	Remington-Whitewater	515	0.29	0.07	0.14	1.37
D0267	Renwick	1,856	0.10	0.00	0.11	1.45
D0109	Republic County	515	0.41	0.00	0.20	1.15
D0378	Riley County	681	0.20	0.01	0.17	1.41
D0114	Riverside	642	0.45	0.00	0.24	1.49
D0404	Riverton	741	0.42	0.01	0.14	1.34
D0323	Rock Creek	1,043	0.22	0.01	0.14	1.46
D0107	Rock Hills	312	0.42	0.00	0.17	1.20
D0217	Rolla	134	0.34	0.28	0.13	1.41
D0394	Rose Hill Public Schools	1,616	0.22	0.02	0.13	1.46
D0337	Royal Valley	837	0.40	0.00	0.17	1.47
D0481	Rural Vista	297	0.35	0.02	0.22	1.30
D0407	Russell County	836	0.42	0.01	0.21	1.37
D0305	Salina	7,386	0.47	0.12	0.14	1.34
D0434	Santa Fe Trail	1,040	0.40	0.00	0.22	1.46
D0507	Satanta	307	0.59	0.50	0.09	1.47
D0466	Scott County	1,023	0.37	0.25	0.12	1.41

D0345	Seaman	3,807	0.28	0.01	0.16	1.50
D0439	Sedgwick Public Schools	479	0.31	0.00	0.14	1.42
D0450	Shawnee Heights	3,504	0.27	0.03	0.13	1.49
D0512	Shawnee Mission Pub Sch	27,333	0.28	0.12	0.09	1.56
D0372	Silver Lake	716	0.14	0.01	0.12	1.53
D0438	Skyline Schools	412	0.23	0.05	0.12	1.20
D0237	Smith Center	400	0.37	0.00	0.19	1.21
D0400	Smoky Valley	1,572	0.13	0.00	0.09	1.32
D0393	Solomon	316	0.38	0.00	0.19	1.35
D0255	South Barber	255	0.36	0.02	0.24	1.12
D0430	South Brown County	577	0.58	0.05	0.19	1.44
D0509	South Haven	208	0.36	0.00	0.23	1.42
D0306	Southeast Of Saline	697	0.18	0.00	0.14	1.28
D0334	Southern Cloud	207	0.46	0.00	0.20	1.30
D0252	Southern Lyon County	498	0.34	0.00	0.14	1.29
D0381	Spearville	356	0.27	0.05	0.12	1.42
D0230	Spring Hill	3,896	0.11	0.01	0.16	1.47

D0297	St Francis Comm Sch	283	0.30	0.09	0.14	1.05
D0350	St John-Hudson	328	0.39	0.16	0.20	1.25
D0349	Stafford	209	0.52	0.10	0.22	1.27
D0452	Stanton County	438	0.41	0.36	0.10	1.28
D0376	Sterling	508	0.28	0.01	0.14	1.33
D0271	Stockton	342	0.40	0.01	0.25	1.33
D0374	Sublette	466	0.49	0.33	0.08	1.47
D0299	Sylvan Grove	248	0.34	0.00	0.13	1.26
D0494	Syracuse	542	0.49	0.43	0.09	1.33
D0110	Thunder Ridge Schools	217	0.50	0.02	0.22	1.18
D0464	Tonganoxie	1,963	0.22	0.01	0.14	1.39
D0501	Topeka Public Schools	13,794	0.66	0.13	0.19	1.53
D0275	Triplains	65	0.28	0.00	0.23	1.18
D0429	Troy Public Schools	333	0.22	0.00	0.18	1.44
D0202	Turner-Kansas City	4,110	0.63	0.24	0.11	1.54
D0240	Twin Valley	603	0.34	0.00	0.15	1.37
D0463	Udall	311	0.33	0.00	0.18	1.24

D0214	Ulysses	1,758	0.50	0.39	0.11	1.38
D0235	Uniontown	442	0.45	0.00	0.12	1.34
D0262	Valley Center Pub Sch	2,879	0.30	0.02	0.14	1.45
D0338	Valley Falls	381	0.31	0.00	0.19	1.45
D0498	Valley Heights	401	0.37	0.01	0.17	1.29
D0380	Vermillion	578	0.22	0.00	0.12	1.27
D0432	Victoria	288	0.13	0.00	0.16	1.44
D0329	Wabaunsee	446	0.23	0.00	0.16	1.42
D0272	Waconda	325	0.36	0.00	0.17	1.20
D0208	Wakeeney	387	0.27	0.00	0.27	1.39
D0241	Wallace County Schools	202	0.29	0.02	0.17	1.16
D0320	Wamego	1,533	0.20	0.01	0.14	1.42
D0108	Washington Co. Schools	340	0.37	0.01	0.22	1.25
D0353	Wellington	1,622	0.46	0.01	0.23	1.36
D0289	Wellsville	782	0.23	0.00	0.17	1.27
D0242	Weskan	104	0.26	0.05	0.20	1.12
D0282	West Elk	353	0.46	0.00	0.28	1.25

D0287	West Franklin	601	0.42	0.00	0.28	1.29
D0106	Western Plains	107	0.56	0.25	0.18	1.31
D0292	Wheatland	110	0.25	0.00	0.10	1.22
D0259	Wichita	50,566	0.65	0.22	0.14	1.50
D0465	Winfield	2,227	0.46	0.04	0.18	1.33
D0366	Woodson	464	0.47	0.00	0.21	1.18

Technical Appendix E: School District Cost Estimates and Weights

Drawing from the findings discussed in chapter 5 of this report, below is a list of each school district in Kansas and the associated estimated base cost per pupil, gap closure per pupil cost, and associated index values for regional cost variation, overall size, and student demographic composition. These tables would apply for the latest year of financial data available which was the 2016-17 school year. The numbers presented in columns 4-6 are expressed as decimals and when multiplied by 100 equal the percentages of the student population for those need categories.

Table 27. School district base and gap closure cost estimates and index values

			Maintenance					Compensate	
District ID	District Name	Total Enroll	Base (95%)	Base (90%)	Regional Index	Economies of Scale Index	Student Need Index	Scenario A	Scenario B
D0435	Abilene	1,635	$3,757.95	$3,483.82	1.88	1.00	1.35	1.29	1.40
D0387	Altoona-Midway	177	$3,724.81	$3,425.46	1.79	1.56	1.47	1.28	1.42
D0385	Andover	8,281	$3,739.55	$3,468.94	1.46	1.35	1.00	1.35	1.35
D0359	Argonia Public Schools	191	$3,668.30	$3,385.17	1.69	1.51	1.34	1.37	1.49
D0470	Arkansas City	2,912	$3,691.10	$3,429.75	1.78	1.05	1.68	1.09	1.14
D0220	Ashland	196	$3,821.00	$3,542.61	1.77	1.49	1.30	1.09	1.21

D0377	Atchison Co Comm Schools	527	$3,929.73	$3,622.75	1.70	1.11	1.40	1.43	1.46
D0409	Atchison Public Schools	1,743	$3,694.44	$3,431.28	1.71	1.00	1.58	1.12	1.15
D0511	Attica	172	$3,639.13	$3,387.73	1.71	1.57	1.31	1.10	1.03
D0437	Auburn Washburn	6,323	$3,799.58	$3,527.01	1.37	1.24	1.21	1.22	1.27
D0402	Augusta	2,295	$3,718.73	$3,452.10	1.61	1.02	1.30	1.18	1.23
D0348	Baldwin City	1,431	$3,722.02	$3,454.77	1.54	1.00	1.23	1.18	1.20
D0254	Barber County North	485	$3,823.36	$3,536.73	1.65	1.13	1.37	1.33	1.33
D0223	Barnes	445	$3,757.56	$3,483.51	1.76	1.15	1.23	1.19	1.24
D0458	Basehor-Linwood	2,549	$3,764.68	$3,489.27	1.68	1.03	1.07	1.25	1.35
D0508	Baxter Springs	1,022	$3,915.11	$3,610.93	1.76	1.01	1.58	1.40	1.46
D0357	Belle Plaine	641	$3,720.23	$3,453.32	1.68	1.07	1.30	1.58	1.74

D0273	Beloit	801	$3,875.12	$3,578.59	1.77	1.04	1.28	1.45	1.43
D0384	Blue Valley	225	$3,720.60	$3,453.61	1.72	1.42	1.13	1.26	1.37
D0229	Blue Valley	22,640	$3,761.13	$3,486.39	1.15	1.97	1.00	1.31	1.31
D0205	Bluestem	490	$3,866.36	$3,571.50	1.71	1.13	1.42	1.15	1.13
D0204	Bonner Springs	2,733	$3,722.69	$3,455.30	1.41	1.04	1.38	1.16	1.27
D0314	Brewster	148	$3,835.54	$3,546.58	1.37	1.68	1.35	1.29	1.25
D0459	Bucklin	239	$3,524.15	$3,282.37	1.72	1.38	1.44	1.48	1.49
D0313	Buhler	2,306	$3,704.92	$3,440.93	1.83	1.02	1.26	1.29	1.29
D0454	Burlingame Public School	299	$3,667.20	$3,384.38	1.67	1.28	1.28	1.31	1.36
D0244	Burlington	858	$3,756.92	$3,482.99	1.86	1.03	1.28	1.37	1.32
D0369	Burrton	246	$3,682.50	$3,395.29	1.69	1.37	1.48	1.12	1.21

D0360	Caldwell	241	$3,690.79	$3,401.21	1.71	1.38	1.39	2.09	2.26
D0436	Caney Valley	766	$3,952.68	$3,641.32	1.72	1.04	1.33	0.95	0.91
D0419	Canton-Galva	349	$3,898.47	$3,597.47	1.72	1.23	1.26	1.26	1.44
D0285	Cedar Vale	189	$3,681.62	$3,394.67	1.77	1.51	1.43	0.77	0.86
D0462	Central	316	$3,902.09	$3,600.40	1.70	1.26	1.46	1.06	1.17
D0288	Central Heights	559	$3,689.73	$3,400.45	1.72	1.10	1.57	1.41	1.49
D0112	Central Plains	531	$3,775.15	$3,497.73	1.77	1.11	1.33	0.98	0.96
D0397	Centre	480	$3,956.33	$3,590.57	1.68	1.13	1.07	1.07	1.10
D0413	Chanute Public Schools	1,851	$3,723.43	$3,455.91	1.91	1.01	1.55	1.01	1.04
D0361	Chaparral Schools	848	$3,858.93	$3,565.50	1.74	1.03	1.56	1.08	1.05
D0473	Chapman	1,093	$3,764.03	$3,488.74	1.79	1.01	1.31	1.14	1.21

D0284	Chase County	347	$3,923.67	$3,617.85	1.74	1.23	1.18	1.08	1.20
D0401	Chase-Raymond	160	$3,761.06	$3,486.33	1.76	1.62	1.57	0.99	1.11
D0286	Chautauqua Co Community	374	$3,980.06	$3,663.46	1.78	1.20	1.56	1.04	1.14
D0268	Cheney	797	$3,722.22	$3,454.93	1.66	1.04	1.17	1.00	1.02
D0247	Cherokee	489	$3,813.08	$3,528.41	1.74	1.13	1.46	1.21	1.34
D0447	Cherryvale	911	$3,877.80	$3,580.75	1.71	1.02	1.50	1.10	1.24
D0505	Chetopa-St. Paul	438	$3,748.02	$3,461.57	1.76	1.16	1.42	1.46	1.61
D0103	Cheylin	129	$3,917.57	$3,612.92	1.24	1.79	1.49	1.36	1.40
D0102	Cimarron-Ensign	655	$3,892.72	$3,592.82	1.82	1.07	1.35	1.05	1.06
D0375	Circle	1,971	$3,812.65	$3,537.11	1.66	1.01	1.13	1.30	1.33
D0379	Clay Center	1,363	$3,474.29	$3,254.40	1.81	1.00	1.28	1.06	1.13

D0264	Clearwater	1,154	$3,846.49	$3,564.64	1.59	1.01	1.20	1.31	1.35
D0224	Clifton-Clyde	316	$3,800.66	$3,518.37	1.75	1.26	1.27	0.90	0.98
D0445	Coffeyville	1,777	$3,789.23	$3,517.99	1.66	1.00	1.79	1.24	1.32
D0315	Colby Public Schools	886	$3,394.97	$3,190.25	1.79	1.03	1.25	1.76	1.90
D0493	Columbus	987	$3,723.05	$3,455.59	1.82	1.02	1.47	1.08	1.20
D0300	Comanche County	323	$3,716.60	$3,450.38	1.68	1.25	1.20	1.31	1.28
D0333	Concordia	1,094	$3,394.97	$3,190.25	1.85	1.01	1.33	1.34	1.49
D0356	Conway Springs	535	$3,785.39	$3,506.02	1.70	1.11	1.17	1.30	1.40
D0476	Copeland	96	$3,394.97	$3,190.25	1.84	2.09	1.16	1.20	1.28
D0479	Crest	223	$3,692.32	$3,430.75	1.77	1.42	1.43	1.21	1.29
D0332	Cunningham	160	$3,850.85	$3,558.96	1.70	1.62	1.27	1.07	1.20

D0232	De Soto	7,137	$3,739.73	$3,469.09	1.38	1.28	1.01	1.21	1.26
D0216	Deerfield	210	$3,715.99	$3,449.89	1.76	1.45	1.75	0.61	0.76
D0260	Derby	7,073	$3,693.81	$3,431.94	1.35	1.28	1.37	1.13	1.18
D0471	Dexter	145	$3,665.97	$3,383.51	1.70	1.70	1.29	2.81	2.96
D0482	Dighton	230	$3,899.50	$3,598.31	1.76	1.40	1.32	1.15	1.18
D0443	Dodge City	7,054	$3,705.07	$3,441.05	1.57	1.28	1.66	1.18	1.26
D0111	Doniphan West Schools	339	$3,831.82	$3,543.57	1.71	1.24	1.33	1.33	1.38
D0396	Douglass Public Schools	736	$3,816.91	$3,531.51	1.66	1.05	1.23	1.25	1.33
D0410	Durham-Hillsboro-Lehigh	599	$3,685.13	$3,397.17	1.83	1.08	1.25	1.21	1.22
D0449	Easton	609	$3,794.21	$3,513.15	1.65	1.08	1.21	1.37	1.42
D0490	El Dorado	1,968	$3,711.46	$3,446.22	1.71	1.01	1.46	1.17	1.23

D0283	Elk Valley	118	$3,844.53	$3,553.85	1.78	1.87	1.68	1.34	1.54
D0218	Elkhart	1,147	$3,750.74	$3,477.99	1.80	1.01	1.11	1.14	1.28
D0307	Ell-Saline	464	$3,918.97	$3,614.05	1.70	1.14	1.19	1.22	1.38
D0355	Ellinwood Public Schools	503	$3,765.93	$3,499.25	1.73	1.12	1.32	1.20	1.18
D0388	Ellis	473	$3,927.69	$3,621.11	1.70	1.13	1.21	0.84	0.93
D0327	Ellsworth	641	$3,877.51	$3,580.52	1.80	1.07	1.21	1.25	1.28
D0253	Emporia	4,598	$3,747.89	$3,475.69	1.72	1.14	1.48	1.32	1.38
D0101	Erie-Galesburg	525	$3,765.46	$3,489.90	1.79	1.11	1.51	1.13	1.18
D0491	Eudora	1,736	$3,702.03	$3,438.60	1.47	1.00	1.26	1.38	1.44
D0389	Eureka	661	$3,846.40	$3,555.36	1.73	1.06	1.54	1.36	1.50
D0310	Fairfield	286	$3,956.33	$3,590.57	1.68	1.30	1.57	1.31	1.51

D0492	Flinthills	273	$3,876.71	$3,589.95	1.67	1.32	1.30	1.12	1.19
D0234	Fort Scott	1,881	$3,735.16	$3,465.39	1.81	1.01	1.50	1.17	1.23
D0225	Fowler	150	$3,837.04	$3,547.79	1.84	1.67	1.36	1.33	1.31
D0484	Fredonia	682	$3,883.98	$3,585.76	1.80	1.06	1.44	0.77	0.82
D0249	Frontenac Public Schools	940	$3,712.59	$3,447.13	1.72	1.02	1.25	0.97	1.03
D0495	Ft Larned	943	$3,730.15	$3,461.34	1.80	1.02	1.41	1.29	1.39
D0207	Ft Leavenworth	1,681	$3,583.00	$3,342.32	1.60	1.00	1.01	1.60	1.60
D0499	Galena	849	$3,736.02	$3,466.09	1.79	1.03	1.57	1.03	1.09
D0457	Garden City	7,701	$3,773.73	$3,504.71	1.57	1.31	1.59	1.36	1.53
D0231	Gardner Edgerton	5,914	$3,394.97	$3,190.25	1.40	1.21	1.20	1.18	1.19
D0365	Garnett	992	$3,881.82	$3,584.01	1.80	1.02	1.34	1.36	1.43

D0475	Geary County Schools	7,802	$3,633.77	$3,383.38	1.71	1.32	1.41	1.23	1.30
D0248	Girard	1,024	$3,394.97	$3,190.25	1.68	1.01	1.36	1.07	1.19
D0265	Goddard	5,679	$3,806.19	$3,532.27	1.40	1.20	1.16	1.43	1.53
D0411	Goessel	273	$3,711.63	$3,416.07	1.82	1.32	1.20	1.32	1.37
D0316	Golden Plains	180	$3,755.08	$3,481.50	1.58	1.55	1.63	1.10	1.13
D0352	Goodland	939	$3,883.16	$3,585.09	1.61	1.02	1.37	1.01	1.00
D0281	Graham County	365	$3,888.51	$3,589.42	1.76	1.21	1.31	1.17	1.28
D0428	Great Bend	2,928	$3,819.30	$3,543.33	1.70	1.05	1.65	1.51	1.61
D0200	Greeley County Schools	251	$3,654.40	$3,375.26	1.68	1.36	1.37	1.13	1.18
D0291	Grinnell Public Schools	82	$3,394.97	$3,190.25	1.59	2.28	1.33	1.24	1.31
D0440	Halstead	771	$3,741.86	$3,470.81	1.68	1.04	1.31	1.13	1.13

D0390	Hamilton	60	$4,113.33	$3,771.25	1.68	2.75	1.47	1.06	1.25
D0312	Haven Public Schools	892	$3,856.54	$3,566.41	1.75	1.02	1.28	1.30	1.32
D0474	Haviland	104	$3,394.97	$3,190.25	1.67	2.00	1.30	1.20	1.13
D0489	Hays	3,177	$3,708.94	$3,444.19	1.55	1.06	1.32	1.22	1.26
D0261	Haysville	5,648	$3,394.97	$3,190.25	1.31	1.20	1.48	1.17	1.24
D0468	Healy Public Schools	67	$3,906.32	$3,603.82	1.76	2.57	1.59	0.23	0.25
D0487	Herington	487	$3,714.95	$3,449.04	1.84	1.13	1.50	1.05	1.12
D0460	Hesston	802	$3,753.25	$3,480.02	1.62	1.04	1.09	1.22	1.21
D0415	Hiawatha	933	$3,697.14	$3,434.64	1.79	1.02	1.42	1.26	1.36
D0227	Hodgeman County Schools	292	$3,887.00	$3,588.19	1.81	1.29	1.23	1.20	1.29
D0431	Hoisington	753	$3,720.28	$3,453.36	1.70	1.04	1.45	1.28	1.25

D0363	Holcomb	1,018	$3,743.45	$3,472.10	1.67	1.01	1.42	0.83	0.92
D0336	Holton	1,128	$3,704.70	$3,440.76	1.63	1.01	1.30	1.44	1.46
D0412	Hoxie Community Schools	392	$3,834.20	$3,545.50	1.65	1.19	1.23	1.24	1.29
D0210	Hugoton Public Schools	1,047	$3,752.84	$3,488.33	1.80	1.01	1.45	1.12	1.22
D0258	Humboldt	805	$3,730.27	$3,461.43	1.84	1.04	1.22	1.15	1.26
D0308	Hutchinson Public Schools	4,677	$3,863.10	$3,573.61	1.83	1.14	1.61	1.31	1.37
D0446	Independence	2,137	$3,548.90	$3,300.02	1.61	1.01	1.55	1.12	1.13
D0477	Ingalls	212	$3,686.24	$3,397.96	1.83	1.45	1.10	0.92	0.94
D0448	Inman	431	$3,953.96	$3,642.36	1.73	1.16	1.17	1.44	1.57
D0257	Iola	1,305	$3,726.94	$3,458.74	1.94	1.00	1.53	1.04	1.12
D0346	Jayhawk	577	$3,856.57	$3,563.59	1.71	1.09	1.51	0.99	0.99

D0339	Jefferson County North	464	$3,721.28	$3,454.16	1.63	1.14	1.20	1.16	1.20
D0340	Jefferson West	861	$3,748.15	$3,475.90	1.62	1.03	1.18	1.15	1.12
D0500	Kansas City	21,937	$3,679.89	$3,420.69	1.17	1.97	1.91	1.33	1.39
D0321	Kaw Valley	1,182	$3,923.24	$3,617.51	1.66	1.00	1.23	1.09	1.16
D0331	Kingman - Norwich	979	$3,788.83	$3,508.80	1.70	1.02	1.30	1.18	1.21
D0347	Kinsley-Offerle	349	$3,874.51	$3,578.10	1.79	1.23	1.48	0.99	1.10
D0422	Kiowa County	420	$3,805.13	$3,499.86	1.74	1.17	1.12	0.97	1.03
D0483	Kismet-Plains	708	$3,677.24	$3,391.54	1.77	1.05	1.50	1.20	1.23
D0395	LaCrosse	289	$3,815.03	$3,539.92	1.77	1.30	1.35	1.12	1.18
D0506	Labette County	1,574	$3,757.27	$3,483.28	1.69	1.00	1.47	1.39	1.39
D0215	Lakin	636	$3,685.16	$3,424.95	1.76	1.07	1.41	1.03	1.08

D0469	Lansing	2,698	$3,775.74	$3,498.22	1.72	1.04	1.19	1.32	1.39
D0497	Lawrence	11,969	$3,742.54	$3,471.36	1.30	1.55	1.25	1.18	1.20
D0245	LeRoy-Gridley	208	$3,798.78	$3,516.85	1.77	1.46	1.30	1.35	1.37
D0453	Leavenworth	3,873	$3,789.90	$3,509.66	1.62	1.10	1.52	1.06	1.04
D0243	Lebo-Waverly	428	$3,708.44	$3,413.79	1.80	1.16	1.28	1.13	1.13
D0467	Leoti	400	$3,878.48	$3,581.31	1.81	1.18	1.45	1.20	1.19
D0502	Lewis	118	$3,394.97	$3,190.25	1.69	1.87	1.52	1.46	1.71
D0480	Liberal	4,971	$3,720.29	$3,457.82	1.55	1.16	1.60	1.11	1.23
D0298	Lincoln	353	$3,842.67	$3,552.34	1.78	1.22	1.41	0.91	0.97
D0444	Little River	315	$3,848.11	$3,573.81	1.74	1.26	1.18	1.44	1.45
D0326	Logan	150	$3,984.39	$3,666.97	1.68	1.67	1.29	1.16	1.26

D0416	Louisburg	1,720	$3,759.93	$3,485.43	1.70	1.00	1.08	1.23	1.32
D0421	Lyndon	436	$3,736.20	$3,466.23	1.66	1.16	1.25	1.35	1.45
D0405	Lyons	847	$3,684.38	$3,424.32	1.85	1.03	1.63	1.37	1.37
D0351	Macksville	236	$3,928.82	$3,622.02	1.69	1.39	1.50	1.06	1.14
D0386	Madison-Virgil	219	$3,990.45	$3,671.86	1.77	1.43	1.38	1.16	1.14
D0266	Maize	7,173	$3,742.63	$3,471.43	1.37	1.28	1.10	1.17	1.21
D0383	Manhattan-Ogden	6,388	$3,730.71	$3,466.03	1.52	1.24	1.28	1.32	1.34
D0456	Marais Des Cygnes Valley	220	$3,726.52	$3,458.40	1.68	1.43	1.40	1.13	1.08
D0408	Marion-Florence	521	$3,778.91	$3,500.78	1.82	1.11	1.31	1.20	1.18
D0256	Marmaton Valley	287	$3,922.52	$3,616.93	1.78	1.30	1.45	1.69	1.83
D0364	Marysville	747	$3,951.25	$3,640.16	1.82	1.05	1.29	1.08	1.11

D0342	McLouth	488	$3,734.67	$3,465.00	1.67	1.13	1.30	1.44	1.66
D0418	McPherson	2,404	$3,750.79	$3,478.03	1.68	1.02	1.27	1.11	1.10
D0226	Meade	408	$3,394.97	$3,190.25	1.82	1.18	1.25	1.57	1.66
D0219	Minneola	244	$3,721.08	$3,454.01	1.85	1.37	1.54	1.39	1.48
D0330	Mission Valley	497	$3,970.90	$3,656.06	1.71	1.12	1.24	1.17	1.36
D0371	Montezuma	236	$3,839.91	$3,550.11	1.80	1.39	1.31	1.33	1.26
D0417	Morris County	733	$3,874.43	$3,578.03	1.78	1.05	1.31	1.36	1.37
D0209	Moscow Public Schools	175	$3,690.08	$3,400.70	1.86	1.56	1.57	1.23	1.22
D0423	Moundridge	401	$3,730.57	$3,461.68	1.74	1.18	1.16	1.10	1.12
D0263	Mulvane	1,797	$3,736.69	$3,466.63	1.52	1.00	1.29	1.36	1.44
D0115	Nemaha Central	603	$3,819.75	$3,533.81	1.84	1.08	1.08	1.67	1.61

D0461	Neodesha	697	$3,915.05	$3,610.88	1.78	1.06	1.47	1.06	1.05
D0303	Ness City	312	$3,993.60	$3,674.42	1.73	1.27	1.40	0.85	0.89
D0373	Newton	3,539	$3,503.07	$3,291.83	1.67	1.08	1.44	1.19	1.28
D0309	Nickerson	1,139	$3,795.45	$3,523.64	1.75	1.01	1.42	1.13	1.23
D0335	North Jackson	367	$3,932.46	$3,624.96	1.71	1.21	1.28	1.24	1.34
D0251	North Lyon County	395	$3,759.59	$3,485.15	1.69	1.19	1.43	1.30	1.36
D0239	North Ottawa County	616	$3,911.67	$3,608.15	1.70	1.08	1.29	1.01	1.03
D0246	Northeast	496	$3,767.07	$3,491.20	1.70	1.12	1.63	1.27	1.36
D0212	Northern Valley	146	$3,735.60	$3,465.75	1.66	1.69	1.38	1.30	1.34
D0211	Norton Community Schools	665	$3,798.11	$3,524.48	1.74	1.06	1.30	1.14	1.18
D0274	Oakley	409	$3,775.97	$3,498.40	1.64	1.17	1.37	0.84	0.89

D0294	Oberlin	340	$3,895.54	$3,595.11	1.60	1.24	1.28	1.16	1.22
D0233	Olathe	29,029	$3,731.06	$3,462.08	1.19	1.97	1.18	1.20	1.23
D0322	Onaga-Havensville-Wheaton	302	$3,720.66	$3,453.67	1.71	1.28	1.29	1.60	1.68
D0420	Osage City	685	$3,724.10	$3,456.44	1.65	1.06	1.33	1.67	1.62
D0367	Osawatomie	1,161	$3,750.98	$3,478.19	1.64	1.01	1.54	1.15	1.16
D0392	Osborne County	278	$3,879.97	$3,582.51	1.72	1.31	1.37	1.37	1.32
D0341	Oskaloosa Public Schools	612	$3,881.53	$3,583.77	1.67	1.08	1.41	1.53	1.59
D0504	Oswego	461	$3,892.13	$3,592.34	1.71	1.14	1.51	1.02	1.13
D0403	Otis-Bison	246	$3,941.27	$3,632.09	1.80	1.37	1.36	1.18	1.22
D0290	Ottawa	2,479	$3,727.24	$3,458.98	1.72	1.03	1.38	0.99	1.01
D0358	Oxford	444	$4,074.50	$3,739.84	1.69	1.15	1.22	0.74	0.82

D0269	Palco	88	$3,696.38	$3,434.02	1.81	2.19	1.25	1.76	1.80
D0368	Paola	2,029	$3,739.63	$3,469.01	1.68	1.01	1.24	1.13	1.19
D0399	Paradise	113	$3,835.08	$3,546.21	1.84	1.92	1.32	1.47	1.67
D0503	Parsons	1,314	$3,709.38	$3,444.54	1.68	1.00	1.66	1.14	1.19
D0496	Pawnee Heights	152	$3,956.33	$3,590.57	1.68	1.66	1.20	2.02	2.22
D0398	Peabody-Burns	262	$3,739.10	$3,435.65	1.78	1.34	1.46	1.12	1.17
D0343	Perry Public Schools	745	$3,746.55	$3,474.60	1.62	1.05	1.27	1.35	1.38
D0325	Phillipsburg	621	$3,725.99	$3,457.97	1.77	1.08	1.24	1.35	1.51
D0426	Pike Valley	223	$3,722.06	$3,454.79	1.72	1.42	1.40	0.74	0.86
D0203	Piper-Kansas City	2,186	$3,394.97	$3,190.25	1.43	1.02	1.05	0.95	1.02
D0250	Pittsburg	3,143	$3,718.12	$3,451.61	1.74	1.06	1.65	1.16	1.21

D0270	Plainville	340	$4,024.17	$3,699.13	1.80	1.24	1.25	1.33	1.28
D0344	Pleasanton	359	$3,878.29	$3,581.15	1.74	1.22	1.44	1.25	1.33
D0113	Prairie Hills	1,125	$3,738.80	$3,468.33	1.80	1.01	1.25	1.33	1.28
D0362	Prairie View	919	$3,749.73	$3,477.17	1.71	1.02	1.38	1.48	1.58
D0382	Pratt	1,229	$3,722.06	$3,454.79	1.90	1.00	1.40	1.76	1.78
D0311	Pretty Prairie	244	$3,693.91	$3,432.03	1.70	1.37	1.10	1.54	1.60
D0293	Quinter Public Schools	304	$3,809.41	$3,525.44	1.74	1.28	1.20	1.17	1.14
D0105	Rawlins County	335	$3,846.93	$3,555.79	1.51	1.24	1.33	1.37	1.50
D0206	Remington-Whitewater	515	$3,762.64	$3,487.62	1.70	1.11	1.28	1.33	1.41
D0267	Renwick	1,856	$3,739.74	$3,469.09	1.63	1.01	1.04	1.54	1.54
D0109	Republic County	515	$3,678.93	$3,392.74	1.71	1.11	1.41	1.25	1.18

D0378	Riley County	681	$3,743.88	$3,472.45	1.67	1.06	1.17	1.58	1.59
D0114	Riverside	642	$3,394.97	$3,190.25	1.58	1.07	1.42	1.05	1.06
D0404	Riverton	741	$3,739.49	$3,468.90	1.81	1.05	1.41	1.48	1.61
D0323	Rock Creek	1,043	$3,843.18	$3,552.76	1.66	1.01	1.18	1.15	1.19
D0107	Rock Hills	312	$3,645.06	$3,368.60	1.67	1.27	1.42	1.51	1.45
D0217	Rolla	134	$3,734.30	$3,432.23	1.83	1.76	1.33	1.48	1.78
D0394	Rose Hill Public Schools	1,616	$3,394.97	$3,190.25	1.53	1.00	1.18	1.10	1.12
D0337	Royal Valley	837	$3,732.99	$3,463.64	1.64	1.03	1.40	1.25	1.26
D0481	Rural Vista	297	$3,685.21	$3,425.00	1.78	1.29	1.33	1.26	1.42
D0407	Russell County	836	$3,394.97	$3,190.25	1.79	1.03	1.42	1.14	1.22
D0305	Salina	7,386	$3,722.29	$3,454.98	1.73	1.30	1.51	1.22	1.28

D0434	Santa Fe Trail	1,040	$3,739.27	$3,468.72	1.64	1.01	1.38	1.11	1.11
D0507	Satanta	307	$3,667.42	$3,384.54	1.83	1.27	1.51	0.99	1.10
D0466	Scott County	1,023	$3,394.97	$3,190.25	1.80	1.01	1.36	1.01	1.11
D0345	Seaman	3,807	$3,817.64	$3,541.90	1.44	1.09	1.26	1.18	1.26
D0439	Sedgwick Public Schools	479	$3,930.25	$3,623.18	1.64	1.13	1.28	1.03	1.09
D0450	Shawnee Heights	3,504	$3,824.30	$3,547.08	1.48	1.08	1.24	1.33	1.38
D0512	Shawnee Mission Pub Sch	27,333	$3,764.90	$3,494.81	1.05	1.97	1.22	1.41	1.42
D0372	Silver Lake	716	$3,871.92	$3,576.00	1.57	1.05	1.09	1.12	1.16
D0438	Skyline Schools	412	$3,700.77	$3,437.57	1.61	1.17	1.20	1.18	1.16
D0237	Smith Center	400	$3,919.92	$3,614.83	1.70	1.18	1.36	1.44	1.56
D0400	Smoky Valley	1,572	$3,756.68	$3,482.80	1.72	1.00	1.06	1.26	1.35

D0393	Solomon	316	$3,937.06	$3,628.69	1.79	1.26	1.37	1.13	1.18
D0255	South Barber	255	$3,841.37	$3,551.29	1.59	1.35	1.32	1.70	1.82
D0430	South Brown County	577	$3,711.00	$3,445.85	1.75	1.09	1.65	1.31	1.38
D0509	South Haven	208	$3,697.24	$3,405.80	1.72	1.46	1.33	1.34	1.44
D0306	Southeast Of Saline	697	$3,894.44	$3,594.21	1.73	1.06	1.14	1.29	1.34
D0334	Southern Cloud	207	$3,939.54	$3,630.69	1.76	1.46	1.46	1.39	1.43
D0252	Southern Lyon County	498	$3,849.63	$3,546.11	1.70	1.12	1.31	1.31	1.28
D0381	Spearville	356	$3,704.03	$3,410.65	1.72	1.22	1.23	1.08	1.13
D0230	Spring Hill	3,896	$3,675.47	$3,417.11	1.50	1.10	1.08	1.37	1.39
D0297	St Francis Comm Sch	283	$3,690.53	$3,401.02	1.47	1.31	1.29	1.76	1.94
D0350	St John-Hudson	328	$3,910.49	$3,607.20	1.75	1.25	1.41	1.32	1.37

D0349	Stafford	209	$3,710.55	$3,415.29	1.76	1.46	1.56	1.27	1.35
D0452	Stanton County	438	$3,922.32	$3,616.76	1.72	1.16	1.36	1.15	1.20
D0376	Sterling	508	$3,904.04	$3,601.98	1.80	1.12	1.25	1.16	1.17
D0271	Stockton	342	$3,659.95	$3,404.56	1.78	1.23	1.36	1.15	1.27
D0374	Sublette	466	$3,766.73	$3,498.92	1.82	1.14	1.44	1.21	1.27
D0299	Sylvan Grove	248	$3,889.62	$3,590.32	1.70	1.37	1.31	1.67	1.68
D0494	Syracuse	542	$3,865.99	$3,571.21	1.75	1.10	1.42	1.05	1.17
D0110	Thunder Ridge Schools	217	$3,756.57	$3,482.71	1.64	1.43	1.51	1.04	1.10
D0464	Tonganoxie	1,963	$3,739.70	$3,469.06	1.66	1.01	1.19	1.39	1.51
D0501	Topeka Public Schools	13,794	$3,717.47	$3,450.62	1.16	1.65	1.79	1.52	1.60
D0275	Triplains	65	$3,803.03	$3,520.28	1.46	2.61	1.23	1.13	1.13

D0429	Troy Public Schools	333	$3,879.52	$3,582.15	1.67	1.24	1.19	1.01	1.03
D0202	Turner-Kansas City	4,110	$3,760.81	$3,495.38	1.21	1.11	1.71	1.25	1.33
D0240	Twin Valley	603	$3,913.65	$3,609.75	1.71	1.08	1.32	1.74	1.75
D0463	Udall	311	$3,757.44	$3,483.41	1.73	1.27	1.32	1.03	1.13
D0214	Ulysses	1,758	$3,729.60	$3,460.90	1.79	1.00	1.49	1.02	1.05
D0235	Uniontown	442	$3,905.05	$3,602.79	1.79	1.15	1.44	1.02	1.05
D0262	Valley Center Pub Sch	2,879	$3,807.23	$3,533.53	1.54	1.05	1.27	1.29	1.31
D0338	Valley Falls	381	$3,664.73	$3,408.43	1.66	1.20	1.29	1.29	1.36
D0498	Valley Heights	401	$3,866.25	$3,571.41	1.79	1.18	1.37	1.18	1.15
D0380	Vermillion	578	$3,861.51	$3,567.58	1.77	1.09	1.18	1.23	1.32
D0432	Victoria	288	$3,880.16	$3,582.67	1.70	1.30	1.10	0.88	0.95

D0329	Wabaunsee	446	$3,837.81	$3,557.73	1.71	1.15	1.20	1.24	1.31
D0272	Waconda	325	$3,641.97	$3,366.39	1.74	1.25	1.34	1.11	1.05
D0208	Wakeeney	387	$3,741.41	$3,470.44	1.81	1.19	1.18	1.24	1.28
D0241	Wallace County Schools	202	$3,695.88	$3,433.62	1.53	1.47	1.28	1.35	1.33
D0320	Wamego	1,533	$3,719.46	$3,452.69	1.65	1.00	1.16	1.27	1.34
D0108	Washington Co. Schools	340	$3,866.29	$3,571.45	1.76	1.24	1.35	0.93	1.05
D0353	Wellington	1,622	$3,720.66	$3,453.66	1.70	1.00	1.45	1.33	1.36
D0289	Wellsville	782	$3,758.64	$3,484.38	1.78	1.04	1.20	1.25	1.34
D0242	Weskan	104	$3,968.81	$3,654.36	1.41	2.00	1.24	1.35	1.44
D0282	West Elk	353	$3,956.33	$3,590.57	1.73	1.22	1.37	1.31	1.35
D0287	West Franklin	601	$3,706.73	$3,442.40	1.74	1.08	1.33	1.63	1.66

D0106	Western Plains	107	$3,557.61	$3,306.23	1.73	1.97	1.64	0.82	0.92
D0292	Wheatland	110	$3,907.12	$3,604.47	1.62	1.94	1.17	0.99	1.12
D0259	Wichita	50,566	$3,682.95	$3,422.86	1.24	1.97	1.76	1.29	1.36
D0465	Winfield	2,227	$3,751.82	$3,478.87	1.73	1.02	1.48	1.32	1.36
D0366	Woodson	464	$3,723.66	$3,456.09	1.72	1.14	1.48	1.22	1.22

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Endnotes

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[v] Long, J.B. (2016). A History of School Finance Litigation. Legislature of the State of Kansas. Topeka, KS: Kansas Office of Revisor of Statutes.

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[vii] *Montoy v. State*, No. 99C1738, at 29 (Shawnee Co. Dist. Ct. Dec. 2, 2003).

[viii] *Montoy v. State*, No. 99C1738 at 11 (Shawnee Co. Dist. Ct. May 11, 2004).

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[x] *Id*. 774.

[xi] Long (2016).

[xii] *Gannon v. State*, 298 Kan. 1107 (2014) (*Gannon I*).

[xiii] *Id.* 1170 (citing *Rose*, 790 S.W.2d at 212).

[xiv] *Id.* at 67-68.

[xv] *Id.* at 69 (quoting *U.S.D. 229*).

[xvi] *Id.* 1175.

[xvii] *Id.* at 80.

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[xx] *Gannon v. State*, No. 2010CV1569 at 7 (Shawnee Co. Dist. Ct. June 26, 2015).

[xxi] *Gannon v State*, No. 113,267 (Kan. Sup. Ct. Order July 24, 2015).

[xxii] *Gannon v. State*, 303 Kan. 682, 720, 726 (2016) (*Gannon II*).

[xxiii] *Id.* 741.

[xxiv] *Gannon v. State*, 304 Kan. 490, 493 (2016) (*Gannon III*).

[xxv] *Gannon v. State*, No. 113, 267 (Kan. Sup. Ct. Order June 28, 2016).

[xxvi] *Gannon v. State*, No. 113,267 at 7 (March 2, 2016) (*Gannon IV*).

[xxvii] *Id.*

[xxviii] *Id.* at 81.

[xxix] Kansas Legislative Research Dept (2017).

[xxx] *Gannon v. State*, No. 113,267 at 78 (Kan. Sup. Ct. Oct. 2, 2017) (*Gannon V*).

[xxxi] K.S.A. 72-8801 and L. 2017, ch. 95, § 91.

[xxxii] *Gannon V* at 59-60.

[xxxiii] *Id.* at 56-57.

[xxxiv] *Id.* at 67.

[xxxv] *Id.* at 70.

[xxxvi] *Id.* at 73-75.

[xxxvii] *Id.* at 18.

[xxxviii] *Id.* at 24.

[xxxix] *Id.* at 25.

[xl] *Id.* at 30.

[xli] *Id.* at 28.

[xlii] *Id.* at 29.

[xliii] *Id.* at 5.

[xliv] *Gannon V* at 77-78.

[xlv] *Id*. Quoting *Gannon II*, 303 Kan. at 744 (quoting *Edgewood Independent School Dist. v. Kirby*, 804 S.W.2d 491, 498 [Tex. 1991]).

[xlvi] *Gannon V* at 80.

[xlvii] *Alabama Opinion of the Justice*, 624 So.2d 107, 165-66 (Ala. 1993); *Idaho Sch. for Equal Educ. Opportunity v. Evans*, 850 P.2d 724, 734 (Idaho 1993); *McDuffy v. Secretary*, 615 N.E.2d 516, 554 (Mass. 1993); *Claremont Sch. Dist. v. Governor*, 703 A.2d 1353, 1359 (N.H. 1997); *Leandro v. State*, 488 S.E.2d 249, 255 (N.C. 1997); *Abbeville Cty. Sch. Dis. v. State*, 515 S.E.2d 535, 540 (S.C. 1999); *Lake View Sch. Dis. No. 25 v. Huckabee*, 91 S.W.3d 472, 485 (Ark. 2002); *Carrollton-Farmers Branch Indep. Sch. Dis. v. Edgewood Indep. Sch. Dist.*, 826 S.W.2d 489, 527-28 (Tex. 1992).

[xlviii] *Gannon I.*

[xlix] *Council for Better Education v. Collins*, No. 85-CI-1759 (Franklin County Circuit Court, Kentucky, October 14, 1988).

[l] Ky. Const. §183

[li] *Council for Better Education v. Wilkinson*, No. 85-CI-1759, slip op. at 4 (Franklin Cir. Ct., Oct. 14, 1988).

[lii] *Rose v. Council for Better Education*, 790 S.W.2d 186, 212-213 (1989).

[liii] *Id.* 197.

[liv] *Id.* 209-210.

[lv] *Id.* 215.

[lvi] *Id.*

[lvii] *Id.* 12.

[lviii] *Id.* 19.

[lix] *Id.* 13-14.

[lx] *Id.* 12.

[lxi] *Dupree v. Alma School District No. 30,* 279 Ark. 340, 651 S.W. 2d 90 (1983).

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[lxiii] *Lake View Sch. Dist. No. 25 v. Huckabee*, 91 S.W.3d 484 (2002) (*Lake View III*), (citing Ark. Const. art. XIV, § 1).

[lxiv] *Id* 486.

[lxv] *Id.*, citing Ark. Act 917 of 1995, § 6(c-d).

[lxvi] *Id.* 487-88.

[lxvii] 1997 Ark. Acts 1108 (codified at Ark. Code Ann. § 6-15-1003(a) to (c)).

[lxviii] *Lake View III, 510.*

[lxix] *Id.*

[lxx] 2003 Ark. Acts 35 (codified at Ark. Code Ann. § 6-15-404(a) to (h)).

[lxxi] 2003 Ark. Acts 57 (codified at Ark. Code Ann. § 10-3-2101).

[lxxii] 2003 Ark. Acts 57 (codified at Ark. Code Ann. § 10-3-2002(a)).

[lxxiii] K.S.A. 2013 Supp. 72-1127, as amended by section 32 of 2014 House Bill No. 2506, published as section 32 of chapter 93 of the 2014 Session Laws of Kansas, to be codified at K.S.A. 2014 Supp. 72-1127

[lxxiv] K.S.A. § 72-1127 (2013)

[lxxv] Kansas SB 19, Sec. 43.

[lxxvi] Division of Learning Services. Kansas State Department of Education (2014). *Kansas Alignment to Rose Standards.* Topeka, KS.

[lxxvii] Ibid.

[lxxviii] Ibid.

[lxxix] K.S.A. §72-1101

[lxxx] Kansas Department of Education. September 2014. *Kansas Graduation Requirements: 2014-2015 School Year.* Topeka, KS.

[lxxxi] Kansas Department of Education. Submitted on September 21, 2017. *Revised State Template for the Consolidated State Plan.* Washington, DC.

[lxxxii] K.S.A. §72-1101

[lxxxiii] Kansas Department of Education. September 2014. *Kansas Graduation Requirements: 2014-2015 School Year.* Topeka, KS.

[lxxxiv] K.S.A. §72-1101

[lxxxv] Kansas Department of Education. September 2014. *Kansas Graduation Requirements: 2014-2015 School Year.* Topeka, KS.

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[lxxxvii] Kansas Department of Education. September 2014. *Kansas Graduation Requirements: 2014-2015 School Year.* Topeka, KS.

[lxxxviii] Kansas Department of Education. Submitted on September 21, 2017. *Revised State Template for the Consolidated State Plan.* Washington, DC.

[lxxxix] Kansas Department of Education. September 2014. *Kansas Graduation Requirements: 2014-2015 School Year.* Topeka, KS.

[xc] Selected from algebra I; geometry; algebra II; or any math course that has algebra II as a prerequisite

[xci] Including biology; advanced biology; chemistry; physics; earth-space science; principles of technology; with at least 1 unit in chemistry or physics.

[xcii] Including: (A) min. ½ unit of U.S. gov't; (B) min. of ½ unit of world history; world geography; or international relations; (C) min. of 1 unit of U.S. history; (D) not more than one unit of the following: anthropology; current social issues; economics; psychology; race and ethnic group relations; sociology; U.S. history; U.S. gov't.

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[xcvi] Kansas Assessment Program. *Relating Kansas Assessment Program Scores to ACT Scores.* Retrieved from http://www.ksassessments.org/act.

[xcvii] *Kansas ESSA State Plan.* Appendix A. page 95.

[xcviii] *Kansas ESSA State Plan.* Appendix A. page 95.

[xcix] *Montoy v. State*, No. 92032 (S. Ct. Kan. July 28, 2006).

[c] Kansas Assessment Program. *Performance Levels.* Retrieved from http://www.ksassessments.org/scorereports#PerformanceLevels-Educators.

[ci] Kansas Assessment Program. *Cut Scores for KAP Summative Assessments.* Retrieved from http://ksassessments.org/sites/default/files/documents/KAP_summative_cut_scores.pdf

[cii] *Kansas ESSA state plan*. Appendix A. page 95.

[ciii] The most recent school finance reform put in place in Kansas, SB 19 provided "to fund the necessary supports and interventions for at-risk students, special education, and ELL students, the new funding formula in SB 19 provides additional funding for students in these groups. This includes raising the weighting for at-risk students from .456 to .484, the weighting recommended by the 2006 LPA cost study; authorizing $12 million more per year for special education than the prior law, for a total of $24 million more; and adjusting the weighting for ELL students to the greater of either the FTE enrollment multiplied by 0.395 (based on contact hours) or the actual enrollment in bilingual programs multiplied by 0.185.

[civ] Kansas State Department of Education (KSDE). September 2015. *Accounting Manual for all Unified School Districts.* Retrieved from http://www.ksde.org/Agency/Fiscal-and-Administrative-Services/School-Finance/Guidelines-and-Manuals. Direct link to the accounting manual: http://www.ksde.org/Agency/Fiscal-and-Administrative-Services/School-Finance/Guidelines-and-Manuals.

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[cvii] Kansas State Department of Education (KSDE). September 2015. *Accounting Manual for all Unified School Districts.* Retrieved from http://www.ksde.org/Agency/Fiscal-and-Administrative-Services/School-Finance/Guidelines-and-Manuals. Object classification descriptions starting on page 30.