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The Texas Constitution requires that the state “establish and make suitable provision for the support and maintenance of an efficient system of public free schools,” as the “general diffusion of knowledge [is]... essential to the preservation of the liberties and rights of the people (emphasis added).” What does this mean, how can it be measured and evaluated, and how does Texas fare in terms of accomplishing this goal? The paper addresses these questions, and presents a framework for discussion that applies not just to Texas, but to any state with a constitutional requirement to educate its students efficiently.

INTRODUCTION

With limited resources and fiscal strain, it is more important than ever for states and school districts to use available funds for education as efficiently and productively as possible. This is even more true today if we want to educate our young people to a higher standard of true readiness for college or career.

This paper reviews both economic and education research to identify characteristics that typify enterprises that are efficient. It focuses on the principles of x-efficiency set out in the work of Henry Levin: 1) A clear objective outcome with measurable outcomes; 2) Incentives that are linked to success on the objective function; 3) Efficient access to useful information for decisions; 4) Adaptability to meet changing conditions; and 5) Use of the most productive technology consistent with cost constraints. The paper evaluates the degree to which Texas in its law and policy follows these principles in its use of resources in two areas crucial to the successful education of students: the effectiveness of teachers and the impact of the instructional materials they use.

This analysis should be of interest to state decision makers as they consider policy matters and the allocation of resources related to education. But the efficiency issue may be more important than simply calling upon better judgment by state officials. The constitution of the state actually mandates that the Legislature “establish and make suitable provision for the support and maintenance of an efficient system of public free schools,” as the general diffusion of knowledge [is]... essential to the provision of the liberties and rights of the people. In other words, the state constitution has set a goal of the general diffusion of knowledge and has required that it be accomplished through an efficient system of schools.

This raises important questions, which this paper discusses. In response to the constitutional mandate, does the state establish outcomes to measure the general diffusion of knowledge? Is the state mindful of efficiency and effectiveness in its policy making and resource allocation? Does the state implement its policies and resources in a rational and effective manner consistent with the principles of efficiency to achieve the constitutionally established goals? More particularly, in two of the areas of state activity that matter significantly to the achievement of the constitutional goal, do we or do we not see the principles of efficiency effectively applied?

The paper acknowledges that the state defines certain outcomes and sets at least minimal accountability for reaching those outcomes. But the paper also argues that the state does not adhere reasonably to the principles of efficiency in assuring that teachers are effective and that they use the most effective instructional materials.

The paper focuses on Texas, but states across the country can draw upon findings presented here and apply them to their own policy discussions. Other states have clauses in their state constitutions mandating efficiency, and the methods used here to assess efficiency are likely to apply in these states too.

EFFICIENCY AS A CONSTITUTIONAL MANDATE

The Texas Constitution mandates that the Legislature “establish and make suitable provision for the support and maintenance of an efficient system of public free schools,” as the “general diffusion of knowledge [is]...essential to the preservation of the liberties and rights of the people (emphasis added).”¹ This paper examines the extent to which Texas state law and policy in several important areas is consistent with this mandate.

In examining the extent to which the public school system is operating efficiently, we draw on the principles of “x-efficiency,” first proposed by economist Harvey Leibenstein and later applied to education by Henry M. Levin. X-efficiency refers to the expectations, measurement of outcomes, incentives for success, and other organizational elements that either encourage or discourage an enterprise to operate as productively as possible. Leibenstein proposes this theory to explain why enterprises with the same inputs may have different output levels.

Levin reviews the literature on x-efficient enterprises and finds that they share five key characteristics:

1. A clear objective function with measurable outcomes.
2. Incentives that are linked to success on the objective function.
3. Efficient access to useful information for decisions.
4. Adaptability to meet changing conditions.
5. Use of the most productive technology consistent with cost constraints.²

The objective function of the Texas public school system as defined by the state constitution is a “general diffusion of knowledge.” In order to measure this, Texas has implemented over the years a series of assessments, which now takes the form of the State of Texas Assessments of Academic Readiness (STAAR). STAAR consists of yearly tests in reading and math in grades 3-8, writing in grades 4 and 7, science in grades 5 and 8, and social studies in grade 8, as well as certain end-of-course exams in high school.

This paper will not assess the extent to which these new assessment tools and the accountability system associated with them will promote the general diffusion of knowledge. The presence and indeed the efficacy of an accountability system to achieving enterprise goals are certainly crucial to x-efficiency or any other set of principles inherent in a productive enterprise. But the Texas system is new, and, for that and other reasons, assessing it is beyond the scope of this paper. Instead, we examine two important areas of state policy and practice and evaluate the extent to which the state follows the key principles of x-efficiency in the pursuit of a successful diffusion of knowledge.

Two of the main ways that students receive knowledge are through interactions with teachers and with instructional materials³. Therefore, if Texas is committed to diffusing knowledge efficiently, as mandated by the state constitution, it should ensure that the system for putting effective teachers in classrooms and effective materials in the hands of teachers and students is characterized by the principles that undergird an efficient enterprise, such as those of x-efficiency.

¹ Tex.Const., Art. 7, §1.

² Henry M. Levin, “Raising School Productivity: An X-Efficiency Approach,” *Economics of Education Review*, Vol. 16, No. 3, pp. 303-311, 1997, pg. 304.

³ Matthew M. Chingos and Grover J. “Russ” Whitehurst, “Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core,” Washington, D.C.: Brookings Institution, April 2012.

TEACHERS

Good teachers are crucial to student learning. Not only is this common sense, it has been shown repeatedly in empirical research.⁴ A 2010 summary of existing research in this area reports similar variance in the value a teacher adds across studies, with an average standard deviation of 0.11 for reading and 0.15 for math.⁵ This is a significant difference between the most and least effective teachers, and may be compounded over time if students are assigned to a teacher at the high or low end of the effectiveness range for consecutive years.⁶ However, observable teacher characteristics such as advanced degrees, certification type, licensure exam scores, and even experience after the first few years of teaching do not explain this difference in teacher effectiveness.⁷ Given the importance of teacher effects and the difficulty of identifying effective teachers based on common input characteristics, rational policies for teacher training, certification, evaluation, compensation, and dismissal are key to an efficient education system.

Pre-Service Training and Certification

In Texas, the State Board for Educator Certification (SBEC) requires candidates for educator preparation programs to hold a bachelor's degree from a college or university accredited by the Texas Higher Education Coordinating Board.⁸ All candidates must hold a 2.75 GPA minimum or career or business experience that the program director deems equivalent to academic achievement in exceptional circumstances for up to 10% of any cohort of candidates. Additionally, before admission to the preparation program, candidates must undergo an assessment in reading, writing, communication, and mathematics.⁹

There are three main SBEC-approved categories: university-based, post-baccalaureate, and alternative/accelerated programs, with the latter offered mainly by education service centers and school districts.¹⁰ As of 2004, the SBEC also created a temporary teacher certificate allowing candidates with a bachelor's degree in the area of their intended subject and a two-year probationary contract with a district to teach grades 8-12, with a guarantee by the district that it would provide extensive mentoring and pre-service mentoring to the teacher.¹¹

Educator preparation programs are assessed based on four standards created by the SBEC: pass rates on certification examinations, an appraisal system for beginning teachers consisting of a principal survey, student achievement of new teachers (particularly improvement in the first three years of the new teacher's career), and the ongoing support and structural guidance during the first year in the classroom.¹²

Texas teacher preparation programs score well on the standards that are currently assessed. In a 2011-12 study, the Texas Education Agency classified the accreditation status of Texas educator preparation programs. Out of 161 programs,

- 4 See, for example, Aaronson, D., Barrow, L., and Sander, W. (2007). Teachers and student achievement in the Chicago Public High Schools." *Journal of Labor Economics* 25, no. 1 (2007): 95-135; Chetty, R. and Friedman, J.N. and Rockoff, J. (2011). The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood. NBER; Jacob, B. and Lefgren, L. (2004). The impact of teacher training on student achievement. *Journal of Human Resources*, 39:1, pp. 50-79; Kane, T. & Staiger, D. O. (2008) Estimating teacher impacts on student achievement: An experimental evaluation. Cambridge, MA, NBER; Kane, T., Taylor, E., Tyler, J. and Wooten, A. (2010). Identifying effective classroom practices using student achievement data. NBER Working Paper; Nye, B., Konstantopoulos, S. and Hedges, L.V. (2004). How large are teacher effects? *Educational Evaluation and Policy Analysis* 26:3, 237-257; Rivkin, S., Hanushek, E. & Kain, J. (2005) Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458; Rockoff, J. (2004) The impact of individual teachers on students' achievement: Evidence from panel data. *American Economic Review*, 94(2), 247-252; Rothstein, J. (2010) Teacher quality in educational production: Tracking, decay, and student achievement. *Quarterly Journal of Economics*, 125(1), 175-214.
- 5 Eric A. Hanushek and Steven G. Rivkin, "Generalizations about Using Value-Added Measures of Teacher Quality," *American Economic Review*, 100(2), May 2010, pp. 267-271.
- 6 William L. Sanders and June G. Rivers, *Cumulative and residual effects of teachers on future student academic achievement*. Knoxville, TN: University of Tennessee Value-Added Research and Assessment Center.
- 7 Eric A. Hanushek and Steven G. Rivkin, "Generalizations about Using Value-Added Measures of Teacher Quality," *American Economic Review*, 100(2), May 2010, pp. 267-271.
- 8 Texas Admin. Code §230.413.
- 9 Texas Admin. Code §227.10(a)(4).
- 10 "Approved Programs." Educator Certification Online System. <https://secure.sbec.state.tx.us/SBECONLINE/approvedprograms.asp?s=3#r17>.
- 11 Texas Admin. Code §230.39.
- 12 Texas Educ. Code, §21.045(a).

100% were accredited.¹³ Nineteen required an action plan but were accredited, 12 were accredited but not rated, six were accredited but warned, and only one was Accredited-Probation.

For the 2011-2012 academic year, the requisite certification examination pass rate was 80%, and the compliance rate with SBEC-approved support and structural guidance requirements was 95%.¹⁴ Of 11,621 principals surveyed in 2011, 38% reported their teachers were well prepared by their preparation program, with 55% finding the programs sufficient.¹⁵

Information on teacher prep programs is incomplete, however, since the metric for the improvement in achievement of students taught by beginning teachers will be piloted for at least two years. The metric includes teacher effectiveness in curriculum, instruction, classroom management, and a principal report on overall influence on student achievement, in addition to student growth on the state assessment using a value-added model.¹⁶

If these four standards (or currently, the three that are being assessed) are met and the SBEC approves of the program, it is assigned an Accredited Status; if a program fails to meet any of the standards it is assigned an Accredited-Warned or Probation status. Not Accredited-Revoked status is designated for programs under Accredited-Probation status for three consecutive years.¹⁷ To improve programs under Warned or Probation status, the SBEC may require technical assistance from the TEA or itself, professional services, or a monitor.¹⁸ Upon completion of an educator preparation program, candidates apply for a standard certificate valid for five years; they must pass a content test for the subject and grade level they hope to teach to become certified, then a Pedagogy and Professional Responsibility examination after being hired and already teaching on the certificate.¹⁹ However, new teachers who have not passed licensing exams can teach with a nonrenewable permit for a year, and those with an emergency permit up to three years.²⁰

X-Efficiency in Pre-Service Training and Certification

One of the characteristics of x-efficient enterprises is efficient access to useful information. While the SBEC has made positive strides to develop a metric to measure the achievement of students taught by new teachers, it will be at least two years until that metric will be finalized. And it is unclear whether it will work in practice any more effectively than the present system in gauging effective teacher preparation. Since the goal of the state education system is a general diffusion of knowledge, the extent to which teacher education programs prepare their teachers to achieve this goal should be the most important factor in the accreditation of these programs.

Additionally, just having the information is not enough. Another characteristic of x-efficient enterprises is adaptability to changing conditions. If Texas is to be efficient in this way, the SBEC must use this information on student achievement to make decisions about the accreditation of teacher training programs and to improve them.

For example, if student assessment results show that teachers from a certain preparation program are not effectively teaching fractions, the SBEC should use this information to require the program receive technical assistance in this area, examine future student assessment results for improvement, and impose consequences that assure more effective teacher preparation in these institutions. If information about effectiveness is available and strong results are expected, teacher

13 Texas Education Agency. (2013). Texas Education Educator Preparation Program, Accreditation Statuses for 2009-2010. Retrieved from <http://www.tea.state.tx.us/index2.aspx?id=2147485421>.

14 Texas Admin. Code§229.4(a).

15 "SB Pilot Principal Survey Data for School Year 2010-11 Teacher Preparation Effectiveness Survey: First Year Teachers. SEDL. 2011.

16 "Item 9: Consideration of and Opportunity to Improve the 2011-12 Accountability System for Educator Preparation Programs (ASEP) Accreditation Statuses." State Board for Educator Certification Meeting. February 8, 2013.

17 Texas Admin. Code§229.4.

18 Texas Educ. Code, §21.0451.

19 Texas Admin. Code §233.1(e).

20 Texas Admin. Code§230.73.

preparation programs can adapt to meet the needs of the teachers they train. Without accurate information and accountability, however, this type of adaptability is unlikely, as is the preparation of more effective teachers.

Teacher Evaluation

The Texas Commissioner of Education maintains an appraisal process and criteria for teacher evaluation, called the Professional Development and Appraisal System (PDAS).²¹ In its recently approved conditional waiver from the No Child Left Behind Act's requirements, the state proposed departing from the current PDAS to use "student achievement growth as a significant measure", with three different options being considered.²² This new evaluation system currently is being designed, with draft standards published that will serve as the basis of observations. The state will submit its guidelines for the system to the United States Department of Education in Spring 2014.²³ While a system constructed in this manner could be more aligned with the principles of efficiency that serve as the foundation of this paper, how and in what ways Texas will actually proceed are unknown at the time of the publication of this paper. Thus, since PDAS has been and, until it is actually replaced, remains as the evaluation system for teachers in Texas, this paper, for its purposes, will evaluate PDAS.

PDAS criteria encompass job-related behavior that is observable, and state law encourages accounting for discipline management and student performance. PDAS has 51 criteria divided into 8 domains that cover observable job-related behavior, with the 8th domain titled "Improvement of All Students' Academic Performance."

Domain VIII has ten criteria, five related to teacher instruction aligned to specific academic skills, one relating to monitoring student performance, and three related to identifying and intervening properly with at-risk students. The final criteria is a shared score consisting of an overall campus performance rating under the state accountability system, and whether the campus met the Adequate Yearly Progress, the evaluation indicator of the federal No Child Left Behind Act.²⁴

The student performance scoring categories are: 1) efforts to enhance academic performance; 2) efforts to enhance student attendance; 3) efforts to identify and assist students in at-risk situations; and 4) campus performance rating.²⁵ As of 2011, 67% of districts used student achievement or growth as a criterion of their teacher evaluation system.²⁶

District superintendents, with approval from their boards of trustees, may select the PDAS as their district evaluation system, or may choose a district-specific evaluation system.²⁷ As of September 2013, 86% of Texas districts used PDAS.²⁸ If the Board of Trustees for a district decides to develop its own appraisal process and performance criteria to substitute for the Commissioner's, the appraisal should still include implementation of discipline management procedures and student performance as two factors in their assessment. The district and any campus-level committees devise this policy, and the Board has the power to reject the criteria and process but cannot modify either.

Some districts, including Houston and Dallas, use the PDAS as a starting point for their evaluation systems, but modify it in some way. Houston adds a value-added system to reward teachers, with student performance data counting for half of a teacher's overall rating. HISD compares students' academic growth year to year, under a commonly used system called EVAAS. Value-added data is collected on both the campus and teacher levels. All teachers get yearly, unannounced

21 Texas Educ. Code, §21.351(a).

22 "ESEA Flexibility Request." Texas Education Agency. pg. 64. September 26, 2013.

23 "Implications of NCLB Flexibility Waiver." Texas Education Agency. November 1, 2013. <http://www.tea.state.tx.us/index4.aspx?id=25769808031>

24 Texas Education Agency. (2005). PDAS Teacher Manual. Retrieved from http://www4.esc13.net/uploads/pdas/docs/PDAS_Teacher_Manual.pdf.

25 Texas Administrative Code §150.1002(e).

26 "Teacher evaluations including student performance." Texas Education Agency. <https://www.google.com/url?sa=t&ret=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCkQFjAA&url=http%3A%2F%2Fwww.thebestteachintexas.org%2FWorkArea%2FDownloadAsset.aspx%3Fid%3D2147502761&ei=oSDuUurMBJPioATAoYGQDQ&usq=AFQjCNHyIBTsWZQrj6JXndlg1mgH4fXw&sig2=PFVZL1951StGxHuEGv3Vg&bvm=bv.60444564.d.cGU>.

27 Texas Administrative Code §150.1001(c).

28 "ESEA Flexibility Request." Texas Education Agency. September 16, 2013.

observations - at least two 10-minute observations and at least two 30 -minute observations. The other half of the factors in Houston’s assessment system are related to instructional practice and professionalism. Teachers get one overall rating: ineffective, needs improvement, effective or highly effective.²⁹ EVAAS results are a basis for bonuses in Houston, through their ASPIRE Award Program, with \$40.4 million awarded in 2010.

Dallas ISD also uses a value-added measure, called the Classroom Effectiveness Index, measuring teacher effectiveness through student standardized test performance. The academic achievement of a teacher’s students after receiving instruction for a full term is compared to students within the district with the same demographics and previous academic achievement: CEIs are a relative measure of student achievement.³⁰ A CEI of 50 means student performance is at the expected level for a class’ comparison group, with a mark below or above 50 indicating substandard or exceptional performance, respectively.³¹ Teachers are grouped in categories from 1 to 5, with 5s in the top 20%.

While some districts are making student performance a larger factor in teacher evaluations, the state does not require that they do so. Despite the fact that the objective function of Texas public schools is the general diffusion of knowledge, teachers are not evaluated primarily on the extent to which they meet this goal. The fifty-one evaluation criteria of PDAS are organized in eight domains, the last of which is Domain VIII, or “Improvement of Academic Performance of Students on the Campus.” Within the domain, there are ten criteria, the last of which is a shared score on the overall campus performance rating and Adequate Yearly Progress status of the campus under NCLB.³² This score measures campus performance, not an individual teacher’s.³³

An outside study found that the absence of a state requirement for districts to submit the actual teacher evaluations in Domain VIII to the state led to an inability to verify a link between PDAS scores and student achievement; the study also found no positive relationship between a PDAS finding of an effective teacher and actual student performance on the TAKS.³⁴ For local appraisal systems, the state has left the method of student performance assessment included in the appraisal system to the discretion of districts completely.³⁵

Some states do make this connection in their teacher assessments. Louisiana, for example, has evaluated its teacher preparation programs using a value-added assessment model since 2003.³⁶ Findings of these assessments have included comparisons of the effectiveness of different types of preparation programs in specific subjects as well as factors with the largest significance in training effective teachers. Louisiana’s longitudinal data system has been credited with allowing useful links between teacher preparation programs and student growth to be drawn, towards identifying effective preparation programs.³⁷

X-Efficiency in Teacher Evaluation

Teacher evaluation systems in Texas may not be properly linked to incentives (when they are linked to incentives at all). In x-efficient enterprises, incentives are linked to success in the objective function of the organization. Some districts, such as Houston, link student achievement to teacher evaluations and then to monetary bonuses. However, in districts where student achievement is not the main component of the assessment (the majority of districts, as student achievement is not

29 “Value-Added Analysis.” http://www.houstonisd.org/HISDConnectEnglish/Images/Documents/ValueAddedFAQ_121010.pdf. HISD Connect. December 10, 2010.

30 Dallas Independent School District. (2010). Classroom Effectiveness Indices. Retrieved from <https://mydata.dallasisd.org/MENU/CEI.jsp>.

31 Dallas Independent School District. (2011). FAQs for the Classroom Effectiveness Indices (CEIs). Retrieved from https://mydata.dallasisd.org/docs/CEI/CEI_FAQ.pdf.

32 “Professional Development & Appraisal System: Teacher Manual.” Texas Education Agency. 2005.

33 Diane Davis-Frost, “The Professional Development and Appraisal System in Texas: Intentions and Implementation.” Dissertation for Doctorate in Philosophy, University of North Texas. December 2000.

34 Glynn Pate, The Texas Professional Development and Appraisal System: Links to student achievement. ProQuest, UMI Dissertation Publishing. September 30, 2011.

35 “Frequently Asked Questions for Professional Development and Appraisal System (PDAS).” Professional Development and Appraisal System.

36 “Value-Added Teacher Preparation Program Assessment Model.” State of Louisiana, Board of Regents.

37 Arne Duncan, “Teacher Preparation: Reforming the Uncertain Profession.” Remarks at Teachers College, Columbia University. October 22, 2009.

the main factor in PDAS), incentives linked to the assessment cannot be properly aligned with the success in the function of the organization.

Additionally, the PDAS and other assessments used by Texas school districts may not be rigorous enough to identify teachers in need of improvement or dismissal. X-efficient organizations have efficient access to useful information for decisions, and by not linking teacher evaluations to student achievement, Texas's teacher evaluation systems fail to provide the necessary information to improve or dismiss teachers that are not meeting the state's goal of the general diffusion of knowledge. In 2010-11, only 7.31% of districts even publicly reported teacher proficiency rates.³⁸ In 2011, TEA reports showed less than two percent of teachers rated below proficient on the assessment used by their district.³⁹ Because these evaluations do not rely on student achievement data, it may not be surprising that less than two percent of Texas teachers are rated below proficient while the percentage of students rated below proficient on state assessments is much larger. For example, 35% of Texas students did not pass the state Spring 2012-13 English I I reading assessment, and 22% did not pass the Algebra I exam.

The state's commitments in its NCLB waiver are a positive development. But, until the current system is replaced and the new system is evaluated after the statewide rollout in the 2015-2016 school year, Texas cannot be deemed to be using an accurate or efficient means of evaluating its teachers.

Calculations by Eric Hanushek of Stanford University show that removing the bottom five percent of teachers in the United States and replacing them with teachers of average effectiveness would raise student achievement in the U.S. 0.4 standard deviations, to the level of student achievement in Canada. Replacing the bottom eight percent would raise student achievement to the level of Finland, a top performing country on international assessments.⁴⁰

If Texas wanted to remove (or improve) the bottom five to eight percent of its teachers, the current evaluation system would not be able to identify them. More rigorous and finer-grained evaluation criteria are needed to identify those teachers who are and are not effectively diffusing knowledge.

Teacher Compensation

The single largest expenditure in education is on payroll, both in Texas and in the U.S. as a whole. The TEA reports that in 2012-2013 Texas spent \$30.6 billion on payroll, about 81% percent of total education spending.⁴¹ The amount spent on instruction alone was \$21.9 billion, or nearly 60% of all operating expenditures. With so much money being spent on teacher compensation and with teachers playing such a fundamental role in student achievement, the efficient compensation of teachers is vital to the efficiency of the education system as a whole.

In Texas, as in most other states, teachers are paid according to salary schedules set by individual districts. As in most states, this salary schedule is based on teacher experience and level of education. The State sets a minimum salary and suggested salary schedule⁴² which sets a floor for district salary schedules based on years of experience. Districts are no longer required to use this schedule, but they may not pay less than the state base salary listed for individual's years of experience as set by the Commissioner of Education.⁴³

38 "Teacher Proficiency Public Reporting 2010-2011." Texas Education Agency. <http://www.tea.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=2147502763&libID=2147502757>.

39 "Use of teacher evaluation results." Texas Education Agency. http://dawson.tea.state.tx.us/public/cgi-bin/cognosisapi.dll?b_action=cognosViewer&ui.action=run&ui.object=%2fcontent%2ffolder%5b%40name%3d%27TSDS%20Outcome%209%27%5d%2fpackage%5b%40name%3d%27TSDS%20Outcome%209%27%5d%2freport%5b%40name%3d%27Teacher%20Evaluation%20Uses%202010-2011%27%5d&ui.name=Teacher%20Evaluation%20Uses%202010-2011&run.outputFormat=&run.prompt=true

40 Eric A. Hanushek, "The Economic Value of Higher Teacher Quality," *Economics of Education Review*, 30(2), June 2011, pp. 466-479.

41 Texas Education Agency. (2013). 2012-2013 Actual Financial data. Retrieved from http://ritter.tea.state.tx.us/cgi/sas/broker?_service=marykay&_program=sfadhoc.budget_report_2013.sas&_service=appserv&_debug=0&who_box=&who_list=_STATE.

42 Texas Educ. Code, §21.402(c-1).

43 Texas Admin. Code §153.1021.

X-Efficiency In Teacher Compensation

X-efficient enterprises use incentives linked to success on the objective function of the organization, which, in the case of Texas public schools, is the general diffusion of knowledge. However, while the state salary schedule (and those of most districts) bases teacher pay on education and years of service, empirical research shows that these two factors have little relationship to student achievement. Teachers early in their careers (particularly first-year teachers) are less effective than their more experienced colleagues, but these differences fade after the first few years in the classroom.⁴⁴ Additionally, there is much more variation in effectiveness within groups of teachers with the same amount of experience than there is between experience levels.⁴⁵ In short, a teacher's level of experience has little to do with how effective she is (especially after the first few years) but it is the main criterion on which teacher pay in Texas is distributed. This compensation system links incentives to tenure on the job rather than to the success of the organization's function, and therefore does not maximize x-efficiency.

Many Texas districts also pay bonuses for master's degrees, despite the fact that there is little correlation between teacher advanced degrees and student achievement.⁴⁶ There is evidence that teacher master's degrees in math, and to a lesser degree science, have a positive impact on student achievement in the subjects, especially at the high school level.⁴⁷ As of September 2012, 69% of districts paid more to teachers with master's degrees.⁴⁸ Of those districts, 90% paid for master's in any subject, while only 7% limited the extra pay to a master's in their assigned teaching field. The average stipend for a master's in any area of study was \$1,132 per year. In 2010, this costs the state \$124.5 million per year.⁴⁹ Given the evidence that master's degrees only matter for teachers of certain subjects at certain grade levels, this practice is clearly not an efficient one. Once again, incentives are linked not linked to the function of the organization, but rather to a characteristic of teachers that is not necessarily relevant to the general diffusion of knowledge.

Dismissal of Ineffective Teachers

Most teachers in Texas are employed under term contracts, usually with a term of one to two years, but possibly longer.⁵⁰ Continuing contracts, closest to actual tenure, are offered by only a few districts. These are contracts voided only by retirement, resignation, or lawful dismissal.⁵¹ Teachers who are new to the profession or school district receive probationary contracts which end with the teacher's termination or the granting of a term contract. Districts can give teachers continuing contracts after just 3 years.⁵²

44 See, for example, Clotfelter, C., Ladd, H., & Vigdor, J. (2010). Teacher credentials and student achievement in high school: a cross subject analysis with fixed effects." *Journal of Human Resources* 45: 655-681; Goldhaber, D. (2007) Everyone's doing it, but what does teacher testing tell us about teacher effectiveness? *Journal of Human Resources*, 42(4), 765-794; Harris, D., and Sass, T. (2011). Teacher training, teacher quality, and student achievement. *Journal of Public Economics*, 95, 7-8: 798-812; Hanushek, E., & Rivkin, S. (2007). Pay, working conditions and teacher quality. *Future of Children*, 17(1), 69-86; Rivkin, S., Hanushek, E. & Kain, J. (2005) Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458; Rockoff, J. (2004) The impact of individual teachers on students' achievement: Evidence from panel data. *American Economic Review*, 94(2), 247-252.

45 Dan Goldhaber, Stephanis Liddle, Roddy Theobald, and Joe Walch, "Teacher effectiveness and the achievement of Washington's students in mathematics," WERA Educational Journal, forthcoming.

46 See, for example, Aaronson, D., Barrow, L., and Sander, W. (2007). Teachers and student achievement in the Chicago public high schools." *Journal of Labor Economics* 25, no. 1 (2007): 95-135; Clotfelter, C., Ladd, H., & Vigdor, J. (2010). Teacher credentials and student achievement in high school: a cross subject analysis with fixed effects" *Journal of Human Resources* 45: 655-681; Goldhaber, D. and Brewer, D. (1997). Why don't schools and teachers seem to matter? Assessing the impact of unobservables on educational productivity. *Journal of Human Resources*, pp. 505-523; Harris, D., and Sass, T. (2011). Teacher training, teacher quality, and student achievement. *Journal of Public Economics*, 95, 7-8: 798-812; Podgursky, M., & Springer, M. (2007). Teacher performance pay: A review. *Journal of Policy Analysis and Management*, 26, 909-949; Rivkin, S., Hanushek, E. & Kain, J. (2005) Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458.

47 Dan Goldhaber and Dominic Brewer, "Why Don't Schools and Teachers Seem to Matter? Assessing the Impact of Unobservables on Educational Productivity." (1997). *Journal of Human Resources*, 32(3): 505-523.; Douglas Harris and Tim Sass, "Teacher training, teacher quality, and student achievement" (2011), *Journal of Public Economics*, 95, 7-8: 798-812.

48 "Salaries and Wages in Texas Public Schools." Texas Association of School Boards. 2012. http://www.tasb.org/services/hr_services/salary_surveys/documents/tchr_highlights_landing.pdf.

49 "Keeping Texas Competitive: A Legislator's Guide to the Issues 2013-2014." Texas Public Policy Foundation. <http://www.texaspolicy.com/sites/default/files/documents/Teacher%20Quality%20and%20Compensation.pdf>.

50 James Golsan. "Teacher Effectiveness in Texas." Texas Public Policy Foundation. May 2012. <http://www.texaspolicy.com/pdf/2012-05-PP16-TeacherEffectivenessInTexas-CEP-JamesGolsan.pdf>

51 Texas Educ. Code §21.154.

52 Texas Educ. Code §21.153.

If an administrator wants to dismiss a teacher, they must give substantial notice. Teachers under continuing contracts can then file a request for a hearing, appeal that finding to the state commissioner, and then appeal that decision to the district court.⁵³ Following the passage of Senate Bill 8 in the 2011 Legislative Session, the notice deadline for nonrenewal of term contracts or end-of-year termination of a probationary contract is 10 days before the last day of instruction.⁵⁴ For both teachers under a probationary and continuing contract, discharge at any time can be for a vague “good cause as determined by the board of trustees, good cause being the failure to meet the accepted standards of conduct for the profession as generally recognized and applied in similarly situated school districts in this state.”⁵⁵ Teacher ineffectiveness is not distinguished as a primary or substantial factor in these dismissals.

For necessary reductions in personnel due to financial exigencies, PDAS appraisal is the main criterion for necessary reduction of teachers with continuing contracts at the end of a school year (the previous “last in-first out” policy was repealed in 2011)⁵⁶ and districts may devise local policies to identify their process for identifying which teacher contracts are not renewed.⁵⁷ If a teacher is found to be “unsatisfactory” in any domain or “below expectations” in two domains, the appraiser and the principal create an intervention plan with the teacher that includes benchmarks and a timeline for correcting the deficient behavior.⁵⁸ In *McLean v Quannah I.S.D.*, the Court clarified that lack of student progress is an appropriate factor in nonrenewal, but actual incompetence, not merely dissatisfaction from parents, is required. An intervention plan is not required for nonrenewal.⁵⁹ Statewide, nearly 73% of districts used the appraisals for removal purposes in 2010-11.⁶⁰

In Houston, the local CEI index using the EVAAS model of growth over a year can be used as a factor in not renewing a teacher’s contract (January 2011). Principals have discretion over whether poor value-added scores result in termination, or professional development and mentorship. Those who consistently perform poorly could be fired for “insufficient student academic growth as reflected by value added scores.”

In 2009, before EVAAS became a factor in terminations, 36 of 12,000 teachers were fired for performance reasons, or .3%, a number so low the Superintendent himself called the dismissal system into question.⁶¹ From 2004-2009, the district fired or did not renew 365 teachers, 140 for “performance reasons,” including poor discipline management, excessive absences, and a lack of student progress. In 2011, 221 teacher contracts were not renewed, multiple for “significant lack of student progress attributable to the educator,” as well as “insufficient student academic growth reflected by [SAS EVAAS] value-added scores.”⁶² A local union representative cited the number at over 100.⁶³ In the 2011-12 school year, 54% of the district’s low-performing teachers were dismissed.⁶⁴

53 Texas Educ. Code §21.159, 21.301, 21.307.

54 Texas Educ. Code §21.103.

55 Texas Educ. Code §21.104, 21.156.

56 Tex. Ed. Code §21.157.

57 Texas Association of School Boards. (2012). Reducing Personnel Costs. Retrieved from http://www.tasb.org/services/legal/esource/personnel/documents/reduce_personnel_costs_feb12.pdf.

58 Texas Administrative Code §21.352()

59 Benton. Wilmer-Hutchins I.S.D., 1983.

60 “Teacher Evaluation Uses 2010-2011.” Texas Education Agency. August 29, 2011.

61 Ericka Mellon. “HISD moves ahead on policy to fire teachers over test scores.” Houston Chronicle. January 14, 2010.

62 “Houston Independent School District (HISD).” Board of education workshop 2011 -12 budget update. 2011.

63 Amrein-Beardsley, Audrey and Collins, Claire. “The SAS Education Value-Added Assessment System (SAS EVAAS) in the Houston Independent School District: Intended and Unintended Consequences.” Education Policy Analysis Archives 20: 12, April 30, 2012.

64 “Houston Independent School District Profile.” 2013 Broad Prize. 2013. <http://www.broadprize.org/asset/houstonfacts.pdf>.

In Dallas, reasons for nonrenewal of term contracts may include “deficiencies pointed out in ...appraisals or evaluations... receiving an evaluation with “unsatisfactory” in one or more domains or a “below expectations” in two or more domains.”⁶⁵ For reduction in forces allowing the district to dismiss teachers before the end of contract term due to financial exigency or the elimination of a curriculum offering or operation, the superintendent is permitted to consider PDAS or CEI appraisals as the second-most important criteria.⁶⁶ In 2012, the Board decided not to renew 259 contracts due to poor performance, five times more than the previous year.⁶⁷ In Arlington ISD, there can be a salary freeze if a teacher receives a negative evaluation, and as state policy if a term contract is nonrenewed due to ‘incompetence’, the teacher may request a hearing before the board; however, if the teacher is terminated during the contract, there is no such recourse.⁶⁸

X-Efficiency in the Dismissal of Ineffective Teachers

While some districts appear to be increasing their efforts to eliminate ineffective teachers, the percentage of teachers dismissed for any reason, let alone poor performance, remains well under one percent in the state’s largest districts, as noted in Table 1. This falls well below the five to eight percent that Hanushek calculates would elevate achievement to internationally competitive levels.⁶⁹

We can find no data statewide on the extent to which Texas districts are removing, replacing, or at least making average the performance of its least effective teachers. We see no evidence that the state even has this as a goal. Indeed we see no evidence of any systematic effort to evaluate teaching specifically on the basis of value added contribution to student learning and then take rational, effective action, to reach Hanushek’s or any similar objectives. Table 1 shows the percentage of teachers dismissed and the reasons for dismissal in nine large school districts.

Table 1. Teachers Terminations In Large Texas School Districts, 2001-06.

School District	Teachers Fired	Annual Dismissal Rate	School District Teachers	Reasons
Arlington	2	.01%	4053	Misconduct
Austin	3	.01%	5745	Misconduct or performance
Cy-Fair	1	.004%	5260	Performance
Dallas	133	.24%	10643	Non-renewal, due to process dismissal, separated for cause
Fort Worth	4	.02%	4839	No reasons provided
Houston	88	.18%	12,057	Non-renewal
San Angelo	2	.04%	968	Non-renewal or reduction in force
San Antonio	9	.05%	3633	Misconduct, performance, reduction in force
Waco	20	.36%	1092	Performance, misconduct, certification

Source: “Shortchanging Our Kids: How Poor Teacher Quality & Failed Government Policies Harm Students.” Texas Public Policy Foundation. October 2009.

65 “Term Contracts, Nonrenewal.” DFBB (Local) Dallas ISD Board Policy.

66 “Termination of Contract, Reduction in Force.” DFF (LOCAL)-X.

67 Joe Tone, “Dallas ISD is Firing More “Bad” Teachers Than It Has In Years, and the Axe is Still Swinging.” Dallas Observer. March 13, 2012.

68 <http://www.docstoc.com/docs/63651937/Texas-Teacher-Contract-Termination>

69 Eric A. Hanushek, “The Economic Value of Higher Teacher Quality,” *Economics of Education Review*, 30(2), June 2011, pp. 466-479.

As with teacher evaluation, teacher dismissal policies are not aligned with the state constitutional goal of the general diffusion of knowledge. Teachers are not generally dismissed for failing to disseminate knowledge, and therefore the incentive of retaining a teaching job is not linked to the success of the objective function of the organization as it would be in an x-efficient enterprise.

INSTRUCTIONAL MATERIALS

While teachers are important, what they teach is also important. The State Board of Education outlines the essential knowledge and skills for each foundation curriculum subject, the Texas Essential Knowledge and Skills (TEKS),⁷⁰ and instructional materials are chosen to support these objectives. If the state is to promote an efficient education system, the materials that are in the hands of teachers and students should be chosen to maximize the amount of learning possible for each dollar the state spends.

Research indicates that the choice of instructional materials can make a major difference in student outcomes. For example, a U.S. Department of Education study of four elementary math curricula showed student achievement differences of up to .17 standard deviations depending on the curriculum used.⁷¹ This difference is of similar magnitude to that between the student achievement of the most and least effective teachers discussed above - clearly the choice of instructional materials matters.

Texas does not mandate that districts use a specific set of instructional materials. According to Texas law, instructional materials must cover the essential knowledge and skills defined by the State Board of Education, but the 2011 Legislature's Senate Bill 6 allows districts to select their own instructional materials or choose to use State Board of Education or Commissioner-adopted materials.⁷² Districts can also now decide whether to purchase instructional materials or, instead, technological equipment.⁷³ SB6 increased the autonomy of district textbook coordinators, but it does emphasize spending on materials that improve student performance on the new State of Texas Assessments of Academic Readiness (STAAR). Before SB6, instructional materials were confined to those adopted by the State Board of Education and Commissioner. However, now, districts have to only certify annually to the SBOE and Commissioner that all the TEKS knowledge and skills are covered by instructional materials.⁷⁴

For materials selected by the SBOE or the Commissioner, each foundation and enrichment curriculum subject's textbooks must be inspected at least once every eight years. Priority for review is given to foundation curriculum subjects whose essential knowledge and skills have been substantially revised and are accompanied by assessment instruments.⁷⁵

The TEA notifies the public of the review process, and also asks for applications to serve on TEKS review panels. The Commissioner decides on the number of review panels, selection criteria, and with the advice and consent of the SBOE appoints the members.⁷⁶ The panel decides how to determine if TEKS standards have been covered in the materials, defined as either an opportunity for the teacher to teach the knowledge or skill, the student to learn the knowledge or skill, or an opportunity for the student to demonstrate the knowledge or practice the skill.⁷⁷

70 Texas Educ. Code, §28.002(c).

71 Roberto Agodini, Barbara Harris, Melissa Thomas, Robert Murphy, and Lawrence Gallagher, *Achievement Effects of Four Early Elementary School Math Curricula: Findings for First and Second Graders* (NCEE 2011-4001), Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education (2010).

72 Tex. Ed. Code §31.004(b)(5).

73 Tex. Educ. Code §31.0211(c)(1)(G).

74 "Instructional Materials Allotment Certification and Access to EMAT." *Instructional Materials Allotment Certification and Access to EMAT*. February 27, 2012.

75 Tex. Educ. Code §31.022(2)(a).

76 Texas Adm. Code §66.33(a).

77 Texas Adm. Code §66.33(d).

X-Efficiency in the Selection and Review of Instructional Materials

While the state may not be in the position to determine which materials are most effective in which districts and therefore may be wise in allowing districts to make their own choices, they could require districts to choose materials that were empirically proven to be effective, if such data were available. SB6 directs districts to purchase materials that improve student performance on the STAAR, but it is unclear how districts could be expected to obtain this information. Most instructional materials have not been evaluated for effectiveness at all,⁷⁸ let alone for effectiveness in improving student achievement on specific state assessments.

Grover J. “Russ” Whitehurst, former director of the Institute of Education Sciences within the U.S. Department of Education and current Senior Fellow and Director of the Brown Center on Education Policy at the Brookings Institution, proposes that states should collect data from their districts on the instructional materials they use.⁷⁹ They can collect data from purchasing departments on instructional materials ordered each school year, survey districts about what materials they use, survey teachers about what materials they actually use in their classrooms, and begin to show the relationship between the use of certain materials and student achievement results. These data could be used immediately, and also enable future effectiveness studies. In the short term, districts could share information about what materials they use for various subjects and student populations and their experiences with these materials, leading to more informed decision-making. In the longer term, states could undertake formal effectiveness studies of that link student-level achievement data to the instructional materials used, identifying and recommending the most effective materials. This would improve the x-efficiency of the Texas education system in two ways: it would provide efficient access to useful information for district-level decisions about instructional materials, and it would encourage (or require) use of the most productive technology (in this case, technology does not refer only to computers, but to all instructional materials).

CONCLUSION

Revisiting the characteristics of x-efficient organizations identified by Levin, we now review how the education system in Texas measures up:

- 1. A clear objective function with measurable outcomes.* Texas does have a objective function with measurable outcomes at several grades. The Texas Constitution states that the purpose of its education system is a “general diffusion of knowledge.” The outcomes of this objective function are measured at several grade levels by the State of Texas Assessments of Academic Readiness (STAAR). It is beyond the capacity of this paper to assess the impact of recent legislation that reduces measures that previous legislatures had imposed to measure the success of the state toward achieving the newly refined state function of graduating students ready for postsecondary success.
- 2. Incentives that are linked to success on the objective function.* Incentives in the Texas education system are not linked to successful general diffusion of knowledge in the areas we examine. Teacher pay in Texas rewards experience and in some cases advanced degrees, characteristics that are not generally linked to student achievement. Texas teacher assessment systems are largely based on factors other than student achievement, so any incentives tied to these systems (generally bonuses or dismissal) are not tied to the objective function of the diffusion of knowledge as measured by student achievement.

78 Matthew M. Chingos and Grover J. “Russ” Whitehurst, “Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core,” Washington, D.C.: Brookings Institution, April 2012.

79 Matthew M. Chingos and Grover J. “Russ” Whitehurst, “Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core,” Washington, D.C.: Brookings Institution, April 2012.

3. *Efficient access to useful information for decisions.* Access to useful information in the Texas school system is lacking in several key areas. In the area of teacher training, the SBEC lacks important information on the effectiveness of teachers completing teacher preparation programs that could improve their accreditation procedures. In terms of teacher evaluation and termination, PDAS and other state evaluation systems do not provide detailed enough information for administrators to determine which teachers are in need of help or dismissal. Finally, in the selection of instructional materials, information on the effectiveness of various materials is not available, leaving states with a directive to choose materials that improve student achievement but without a means to determine which materials those might be.
4. *Adaptability to meet changing conditions.* Due to a lack of information, Texas teacher preparation programs are not well positioned to adapt to the changing needs of their students. A similar lack of information precludes any useful adaptability in the use of instructional materials.
5. *Use of the most productive technology consistent with cost constraints.* It is unlikely that Texas schools are using the most productive technology (in this case, we expand the term “technology” to include all instructional materials), since information on what technology is most productive is not readily available.

While the Texas Constitution has established a clear objective function for the state school system and assessments are in place to measure the outcome, it does not appear that the Texas education system shares the other four characteristics of x-efficient enterprises as identified by Levin. Given the constitutional mandate for efficiency and the difficult economic climate, it may be a good time for the state to remedy this situation. In fact, when originally proposing the theory of x-efficiency, Leibenstein observed, “Both competition and adversity create some pressure for change. Even if knowledge is vague, if the incentive is strong enough there will be an attempt to augment information so it becomes less vague and possibly useful.”⁸⁰ The adversity and incentives may now be in place for Texas to focus on improving the x-efficiency of its school system.

State education finance systems typically are challenged on the grounds that they are inequitable. We have argued that state constitutions also focus on efficiency as a requirement of education finance systems. The advantage of defining efficiency in terms of ‘x-efficiency’ is that x-efficiency can be assessed using empirical criteria. The efficiency analysis applied here to Texas can be applied in other states as well.

80 Harvey Leibenstein, “Allocative Efficiency vs. ‘X-Efficiency,’” *The American Economic Review*, 56(3), June 1966, 392-415, pg. 408.

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