School Leadership Review

Volume 17
Issue 1 *Fall/Winter 2022*

Article 8

October 2022

Producing College, Career, and Military Ready Graduates: A Study of Efficiency in Texas Public School Districts

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There is an ongoing search for efficiency in the Texas public education system (Carter, 2012; Thompson, 2017). Legislators see perpetual increases in enrollment as an open-ended liability to taxpayers and the state budget, and public school districts face pressure from the rigors of accountability requirements and increasing expectations for student outcomes in a climate of limited resources. The desirable outcome for both is to produce successful graduates efficiently (Hanushek & Raymond, 2005; Texas Commission on Public School Finance, 2018). To create efficiency, leaders must make data driven decisions toward the most strategic allocation of funds for student success (Ybarra & Shelton, 2020). In response to the need for greater efficiency in the Texas public education system, this study identified school districts producing successful student outcomes, measured by the percentage of College, Career, and Military Ready graduates, and evaluated variables effecting efficiency for the benefit of school districts in Texas seeking improvement.

Background

Accountability for student performance in Texas public schools historically centered on standardized tests (Cruse & Twing, 2000). In 2017, the 85th Legislature in Texas changed the accountability system to include a new metric for high school graduates called College, Career, and Military Readiness (CCMR), which identified the achievement of graduates on standardized tests, industry based certifications, and the intention to join the military (Texas Education Agency, 2019c). The CCMR designation is a more holistic measure of success than the traditional approaches, which focused solely on standardized test performance (Texas Commission on Public School Finance, 2018).

Funding for public school districts in Texas traditionally aligned to student characteristics, average daily attendance, and local property wealth (Chingos & Blagg, 2017). This funding system created disparity in the levels of funding different school districts received (Warren, 2008). Because of consistent litigation to address those disparities, Texas legislators continuously reformed the funding system from 1968-1993 (Kauffmann, 2009). In 2019, the 86th Legislature in Texas updated the funding formula for public education through House Bill 3, reducing the impact of local property values, providing more funding from the State of Texas, and moving to additional funding for specific outcomes from funding based solely on average daily attendance and student characteristics (Texas Education Agency, 2019a). One successful student outcome identified by House Bill 3 for additional funding to school districts was the percentage of students who graduated with the CCMR designation (Texas Education Agency, 2019d). As a result of these systemic changes to accountability and funding, Texas public school districts with the capacity to produce College, Career, and Military Ready graduates efficiently received better accountability ratings and additional funding (Texas Education Agency, 2019a; Texas Education Agency, 2019c). In order to improve practice in a culture of limited resources, school districts may compare performance with other peer districts and identify factors that increase efficiency (Carter, 2012; Thompson, 2017).

Previous research for identifying efficiency in Texas public education utilized different variables for effectiveness in the context of different accountability systems. Recognizing the ongoing change in education, Carter (2012) called for periodic efficiency studies in public education to support data based decision-making, while Thompson (2017) called for additional research to replicate his study using a different measure of effectiveness, such as the postsecondary readiness standard. With the introduction of the CCMR standards, Texas created a new variable to study and a justification for extending the research of both Carter and Thompson (Creswell & Guetterman, 2019).

The most proactive school districts maximize effectiveness by implementing research-based programs and increasing student outcomes with the funding provided by state and local resources (Daggett, 2009). However, there are inconsistent findings in research about the variables that make some schools and school districts more effective than others (Monk, 1992). There is a need for studies of efficiency in the production of CCMR graduates to maximize resources for school districts in Texas in the House Bill 3 funding formula and improve ratings in the accountability system.

The purpose of this quantitative study was to determine the efficiency of Texas public school districts, defined by their ability to produce CCMR graduates, and identify factors influencing efficiency or inefficiency in those school districts. This study is a replication of Carter's (2012) and Thompson's (2017) efficiency studies. The following research questions guided this study.

1. What non-discretionary factors influence the efficiency of Texas public school districts in the production of College, Career, and Military Ready Graduates?
2. What discretionary factors influence the efficiency of Texas public school districts in the production of College, Career, and Military Ready Graduates?

Method

For school districts and educational leaders, efficiency is the relationship between the desired outcome and the resources for achieving that outcome (Imazeki &

Reschovsky, 2005). Data envelopment analysis (DEA) was the methodology selected for this analysis because it can handle multiple inputs and outputs simultaneously; it does not require parametric data; and it does not require profit-seeking motives (Kantabutra, 2009). DEA is also a preferred methodology for determining efficiency because it generates an objective measure of efficiency, permitting the comparison of efficiency rates among peer school districts (Charnes et al., 1978; Johnes, 2006; Kantabutra, 2009). DEA generates an efficiency rating oriented to maximizing the inputs and an efficiency oriented to maximizing the outputs.

The variables used to inform the Data Envelopment Analysis process in this study were aligned to the variables used in studies of Carter (2012) and Thompson (2017). Carter (2012) considered both results. Thompson (2017) only included the efficiency rating of the output model in the data analysis. This study followed the Thompson design as the study was focused on the maximizing the efficiency of the sole output variable, the percentage of graduates designated as College, Career, and Military Ready (CCMR).

Population and Participants

This study collected financial and student performance data from every school district in Texas for the 2017-2018 school year. Only school districts with complete student performance and financial data or the 2017-2018 school year were analyzed, resulting in 1054 school districts being included in the study. This analysis included charter school districts when complete data was available.

Measures

Data used for this study came from the 2017-2018 Texas Academic Performance Report (TAPR) that is collected and made publically available from the Texas Education

Agency on their website (https://tea.texas.gov/texas-schools/accountability/academic-accountability/performance-reporting/texas-academic-performance-reports). The inputs analyzed against the output variable were divided into two categories: discretionary variables and non-discretionary variables. The output variable in the Data Envelopment Analysis was the percentage of graduates earning the CCMR designation in the 2017-2018 school year.

Discretionary Input Variables

The discretionary variables, which are variables that can be controlled by management (Charnes et al., 1978), were the average teacher salary, average years of teacher experience, percentage of teachers with master's degrees, per student operating expenditures, per student expenditures for instruction, per student expenditures for instruction-related services, per student expenditures for instructional leadership, per student expenditures for school leadership, per student expenditures for student services, and per student expenditures for general administration.

Average Teacher Salary. This variable reflects the base pay approved by the school district board of trustees yearly, excluding stipends and extra duty pay. The Texas Education Agency reports the overall average teacher salary on the TAPR report for each school district each year. Though there is a minimum salary schedule mandated by the State of Texas, school districts have the discretion to approve a salary schedule above that standard to recruit and maintain high quality teachers.

Average Years of Teacher Experience. Texas public school districts are required to maintain an accurate record of each teacher's years of experience on the Teacher Service Record and report that to the Texas Education Agency yearly. The Texas

Education Agency reports the experience of teachers in each district on the TAPR report as an overall average and broken down into the following categories: zero years of experience, one to five years of experience, six to ten years of experience, eleven to twenty years of experience, and over twenty years of experience. The average years of experience for all teachers was used in this study. School districts have the ability to recruit and retain teachers with experience.

Percentage of Teachers with Master's Degrees. A bachelor's degree and certification process are requirements to teach in Texas. While master's degrees are not required, many teachers pursue additional education as part of professional learning and ongoing education. This credential is an indication of additional preparation for classroom instruction

Total Operating Expenditures Per Pupil. The annual TAPR reports a per pupil expenditure to measure the cost of educating each student for every Texas public school district (Texas Education Agency, 2019b). Expenditures for the district general fund are approved by the board of trustees in the annual budget.

Instructional Expenditures Per Pupil. Expenditures for instruction include spending for the instruction of students in the school district and at a separate facility for students assigned to a Disciplinary Alternative Education Program (Texas Education Agency, 2019b). Instructional expenditures are recorded in functions 11 and 95 by the Texas Education Agency and aggregated and analyzed on a per pupil basis for this analysis.

Instructional-related Service Expenditures Per Pupil. Expenditures for instructional-related services include spending for libraries, instructional media, curriculum development and instructional staff development (Texas Education Agency, 2019b). These expenditures are reported in functions 12 and 13 by the Texas Education Agency and aggregated and analyzed on a per pupil basis for this analysis

Instructional Leadership Expenditures Per Pupil. Expenditures for instructional leadership include spending for supervisors, program coordinators, staff and others responsible for managing, directing, and supervising those who provide instruction (Texas Education Agency, 2019b). These expenditures are reported in function 21 by the Texas Education Agency and analyzed on a per pupil basis for this analysis.

School Leadership Expenditures Per Pupil. Expenditures for school leadership include spending for campus administrators, office staff and the costs related to administration (Texas Education Agency, 2019b). These expenditures are reported in function 23 by the Texas Education Agency and analyzed on a per pupil basis for this analysis.

Student Support Services Expenditures Per Pupil. Expenditures for student support services includes spending for guidance, counseling, evaluation, social work, and health services (Texas Education Agency, 2019b). These expenditures are reported in functions 31, 32, and 33 by the Texas Education Agency and aggregated and analyzed on a per pupil basis for this analysis.

General Administration Expenditures Per Pupil. Expenditures for general administration include spending district wide management, the board of trustees, legal fees, the superintendent, capital expenditures, and the purchase of attendance credits if the district was designated for recapture payments through Chapter 41 (Texas Education Agency, 2019b). These expenditures are reported in functions 41, 80, and 92 by the

Texas Education Agency and aggregated and expressed on a per pupil basis for this analysis.

Non-Discretionary Input Variables

The non-discretionary variables, which are those variables beyond the control of management (Charnes et al., 1980), used in the analysis were the enrollment of the school district, the percentage of non-white students, the percentage of economically disadvantaged students, and ratio of students to teacher.

Total Student Enrollment. The enrollment of a school district depends greatly on the population size and economic condition of the community served by the school district.

Percentage of Non-White Students. The percentage of non-white students in the school district is a metric included in Carter's (2012) and Thompson's (2017) efficiency studies even though it is not specifically recorded in the TAPR report. The TAPR report, however, does record the percentage of white students, and the percentage of non-white students was extrapolated from the percentage of white students for analysis.

Percentage of Economically Disadvantaged Students. A consistent consideration in studies about efficiency in education is the degree to which the students surveyed are economically disadvantaged. This data point is prominent in the funding and accountability formulas in Texas and provided on the TAPR report.

Ratio of Students Per Teacher. While Texas requires classrooms in grades Kindergarten to Fourth Grade to maintain a 22 to 1 student to teacher ratio, there is a waiver process permitting more. Student enrollment growth can be a determining factor in class size if the school district was not adequately prepared for the increases.

Output Variable

The output variable for this study was the percentage of graduates in each Texas school district in the 2017-2018 school year. The criteria for earning the College, Career, and Military Ready distinction are listed in Table 1. Previous efficiency studies of the same design (Carter, 2012; Thompson, 2017) utilized the highest possible measure of student achievement on the standardized test administered by the state at that time rather than using a lower but still acceptable level of achievement. Thompson reflected on this choice and called for additional research to replicate the study using a different measure of effectiveness, such as the postsecondary readiness standard. This study measured the effectiveness of Texas school districts by the percentage of graduates identified as College, Career, and Military Ready, a successor to the post-secondary readiness metric Thompson recommended.

Table 1

Measures of College, Career, and Military Readiness (Texas Education Agency, 2019d; TX HB 22 85th Legislature, 2018)

College Ready	Meet criteria on Advanced Placement and International Baccalaureate exams.
	Meet Texas Success Initiative criteria in reading and mathematics (on ACT, SAT, TSIA, or college prep course).
	Complete a college prep course offered by a partnership between a school district and institution of higher education as required by HB 5.
	Complete a course for dual credit.
	Complete a course in the OnRamps dual enrollment program.
	Earn an associate's degree while in high school.

	Meet standards on a composite of indicators indicating college readiness.
Career Ready	Earn industry certification.
	Be admitted to a post-secondary industry certification program.
	Complete a CTE Coherent Sequence Coursework Aligned with Industry-Based Certifications
Military Ready	Enlist in the United States Armed Forces.

Data Analysis

The data analysis occurred in three stages. First, Data Envelopment Analysis (DEA) was used to measure efficiency of each school district in creating College, Career and Military Ready graduates given the resources available. The program used to apply Data Envelopment Analysis in this study was MaxDEA, a supplement to the text by Cheng (2014). Banker et al., (1984) described the output oriented formula in Equation (1).

$$\max \mathrm{h_o} = \frac{\sum_{r=1}^{s} U_r Y_{r0}}{\sum_{i=1}^{m} V_i X_{i0}}$$

subject to: (1)

$$1 \geq \frac{\sum_{r=1}^{s} U_r Y_{rj}}{\sum_{i=1}^{m} V_i X_{ij}}, \text{ j=1, } \dots \text{, n}$$

with:

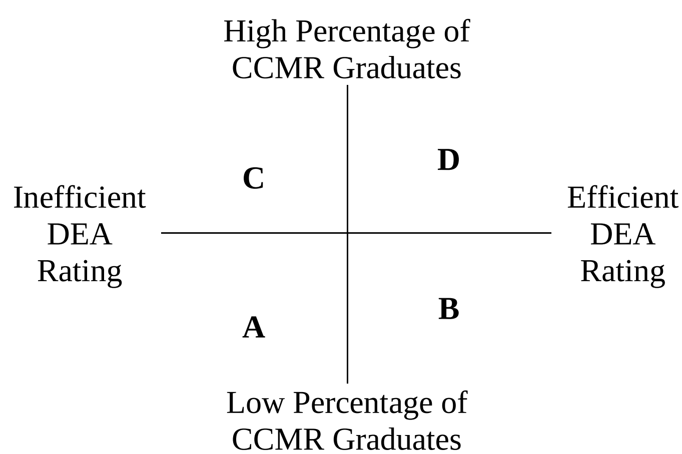
$$u_r, v_i > 0,^1 \quad i = 1, \dots, m \;\; r = 1, \dots, s$$

The formula produces an efficiency rating between 0 and 1. The lower the coefficient, the less efficient the district. Districts with an effiency of 1 are considered fully efficient.

Next, Daggett's (2009) Effectiveness and Efficiency (E/E) Framework was used to plot the school district DEA efficiency rating against the percentage of CCMR graduates in 2017-2018, which could be used to determine which school districts were most successful in their practices and those in need of change. The Effectiveness and Efficiency Framework compares the frequency of an educational outcome (effectiveness) with its cost (efficiency) by plotting each metric into one of four quadrants, labeled A, B, C, and D. Figure 1 presents the Effectiveness and Efficiency Framework as it was utilized for this study.

Figure 1

Daggett's Effectiveness and Efficiency Framework (Daggett, 2009).



In the third step of the analysis, the DEA efficiency rating for each school district, the discretionary and non-discretionary variable collected for each school district were regressed against the efficiency rating using ordinary least squares (OLS) to determine the effect of each variable on the efficiency of the school district. The OLS regression was calculated using the SPSS statistics software.

Findings

For the 1,054 Texas public school districts included in the data analysis, Table 2 lists each district type as designated by the Texas Education Agency (TEA) with the average enrollment of the school districts assigned to it. The smallest school district category, Major Urban, comprises the Texas public school districts with the largest student populations. The largest school district category, Rural, includes the Texas public school districts with the smallest student populations.

Table 2

Enrollment by Texas Education Agency School District Type

District Type	*n*	*M*	Minimum	Maximum
Major Urban	11	87,905	41,185	213,528
Major Suburban	79	22,128	2,001	116,138
Other Central City	39	21,822	4,612	61,323
Non-Metropolitan Fast Growing	30	1,182	302	4,368
Other Central City Suburban	163	4,695	917	24,791
Independent Town	68	3,734	321	14,243
Charter School Districts	88	2,847	75	35,595
Non-Metropolitan Stable	168	1,691	899	6,047
Rural	408	428	63	897
TOTAL	1,054	17,453	63	213,528

District Type	*n*	*M*	Minimum	Maximum

Note. *n* = number of Texas Public School Districts; *M* = average enrollment of the school districts in the category.

The efficiency of each school district was calculated using Data Envelopment Analysis by comparing the input variables collected for each school district against the output variable, the percentage of CCMR graduates in the 2017-2018 school year. Table 3 shows the descriptive statistics by the Texas Education Agency's school district designation. At least one school district in each category, except Major Urban, demonstrated efficiency.

Table 3

CCMR Efficiency by Texas Education Agency School District Type in 2017-2018

District Type	*n*	*M*	Minimum	Maximum
Major Urban	11	0.710	0.607	0.859
Major Suburban	79	0.723	0.386	1.000
Other Central City	39	0.728	0.476	1.000
Non-Metropolitan Fast Growing	30	0.818	0.513	1.000
Other Central City Suburban	163	0.725	0.303	1.000
Independent Town	68	0.681	0.433	1.000
Charter School Districts	88	0.700	0.061	1.000
Non-Metropolitan Stable	168	0.712	0.387	1.000
Rural	408	0.781	0.000	1.000
TOTAL	1,054	0.731	0.000	1.000

Note. *n* = number of Texas Public School Districts; *M* = average efficiency of the school districts in the category.

For the next step in the analysis, Daggett's E/E Framework (2009) was used to evaluate which districts were most successful in their practices. In plotting the districts, the x-axis, representing efficiency in 2017-2018 as calculated by Data Envelopment Analysis, was placed at 0.742, which was the grand mean efficiency scores for all of the school districts in the first step of the data analysis. The y-axis, representing the effectiveness of the school districts in 2017-2018, was set at 67.013, the average percentage of graduates designated as CCMR in 2017-2018 for the school districts in the data analysis. Figure 2 shows the plots of all public school districts in Texas included in this study and Table 4 presents the summary data for all school districts in Texas by quadrant.

Daggett's (2009) Effectiveness and Efficiency (E/E) Framework was designed to analyze and communicate the most successful educational practices with clarity and simplicity. The Effectiveness and Efficiency Framework compares the frequency of an educational outcome (effectiveness) with its cost (efficiency) by plotting each metric into one of four quadrants, labeled A, B, C, and D. School districts with efficiency represented in Quadrant A have practices to reevaluate, and school districts represented in Quadrant D have practices to replicate.

Figure 2

All Public School Districts in Texas in Daggett's E/E Framework

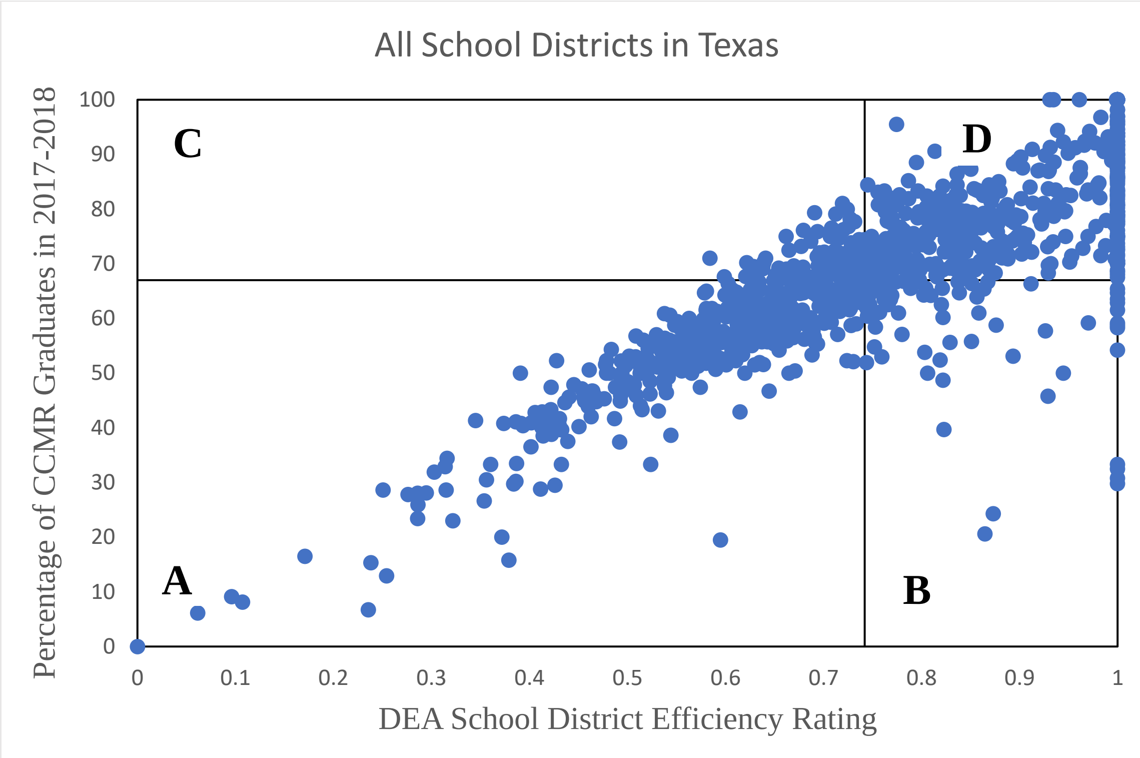


Table 4

All Texas Public School Districts CCMR Effectiveness and Efficiency by Quadrants

		A	B	C	D
District Type	*n*	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Major Urban	11	8 (72.7)	2 (18.2)	0 (0.0)	1 (9.1)
Major Suburban	79	38 (48.1)	6 (7.6)	7 (8.9)	28 (35.4)
Other Central City	39	19 (48.7)	4 (10.3)	5 (12.8)	11 (28.2)
Non-Metropolitan Fast Growing	30	6 (20.0)	3 (10.0)	3 (10.0)	18 (60.0)
Other Central City Suburban	163	73 (44.8)	5 (3.1)	19 (11.7)	66 (40.5)
Independent Town	68	39 (57.4)	5 (7.4)	6 (8.8)	18 (26.5)
Charter School Districts	88	39 (44.3)	12 (13.6)	1 (1.1)	36 (40.9)

Non-Metropolitan Stable	168	80 (47.6)	6 (3.6)	24 (14.3)	58 (34.5)
Rural	408	123 (30.1)	33 (8.1)	41 (10.0)	211 (51.7)
TOTAL	1,054	425 (40.3)	76 (7.2)	106 (10.1)	447 (42.4)

Out of 1054 Texas public school districts in the data analysis, 142 school districts demonstrated full efficiency by earning a DEA rating of 1.0, and 21 of those efficient school districts were scored as fully effective for graduating 100% of the 2017-2018 class College, Career, and Military Ready. Regarding efficiency by quadrant, the Rural schools and Non-Metropolitan Fast Growing appeared to have the most percentage of districts in Quadrant D, suggesting practices that should be emulated for maximizing return on investiment of resources. Conversely, it appears that being large and urban yielded the least efficient and worst return on investment (i.e., lower percentate of CCMR graduates) and all the school districts not designated Rural or Non-Metropolitan Fast Growing had the largest percentage of schools in Quadrant A.

In the second step of the analysis, Ordinary Least Squares (OLS) regression was used to determine what variables, if any, had a significant effect on the ability of public school districts in Texas to produce CCMR graduates with efficiency. The dependent variable in the regression analysis was the Data Envelopment Analysis efficiency score for each school district. The independent variables in the regression analysis were the discretionary and non-discretionary variables. After analyzing correlational data and variance inflation factors (VIF) for indications of multi-collinearity among the independent variables, the regression analysis was conducted in alignment with the selected variables of Carter (2012) and Thompson (2017). Descriptive statistics for the variables in the regression analysis were summarized in Table 5.

Table 5

Descriptive Statistics for Variables Used in Regression Analysis

Variable	*n*	*M*	*SD*
Dependent Variable			
DEA Efficiency Score	1054	.74	0.18
Non-discretionary Independent Variables			
Total Student Enrollment	1054	5,031.89	13,762.52
Percentage of Non-white Students	1054	53.11%	26.96%
Percentage of Economically Disadvantaged Students	1054	59.44%	19.73%
Student to Teacher Ratio	1054	13.13	2.64%
Discretionary Independent Variables			
Average Teacher Salary	1054	$47,751.84	$5,035.97
Average Years of Teacher Experience	1054	11.90	3.01
Percentage of Teachers with Master's Degree	1054	19.01%	8.74%
Instructional Expenditures Per Pupil	1054	$5,238.13	$1057.33

Based on the regression analysis the student to teacher ratio percentage and the percentage of economically disadvantaged students had a significant negative influence on school district efficiency in creating CCMR graduates, with standardized beta coefficients two to four times greater in magnitude than any other variable analyzed. The percentage of non-white students did not have a significant influence on school district efficiency. Table 6 presents the results of the regression analysis of non-discretionary variables in the study.

Table 6

Regression Analysis of Non-discretionary Variables

Variable	Standardized Beta Coefficient	Significance
Total Student Enrollment	.143	.000*
Percentage of Non-white Students	-.018	.671
Percentage of Economically Disadvantaged Students	-.411	.000*
Student to Teacher Ratio	-.247	.000*

Note. Statistical significance indicated at 0.05.

In regard to the non-discretionary variables, there was a statistically significant negative influence on school district efficiency for average teacher salary, average years of teacher experience, and percentage of teachers with a master's Degree. The standardized beta coefficients for the significant discretionary variables are of less magnitude than the non-discretionary variables analyzed. Table 7 presents the results of the regression analysis of the discretionary variables in the study.

Table 7

Regression Analysis of Discretionary Variables

Variable	Standardized Beta Coefficient	Significance
Average Teacher Salary	-.126	.002*
Average Years of Teacher Experience	-.087	.008*

Percentage of Teachers with Master's Degree	-.102	.001*
Instructional Expenditures Per Pupil	-.041	.339

Note: Statistical significance indicated at 0.05.

Discussion

There is support in the literature for educational reforms addressing funding and achievement simultaneously (Baker et al., 2015; Chung, 2015; Le Floch et al., 2014; Lafortune et al., 2016, Odden, 1994). In finding greater success for students and higher efficiency rates for school districts than preceding efficiency studies found in studies focused on standardized testing alone (Carter, 2012; Thompson, 2017), this study demonstrated potential for the CCMR standard to be a reform empowered by both funding and accountability.

However, in spite of that success, there remains measurable room for improvement in Texas public school districts. Even as 42.4% of school districts demonstrated above average effectiveness and above average efficiency (Quadrant D), 40.3% of the 1054 school districts analyzed in this study fell below the state average for effectiveness and below the state average for efficiency (Quadrant A). A consistent emphasis on the CCMR standard in the funding and accountability formulas by legislators and policymakers has the potential to move school districts in Quadrant D to improved outcomes for all students.

The findings of the Coleman Report (Coleman, 1966) focused on race as a significant factor for creating positive educational outcomes for students. Preceding efficiency studies (Carter, 2012; Thompson, 2017) using the same methodology as this study, but focused on standardized tests as the measure of success, found the percentage of non-white students in the school district had a significant effect on efficiency. In this study, the percentage of non-white students did not have a significant effect on efficiency. Perhaps this finding is due to the use of CCMR as the outputvariable, creating diverse ways to demonstrate success in the Texas public educational system. However, the inequities Coleman defined by race in segregated communities at that time in history may have a viable proxy in the economically disadvantaged variable recorded by these efficiency studies. There is a consistently negative effect on efficiency and a consistently large standardized beta coefficient for increasing populations of students from economically disadvantaged backgrounds. The regularity of this finding in research should lead policymakers to invest meaningfully to help students overcome the challenges common in communities of economic need.

Implications for Practice

This research study is valuable to educators and educator leaders in guiding the allocation of resources for student success. It was previously noted how the CCMR standard impacts the funding and accountability rating of a public school district in Texas. This study demonstrates the potential for improvement in the production of CCMR graduates with a focus on the classroom, the program, and the student instead of the teacher. Hiring managers may prioritize the capability of a novice teaching candidate over traditional experience and training, campus leaders may allocate additional resources to help students from economically disadvantaged backgrounds overcome disadvantages they face in the educational system, and district leaders may emphasize spending for diverse and engaging programs over significant pay salary increases and recruitment focused on experienced teachers.

Additionally, policymakers will also find value in this study. The CCMR measure of success is broader than what was previously measured by standardized test scores alone, identifying successful learning outcomes in diverse programs and areas of study. As a result, legislators and policymakers may want to continue to emphasize this metric in funding and accountability since this study reveals the capacity school districts have to support a greater range of student success in contrast to when funding and emphasis is placed solely on standardized test outcomes.

Finally, researchers and academics who want to use Data Envelopment Analysis to improve educational outcomes will benefit from the addition to the body of literature of efficiency studies in Texas public school districts. Even though this study used a different output variable than those it replicates, there is sufficient consistency to affirm the methodology and its connection to practice.

Recommendations for Future Research

The ability of public school districts in Texas to produce graduates with the CCMR designation is ripe for additional research. This study affirms Thompson’s (2017) finding that Non-Metropolitan Fast Growing school districts produce CCMR graduates with the greatest efficiency, and Independent Town school districts produce CCMR graduates with the least efficiency. A qualitative study of individual school districts in these categories may reveal insight into the organizational qualities driving these respective outcomes.

The CCMR standard encompasses many career and technology pathways with certification programs. These programs can be complex and costly for school districts to create and maintain. To address this challenge, school districts offer selected only selected programs, centralize their resources for multiple campuses, and use magnet schools to send students to campuses of choice. A quantitative study of like school districts implementing different models to support career and technology pathways may reveal a model with superior efficiency and effectiveness. This may be particularly useful to school districts with larger student populations.

The debate over charter schools in Texas is ongoing. This study demonstrated the disparate outcomes for school districts in the Charter School District category. A focused study quantitative or qualitative study of the inconsistent ability of charter school districts to produce College, Career, and Military Ready graduates would further inform and shape the debate over the development of the charter school movement in Texas.

The challenge of educating students from economically disadvantaged communities begins in the literature (Coleman, 1966) and consistently resonates through Carter's (2012) efficiency study, Thompson's (2012) efficiency study, and this efficiency study. It would be valuable to education and to the literature to conduct a study of successful school districts with the highest populations of economically disadvantaged students to understand the practices and programs producing CCMR ready graduates in communities of economic need.

Finally, it is important to note the findings regarding the performance of school districts designated Rural and Non-Metropolitan Fast Growing, as the school types with the greatest percentage of schools in Quadrant D. Although findings from years of previous research have been mixed in regard to the role factors such as school size, community factors (Stanley et al., 2007; Stockard & Mayberry, 1992), or the role of necessity in doing more with less, future research should investigate the factors in these settings that yield the greatest return on investment.

Concluding Remarks

The Data Envelopment Analysis affirms the potential Texas public school districts have to produce CCMR graduates with efficiency and effectiveness. The regression analysis indicates the need for educational leaders to shift resources and training away from traditional instructional settings into the diverse programs of study measured by the CCMR standard. For the benefit of this generation of educators and students and the next, future studies of this standard and additional efficiency studies using this methodology are encouraged.

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