Copyright

by

Linda Lou Brown

2009

**The Dissertation Committee for Linda Lou Brown certifies that this is the approved version of the following dissertation:**

# Opening Pandora's Box:
# Texas Elementary Campus Administrators use of Educational Policy And Highly Qualified Classroom Teachers Professional Development through Data-informed Decisions for Science Education

**Committee:**

James P. Barufaldi, Supervisor

Charles T. Clark

Sherry L. Field

Carol L. Fletcher

Stuart Reifel

# Opening Pandora's Box:
# Texas Elementary Campus Administrators use of Educational Policy And Highly Qualified Classroom Teachers Professional Development through Data-informed Decisions for Science Education

**by**

**Linda Lou Brown, B.S., M.A., C.A.P.M.**

**Dissertation**
**Presented to the Faculty of the Graduate School of**
**The University of Texas at Austin**
**in Partial Fulfillment**
**of the Requirements**
**for the Degree of**

**Doctor of Philosophy**

**The University of Texas at Austin**

**August, 2009**

UMI Number ________________________

Copyright 2009 by

Brown, Linda Lou

All rights reserved.

## Acknowledgements

First, *THANK YOU* to the hundreds of Texas elementary, intermediate, and middle school teachers, the campus principals and assistant principals, superintendents, information technology directors, and countless other individuals who enabled this research study. Without your contribution, openness, and willingness to participate, this research study would not be as rich, challenging and diverse.

I would like to say *THANK YOU* to my dissertation committee members: James Barufaldi, C. Terry Clark, Sherry Field, Carol Fletcher and Stuart Reifel who supported this research study.

To James P. Barufaldi, his support and belief as a mentor, advisor, and colleague over the last 20+ years of our professional relationship has been one of the most endearing relations in my career. May my future career endeavors and interactions with others who cross my path always demonstrate the level of kindness, graciousness, patience, and professionalism as Jim portrays every day.

To my parents Mary Lou and Frank F. and family Ken B., Zach B. & Julie N.

To my friend, neighbor, and mentor, Martha O. – you are *one of a kind inspiration*.

To my friends and relatives, your support and encouragement was extraordinary: Anne B., Jane B., Rod D., Diane L., Karen F., Ruth-Ann F., Al G., Harvey and Connie G., and Kenneth G., Joann H., Linda and Steve J., Lee K., Diane L., Michael M., Nikki S-B, Jane S., Todd S., Rev. Larry S. and the members of Faith UMC, Rev. Jim R. and Rev. Pam S. and the members Oak Hill UMC, Gail S., Sue S., Eric T., and Fernando V.

To Lowell Bethel and O.L. Davis, Jr. who taught me the importance of my insights and guided my thinking.

The person that I am today, and hope to continue to be is, from the love, support, guidance, cajoling, unending care, love and listening provided as we travel the paths of life together. May my future work always remain humble, ethical, and loyal to what I learned. I am grateful that I was fortunate enough to be supported throughout this unique, unusual, *out-of-the-box* organizational thinking and multi-tiered research working to unravel and understand complexities within our educational system.

**Opening Pandora's Box:**

**Texas Elementary Campus Administrators use of Educational Policy And Highly Qualified Classroom Teachers Professional Development through Data-informed Decisions for Science Education**

**Publication No. _______________**

**Linda Lou Brown, Ph.D.**

The University of Texas at Austin, 2009

Supervisor: James P. Barufaldi

Federal educational policy, *No Child Left Behind Act of 2001*, focused attention on America's education with conspicuous results. One aspect, *highly qualified classroom teacher* and *principal* (HQ), was taxing since states established individual accountability structures. The HQ impact and use of data-informed decision-making (DIDM) for Texas elementary science education monitoring by campus administrators, *Campus Instruction Leader* (CILs), provides crucial relationships to 5$^{th}$ grade students' learning and achievement. Forty years research determined improved student results when sustained, supported, and focused professional development (PD) for teachers is available.

Using mixed methods research, this study applied quantitative and qualitative analysis from two, electronic, on-line surveys: *Texas Elementary, Intermediate or Middle School Teacher Survey©* and the *Texas Elementary Campus Administrator Survey©* with results from 22.3% Texas school districts representing 487 elementary campuses surveyed. Participants selected in random, stratified sampling of 5th grade teachers who attended local Texas Regional Collaboratives science professional development (PD) programs between 2003-2008. Survey information compared statistically to campus-level average passing rate scores on the 5th grade science TAKS using Statistical Process Software (SPSS). Written comments from both surveys analyzed with Qualitative Survey Research (NVivo) software. Due to the level of uncertainty of variables within a large statewide study, Mauchly's Test of Sphericity statistical test used to validate repeated measures factor ANOVAs.

Although few individual results were statistically significant, when jointly analyzed, striking constructs were revealed regarding the impact of HQ policy applications and elementary CILs use of data-informed decisions on improving 5th grade students' achievement and teachers' PD learning science content. Some constructs included the use of data-warehouse programs; teachers' applications of DIDM to modify lessons for differentiated science instruction, the numbers of years' teachers attended science PD, and teachers' influence on CILs staffing decisions. Yet CILs reported 14% of Texas elementary campuses had limited or no science education programs due to federal policy requirement for reading and mathematics. Three hypothesis components were supported and accepted from research data resulted in two models addressing elementary science, science education PD, and CILs impact for federal policy applications.

# Table of Contents

## List of Tables

**List of Figures**

## List of Illustrations

# Chapter 1 - Introduction

This dissertation is an account of how educational policy, specifically science education curriculum, is monitored in Texas elementary schools. It is a tale of encouragement as well as a tale of desolation, due to an apparent lack of foresight regarding elementary science curriculum. Some elementary campus leaders, while chasing illusive test scores required by educational policy in limited subject areas such as mathematics and reading, ignore science entirely. Nonetheless, it is a hopeful story of Texas elementary teachers who develop appropriate and meaningful science learning experiences for the diverse student populations they teach.

Yet, it is evident that dedicated teachers who experience deprivation from professional interactions or who are banned from teaching science emanate frustration, anger, and disappointment. These same teachers express those exact heartfelt feelings when campus or district administration instructs them to ‘not teach science.’[1] Teachers are denied participation in science education professional development by their campus administrators, and therefore prohibited from opportunities to renew and recharge their personal internal resources. For many elementary teachers, the lack of professional networking among like-minded science educators is dispiriting. And still, the local community, the educational state agency, and federal mandates charge teachers and campus administrators with ensuring the success of all children.

This story is about power within school systems. Throughout America’s 150-year history of public schools, education’s organizational structure has changed very little regarding roles and job functions. *Principals* are regarded as the leaders or administrators and expected to establish internal culture, maintain day-to-day operations of the facilities, hire and fire staff, monitor teaching and curricula used, and establish rules, procedures and consequences for student behavior. Teachers are regarding as the primary figure responsible for teaching the students by writing lesson plans, developing evaluation measures, e.g. tests, of material learned, working within the rules and procedures boundaries established by the principal, as well as maintain an appropriate learning environment. The examples above are minimal socially-accepted beliefs regarding public schools responsibility for students' achievement that specifically identifies teachers as the individual primarily responsible for student achievement.

Nonetheless, I believe that other individuals are equally involved and accountable in student achievement, yet in education arenas these connections are lost. Campus administrators, whose role may be identified as principals, or assistant principals are just as involved in student achievement as are the teachers who are employed to teach students. Campus administrators represent the power within public schools since decisions about budgets, professional development, campus policies, and as well as a multitude of challenges principals determine occurring daily. In a business structure, these individuals are management or the chief executive operator (CEO) and everyone knows that any decision made impacts everyone. Unfortunately, schools and school systems are not viewed in the same manner and broken lines of accountability remain regarding responsibilities for student achievement.

In spite of disheartening information, this dissertation is still a tale of the positive culture and events occurring daily throughout education locations. Collaborative support and encouragement occur every day among elementary school campus administrators, campus teacher-leaders, and individual teachers. Those who stretch their own understanding of the pedagogy of science education, through targeted content knowledge and professional growth, promote successful learning for the children in their classrooms. Regrettably the constraints of a national accountability system in which *teaching to the test*[2] is overly emphasized that many campus administrators, teachers and their students lose sight of sparking creative thought, forgetting how to ignite intrinsic curiosity or maintaining a sense of wonderment throughout learning, especially through science lessons.

This is a story searching for meaning within this highly complex Texas public elementary education system. To untangle all of the complexities of science programs within locally controlled school systems would be a nearly impossible task. Within this involved organizational system, initially the need to address educational leadership – elementary school campus administrators – was ignored in the first iteration of federal policy "*No Child Left Behind Act of 2001*" (*NCLB*).[3] This Act actually left behind children, teachers, and principals with its unrelenting drive for constantly elevated performance standards and ultimately caused some school closures and many district mergers[4] throughout Texas.

To explore federal education policy implementation within a state as large as Texas provides a glimpse of the best and worst examples of encouraging student achievement within science education in an elementary school setting. When elementary school campus administrators are limited to accountability measurements of students' achievement on state-mandated exams, the results of which also effectively measure teacher performance, the lens of data-informed decision-making dangerously narrows.

*NCLB* demand for an Annual Yearly Progress (AYP) state report from elementary campuses focuses on reading and mathematics. AYP does not include science as a measurement for campus success or failure. Although science was added to the federal listing of academic subject in 2008, it is still not a discipline that an elementary campus is measured in the AYP report since science is to be tested one time at the elementary school level, one time at the middle school level, and annually for the high schools. At the state of Texas level, reading and mathematics remain the primary aspects for school accountability. The 5$^{th}$ grade science test was added in 2007 to meet federal standards, however it is not included in school accountability measures.

However, when teacher performance is bolstered through sustained science education professional development programs, for example those offered through regional collaboratives such as the Texas Regional Collaboratives (TRC) science network, student achievement, teacher confidence, and overall campus accountability improves.[5] It is my belief that seeking the 'highly qualified classroom teachers' *NCLB* requirement for Texas elementary accountability need to be as important as supporting elementary school campus administrators as CILs encouraging teachers' to attend sustained science education professional development (PD) programs, and ultimately implement and practice science pedagogy of what is learned. Systemic teacher PD involvement, only made possible with the support of elementary school campus administrators I believe has a direct influence on students' success to learn, as well as achieve success, for state-mandated science TAKS tests.

**PURPOSE OF STUDY**

The purpose of this dissertation research is two-fold. First is to examine the influence that elementary school campus administrators have on fifth grade student achievement in science education. Second is to determine the impact of educational policy on elementary science education students' achievement when Texas elementary school campus administrators, as Campus Instructional Leaders, make decisions impacting teachers' professional development. One area of *NCLB*, professional development for in-service teachers, has been researched in various ways, from Dewey to Barufaldi.[6] The impact of elementary teachers' professional development on 5$^{th}$ grade elementary students' performance on state-mandated standardized tests through one pedagogical model[7] has been further documented[8] in numerous research studies.[9] These results demonstrate that there is a relationship between the intense train-the-trainer model for science education professional development and students' test scores on the Texas Assessment of Knowledge and Skills (TAKS) 5th grade science exam.[10] Yet, missing from the results is the impact elementary campus administrators have on student achievement by way of educational policy and utilizing best practice approaches for science education professional development for teachers. Therefore, this research hopes to *open Pandora's Box*[11] in regard to educational policy use through data-informed decisions, professional development, and campus administrators as *Campus Instructional Leaders (CIL)*. The search for answers begins with analyzing and classifying the complexities of the decision-making processes available to elementary campus administrators when determining appropriate elementary science education programs. The possible processes for determining appropriate decisions and variations of data-information available for decision making[12] were thoroughly described and defined in the work of Neustadt and May, as they examined 60 years of American political history through the microcosm of nine American presidential challenges and successes during that period.[13] This study draws from Neustadt and May's process while examining educational decision making processes and influences.

## STATEMENT OF THE PROBLEM

In 1897, John Dewey's creed states that *"Education is the fundamental method of social progress and reform,"* when he wrote *My Pedagogic Creed (1897)*[14] as one of his earliest philosophical writings. These words, it could be argued, are either a cornerstone of American public education policy reforms over the past 110 years or a mockery of these reforms. As educational and historical researchers have examined the history of the American education system since Dewey penned these words there has been evidence of tremendous transformations across America.[15]

Yet, one will rarely find as truth that behind education policy reform will be a socially valued public educational system designed for *all* children to succeed.[16] Even though Dewey's philosophy remains the basis of university-level curriculum and instruction programs for teacher training, during most of the "twentieth century Americans have argued about their public schools."[17] Many individuals clamor for a 'back-to-basics' curriculum approach, while others claim education is not preparing students for competing in future careers or global technology applications.[18] Current demand of higher accountability for students and teachers continues gaining momentum, yet many parents believe their children need to pursue their own interests through other educational avenues, such as charter schools or home school efforts.

No matter how parents choose to educate their children, the bottom line remains: All educational activities fall under federal educational policy, and the goal remains for all children to succeed. Whether a child's education commences with Head Start,[19] pre-Kindergarten, or Kindergarten, elementary school is a crucial element in children's success as learners across all disciplines. It lays the important foundations of knowledge and concepts for future learning in middle school, high school, higher education, and beyond, in one's work or career.

### *Impact of Federal Education Requirements on Elementary Schools*

During the fall of 2001, the *No Child Left Behind Act of 2001* (Public Law 107-10, §9101(23)) was passed by the U. S. Congress and ratified on January 20, 2002. The *NCLB* federal education law holds states, districts, and schools accountable for student achievement by requiring regular assessments to mark progress and highlight weaknesses in the core academic subjects: Language Arts (reading and writing), Mathematics, Science, and Social Studies. For elementary campuses, Language Arts and Mathematics serve as the report card for federal AYP measurement. Within Texas, elementary school campuses are deemed accountable for Reading (grades 3, 4, and 5), Writing (grade 4), Mathematics (grades 3, 4, and 5), and Science (grade 5). Social Studies for elementary students is scheduled to become part of the Texas accountability system in 2012 or 2014.

### *Highly Qualified Classroom Teachers*

Prior educational research demonstrates that teachers who use student test performance data to guide and improve their teaching are more effective than teachers who do not use such information.[20] Effective teachers use data daily to analyze which students are and are not learning what is taught. Constant analysis enables classroom teachers to tailor instructional delivery to best meet individual students' learning needs.[21] In this context, *NCLB* considers 'highly qualified classroom teachers and principals' (HQCT or HQP) an essential component of student achievement.[22] On the other hand, defining appropriate criteria for a 'highly qualified classroom teacher' has prompted numerous debates on Capitol Hill.[23] Both the U.S. House of Representatives and the U.S. Congress agree that highly qualified teachers and principals must have appropriate advanced higher education degrees and to demonstrate knowledge and skills required for their position through state-mandated certification. At the time of this study and writing, no other agreements regarding what 'highly qualified' beyond a college degree and state certification has been reached. Under the current administration, new federal policy initiatives may still be forthcoming.

### *Roles Defined for Elementary School Campus Administrators*

Nevertheless, within the equation of teachers' pedagogy + content knowledge + student achievement[24], teacher knowledge and preparation are well-known dynamics for student learning and academic success.[25] Still a fundamental component is missing: the elementary school campus administrator, an individual who, in today's educational environment, is expected to provide curriculum and campus administrative leadership, as well as promote data-informed decision-making.[26] Instructional leadership is considered fundamental, and elementary school campus administrators are the primary individuals responsible for staffing (i.e., coordinating classroom assignments that would best meet student needs for learning).[27] Multiple research studies indicate that elementary school campus administrators have tools available for determining crucial decisions through a multitude of campus-wide data sources.[28]

*NCLB* demands meticulous data for AYP reporting, which strains finite and at times inadequate campus-level resources. Based on using the information at hand for data-informed decision-making, it is expected that the elementary campus administrator use of such for analyzing and predicting teachers' impact required for promoting successful student learning and achievement in science. Absent from the decision-making process may be the consideration of sustained annual professional development for science content and pedagogy. In my opinion, additionally issues may arise due to state-level and or district-level policy ambiguities and interpretations, and as such the federal policy may not operationalized or validated throughout Texas school districts and campuses. Therefore, the tremendous potential to influence student learning and achievement in science[29] remains within the domain of the elementary school campus administrator.

**EDUCATIONAL REFORM INITIATIVES**

The last five decades of educational reform initiated by the post-Sputnik era of the 1960s[30] continued through the federally solicited three-year program known as *A Nation At Risk.*[31] At the state-level, Texas educational reforms, known as Texas House Bill 72 of 1984, progressed concurrently through state legislation and became a foundation for the *No Child Left Behind Act of 2001* federal mandate. None of these reforms produced the anticipated level of national educational changes.[32] Science education and literacy have suffered as national attention toward high-stakes testing and school accountability has addressed only Language Arts and mathematics.[33]

In order for Texas high school students to gain the knowledge, skills, and experience necessary to succeed in high school science course work,[34] as well as to be informed and scientifically-literate adults in American society, the building blocks of science education need to be incorporated and developed from the very start, in the elementary classroom setting. The elementary campus administrator is the key policy implementer in Texas elementary schools. As such, the elementary school campus administrator's decisions concerning promoting teacher's science education professional development can be traced directly to the successes, and failures, of student learning and achievement within this subject. This scientifically-based research study found *Pandora's Box* in a straightforward link between teachers' sustained and continual science education professional development experiences and students' learning and achievement in science.[35]

## THEORETICAL ASSUMPTION

My theoretical assumption centers on the speculation that Texas elementary school campuses with high, or consistently improving, 5th grade science TAKS test scores have achieved these scores due to a series of campus-level administrative decisions:

(1) utilizing the TRC's science education PD programs when determining campus staffing levels for teacher assignments,

(2) providing both monetary and supervisory support for implementing elementary science education programs,

(3) incorporating data-informed decision-making processes into the campus administration's leadership decisions, and

(4) improved definition for *NCLB*'s requirement of HQ teachers and principals on elementary campuses with specific criteria necessary for higher education degrees and certification along with annual, sustained, and consistent professional development opportunities focusing on increased students' achievement on state-level mandated and content-specific tests.

If any one of these four components is underrepresented or otherwise not utilized by individual elementary school campus administrators, then one will surmise that the TAKS 5$^{th}$ grade science test scores will reflect a decline, very little change, or no change at all.

### *Personal Career Experiences*

This theoretical assumption is built upon personal experiences that are supported by educational research.[36] My background positions have included classroom magnet science teacher in a central Texas public school, corporate American manufacturing-industry management, and various educational development and strategic policy-writing capacities at a Texas state agency. Throughout my 25+ year career, steeped in Texas education, I observed teachers and campus administrators coerced into numerous educational policy reform efforts for school-level accountability and data-informed management decisions; yet, often these individuals were neither properly trained nor prepared to use data in this manner.[37] These personal observations were confirmed when Wayman wrote, "[Districts and schools are] simultaneously data-rich but information-poor."[38]

***Theoretical Construct: Critical realism***

From a post-positivist research perspective, my theoretical construct can be viewed as a wholesale rejection of the central tenets of positivism. According to Trochim,[39] "There is a reality independent of a person thinking about it that can be studied, that all observation is fallible, it has error, and all theory is revisable."[40] A critical realist opposes the notion of an individual's ability to know reality with certainty. The goal of science is to hold steadfastly to accurately ascertaining reality, even though this goal can never perfectly be achieved."[41] Most scientists, as well as science educators, know that all measurements can be fallible; therefore, the post-positivist in this theoretical construct stresses the importance and obligation of multiple measures and observations.

With multiple measurement levels, there is a chance for different types of error. The need to *triangulate* these multiple, potential error sources is crucial for one to approach reality.[42] The data-informed decisions method of triangulation, also referred to by Wayman et al.[43] as calibration, epitomizes the necessity for three independent data sources to verify and validate reality. Such verification and validation of information presented are absolutely necessary. From my perspective as a science educator with multiple career successes, I support both Trochim's and Wayman's definitions. The more data sources one has to validate the reality of information made available, the better assisted one is in determining what will be true regarding educators' teaching and students' learning. One will make more accurate decisions if basing them upon given propositions, inferences, or conclusions available at that time.

***Theoretical Perspective – Interpretivism & Critical Social Theory***

According to Crotty,[44] a theoretical perspective regarding how an individual "describes the philosophical stance that lies behind our chosen methodology … how it provides a context for the process and grounds its logic and criteria."[45] An individual's lifetime of experiences and opportunities frames the number of assumptions each person brings to one's chosen methodology; thus, it is important to state one's assumptions, for such elaboration defines an individual's theoretical perspective. Additionally, Crotty describes that "Expounding our theoretical perspective … our view of the human world and social life within that world … [so that] such assumptions are grounded."[46] Assumptions are the symbolic interactions that assist one in defining human interactions in the "most explicit fashion through language, culture, communication, interrelationships and community."[47] Therefore, symbolic interactions consist of one's social interactions according to the perceptions, attitudes, and values demonstrated by the community studied through the "… heart … to put ourselves in the place of others – the very notion that we have already expressed … our methodology and catered to … the choice and shaping of our methods."

Therefore, from my unique perspective as a social activist by career choice, and a critical social theorist by definition of educational research ontology, emerges a very basic and simple argument: I truly believe that all surviving theories have been subjected to such intense scrutiny that they are like the species which have survived the evolutionary struggle over millions of years (this concept is sometimes referred to as "natural selection of theory of knowledge").[48] Philosophers have debated these issues and will continue doing so for hundreds more years while I, a practicing educational researcher and social activist, will focus on the work that needs to be done.

## LIMITATIONS OF RESEARCH

### *Participant Response*

The ability to participate in this study was limited by technological advancements incorporated into Texas school districts. One such limitation involved using online surveys[49] as the primary method for gathering information from random and stratified selected participants. Two surveys designed for this study were the *Texas Elementary Campus Administrator Survey*™ and the *Texas Elementary, Intermediate or Middle School Teacher Survey*™[50], available to participants through the Hosted Survey™[51] secure web site. The pilot study (June 2007 through July 2007) and the dissertation research study (November 2007 through January 2008, and May 2008 through August 2008) were conducted entirely through Hosted Survey™ services.

The school district Information Technology (IT) department's firewall software, containing spam filters on all incoming email directed to district employees, limited study involvement. During the initial issuance of the research surveys, 55% of the participants received neither the *Texas Elementary Campus Administrator Survey*™ nor the *Texas Elementary Teacher Survey*™ (renamed the *Texas Elementary, Intermediate or Middle School Teacher Survey*™ for the second release), due to firewall spam filter software applications. The title was changed because many teachers were either (1) no longer teaching fifth grade after they attended the TRC professional development programs or (2) the fifth grade class they were teaching was not in an 'elementary' school in their district. The title of the survey alone was resulting in many teaching deciding not to complete the survey because they did not believe it applied to their teaching circumstances. By adding the words "Intermediate" and "Middle School" to the title, this situation dissipated.

In the first survey release, 44.9% of the participants who received the *Texas Elementary Campus Administrator Survey*™ responded, while 29.9% of the participants who received the initial *Texas Elementary Teacher Survey*™ responded. In order to reach more of the original 1,726 selected participants for this study, from January 2008 to May 2008, phone calls, emails, and letters were directed to the participants' district superintendents. In these communications, the superintendents were requested to assist[52] in bypassing the firewall and spam filtering software applications, a process known as a *whitelisting.*

During the second issuance of both surveys, participants were offered an incentive to complete and submit the online survey. These incentives were a variety of loose gemstones from my private collection, which, per stone, averaged $50 appraised and totaled approximately $3,500. The second survey issuance resulted in a completion rate of

34.6% on the *Texas Elementary Campus Administrator Survey*™ and 38.1% on the *Texas Elementary, Intermediate and Middle School Teacher Survey*™.

The final combined results for the *Texas Elementary Campus Administrator Survey*™ was 79.5% and 68% of the teachers completed the *Texas Elementary, Intermediate and Middle School Teacher Survey*™.

### *Self-selected Participation vs. Mandatory Participation*

Another limitation was that each participant who received a survey was able to determine self-selected participation. The apparent honesty and clarity expressed by those who chose to participate offered a unique insight into Texas elementary schools, science education, data-informed decision-making, and the utilization of science-content professional development for teachers.

### *Mathematics Education*

Although the TRC network consists of regional sites for science and mathematics education, this research focused on science education only. Elementary mathematics education in Texas is not part of this study.

### *Pandora's Box Logic*

The fourth limitation of this study was that many naysayers referred to it as "Opening Pandora's Box" since it touched eight distinctly different disciplines within the educational environment:

(1) business and industry involvement in and expectations of America's public educational system;

(2) federal AYP and state education accountability systems through policy statutes;

(3) implementation of education policy at the individual, community-controlled, school district level;

(4) professional development opportunities for elementary, specifically 5th grade, Texas teachers and campus administrators;

(5) use of data-informed decision-making at the campus level;

(6) the requirements demanded by federal AYP reporting and state education accountability policy statues;

(7) the multi-layered responsibilities and requirements demanded of elementary campus administrators and teachers; and

(8) a definition of HQ classroom teacher and principal.

The organizational system of education contains a myriad of multifaceted and intrinsic entities that continually change in regard to social/community, economic, and political pressures. Although all of these will be identified and incorporated where appropriate in this dissertation, the complete examination of such a level of complexity is too great to include in any one study. This study, therefore, is limited to elementary school campus administrators' impact on fifth grade student achievement in science.

### *Longitudinal Data*

As this research evolved, it was necessary to examine a six-year period extending from 2003 to 2008. Fabulous opportunities as well as numerous limitations presenting unique challenges for research accompanied this decision. The TAKS fifth grade science test pilot was presented in 2003, with revisions presented in 2004. This test was not considered part of Texas' accountability system until 2005.

### *Requirements for Student Passing and Campus Rating System*

Annually, the Texas Education Agency (TEA) changes the $5^{th}$ grade science questions as well as 'raise-the-bar' for the level of campus ratings for academic achievement. There are five levels of campus ratings based on the average of all individual students from all sub-groups average from the discipline specific TAKS test. For an elementary school (Grades Kindergarten through $5^{th}$ grade), the TAKS tests include Reading (Grades 3 and 5), Writing (Grade 4) and Mathematics (Grades 3 and 5). Although there is a $5^{th}$ grade science TAKS test, students' test score averages were not included as part of the Texas accountability system until 2008 and it is of minimal importance. Language Arts and Mathematics are the primary standards within the Texas accountability system.

An individual student's TAKS test scores is considered passing when 70% of all questions are answered correctly. The final score is called a *scaled score* and the Texas Education Agency determined that the passing minimum score is 1250. Next, all of the individual student scaled scores from all students in all sub-groups are combined and averaged to determine the average scaled score for each campus. This number is converted to a percent average score that is used for the campus standard passing rate for Reading (Grades 3 and 5), Writing (Grade 4), Mathematics (Grades 3, 4, and 5), and Science (Grade 5). The same accountability system for an individual student's scaled score, campus-level averaged scaled scores, and campus-level percent average score for each academic subject is used for ***all students in all sub-groups*** in all public school campuses throughout Texas (Grades 3 through 12).

In 2005, the standard passing rate for 5$^{th}$ grade science was determined by TEA as 40% averaged score on the 5$^{th}$ grade science TAKS. This percent average score was calculated from students' individual scaled scores from all students from all sub-groups averaged for the campus average scaled score and converted to the campus-level percent average score.

In 2006, the campus rating for minimal passing rate average from all students from all sub-groups individual test scores increased to 45%. Again, this percent average score was calculated from students' individual scaled scores from all students from all sub-groups that were averaged for the campus average scaled score and converted to the campus-level percent average score.

### *Selecting Teacher and Campus Administrator Participants*

Locating the teachers who attended the regional collaboratives science education PD programs was another challenge, especially those individuals who attended programs between 2003 and 2008 due to teachers changing jobs or positions within the same district, move to other districts, leave the profession, and a multitude of other life events. Additionally, there was not a statewide data base that maintains a listing of where teachers move throughout their careers. It is possible to search the Texas Board of Certification for teacher certificates; however teachers and teacher certification are not within the scope of this dissertation beyond the link of between the elementary campus administrator data-informed decision-making efforts and the 5th grade student achievement in science.

Trying to locate the original elementary school campus administrators in place when a teacher attended regional collaborative science education PD was impossible. Therefore, the campus administrators assigned to where the teachers were employed during the 2007-2008 school year were contacted as *campus administrator participants* since these individuals were expected to be involved in teacher development and student achievement which were the elements of this study.

### *General Database Information*

Participants were selected randomly and stratified from the Texas Regional Collaborative database. Due to numerous federal and state requirements regarding exactly what kind of information regarding the teachers attending professional development opportunities throughout the school year was required from the regional collaboratives, an uneven quality of information within the data records emerged. Additionally, during the six-year period of this study, some elementary teachers, as well as elementary school campus administrators, changed locations, left the profession, or switched assignments within the same district.

For many schools, it was impossible to determine campus-level staffing arrangements from district web sites. The TEA database listing of superintendents and campus-level principals trails one year behind the current district staffing (i.e., the 2008-2009 TEA district administration data base actually displays the 2007-2008 school-year employees). Databases kept by the Texas Association of School Administrators, the Texas Elementary Principals and Supervisors Association, the Texas Association of School Personnel Administrators, and the Texas Association of Secondary School Principals are all membership-oriented professional associations and, as such, not all Texas elementary, intermediate, middle school principals, or the corresponding assistant principals, are paid members.

Districts were contacted when information was inaccessible through the district web sites. However, after going through numerous levels of district-level administration and providing information regarding the purpose of this research study, many refused to provide any information. Basic information to questions asked regarding (1) "Does [this person] currently work in this district as a [job function] at [campus]?" and (2) "What is [this person's] email address?" were not answered. Some districts refused outright to answer repeated requests. Others insisted that I submit a separate, district-level Internal Review Board application to conduct any research within a district to the superintendent and that the research would be scheduled during the next school year. One district wanted a research application plus a $35.00 fee to consider the study. This study only included Texas Regional Collaboratives participating teachers and campus administrators at selected campuses and did not include students.

Although all available databases were accessed for the random, stratified selection process, none were perfectly complete, and none of them probably ever will be. In the end, potential participants were those educators who were still teaching and the elementary school campus administrators who were on a current assignment to a particular campus site.

## SCOPE OF STUDY

Texas is geographically the second largest state in the United States, and within its boundaries lie 1,100 public school districts, numerous private and charter school systems, and hundreds of thousands of home-schooled children. The massive number of public school districts precludes this research from involving all of them. Therefore, this study was limited to 25% of Texas public school districts and selected elementary campuses within them.

This dissertation research primarily focused on how the elementary school campus administrators influence student achievement on the 5$^{th}$ grade elementary science standardized exam, as measured by TAKS. Additionally, it explored how elementary school campus administrators utilize TRC science education PD programs to determine 'highly qualified *elementary science* classroom teachers and principals' [emphasis added by author] as a crucial element within this system. NCLB defines a highly qualified teacher and principal as individuals who meet and demonstrate (1) possession of an advanced, higher education degree (e.g., B.A., B.S., etc.), (2) possession of state license or certification specific to job function (e.g., teacher certificate or mid-management certificate), and (3) demonstrated knowledge of content area (e.g. content-specific certificate for each job requirement). Elementary teachers who teach science are only required to have 6 college-level course hours to be considered as a 'highly qualified classroom teacher' while principals have no requirements for college-level, content-specific coursework. The author and researcher believes that using the federal NCLB policy requiring annual and content-specific professional development needs to be completed by both teachers and principals or campus administrators through programs such as the Texas Regional Collaboratives science professional development network in order to provide improved accountability in science education learning for both students as well as teachers.

## TERMINOLOGY AND CONCEPTS DESCRIPTION

For any story told, the author assumes that the majority of readers possess a basic intellectual understanding of the terminology, content, and concepts within the narration. This assumption may be false due to nuances in language, individual words, and cultural definitions across disparate industries. Therefore, to ensure clarity of the terms contained within this writing, a list of their standard dictionary[53] definitions, or further information related to education or references contained in the Appendix, follows. The terminology, content, and concepts described below are presented alphabetically, in a list format style.

*A Nation At Risk*: President Ronald Reagan directed Secretary of Education T. H. Bell to submit a report regarding the quality of America's educational system. Bell created the National Commission on Excellence in Education on August 26, 1981 and directed the members to submit a report to him, President Reagan, and the Nation within 18 months. Three years, and thousands of hours of testimonies, discussions, and meetings across the U.S.A., *A Nation At Risk: The full account*[54] was published. This report is considered the foundation for nearly 30 years of federal educational policy and is the baseline for *NCLB.* For the purpose of this research study, *A Nation At Risk* provides the historical background to educational standards regarding curriculum, professional development in science education for teachers, and leadership.[55] Although *A Nation At Risk* was written as a guideline and report[56] requested by President Ronald Reagan about the state of America's education, the document was not intended by the authors to become federal policy. However, President Reagan had his own personal agenda for the U.S. public education system[57] and released *A Nation At Risk* to the public as a plan to alter public education. Its three-decade history has been both loathed and honored by numerous writers, researchers, policy makers, and others.[58]

Academic year: If not referring to the academic year of a particular public, private, or charter school or institution of higher education, September 1 through August 31.

Accountability: A concept that initially was not considered applicable to America's public educational system, this "obligation or willingness to accept responsibility or to account for one's actions"[59] is now within the lexicon of education.

In Texas, the Texas accountability system is used by the Texas Education Agency to monitor students' achievement on state-level mandated tests, the Texas Assessment of Knowledge and Skills (TAKS). For elementary schools, the accountability system uses test scores for Language Arts and Mathematics. Science testing was not included until 2008 and at this point there are no consequences for failure or reaching minimal achievement levels on the 5th grade science TAKS tests.

Annual Yearly Progress (AYP): As required by *NCLB* federal policy, each campus and district are monitored annually by the state-level mandated standardized tests. For elementary schools, the reported test scores submitted are for Language Arts and Mathematics and NCLB policy has well-defined consequences when a pre-set percentage of all children of sub-groups test scores do not meet minimal achievement. Science testing was not included until 2007 and at this point there are no consequences for failure or reaching minimal achievement levels on state-level mandated standardized tests.

Calibration: Described by Wayman[60] as a process to determine data-informed decision-making methodology. Educational researchers are expected to utilize multiple measurement levels in order to reduce random occurrences that may be caused by different types of error. This process is crucial when one attempts to determine what is real. The systematic progression epitomizes the necessity of factoring in three independent data sources to verify and validate reality. The process may also be referred to as *triangulation*.

Campus administrator: A campus administrator is an individual who has completed a graduate level degree in Educational Administration, successfully passed all required certification tests, and taught a minimum of three years as a certified classroom teacher. Within this document, campus administrator(s) will refer to those individuals located on Texas elementary school campuses who are not directly assigned to teaching functions (i.e., principal, assistant principal, counselor, or instructional specialist).

Collaboration: A noun defined as "to work jointly with others or together especially in an intellectual endeavor or to cooperate with an agency or instrumentality with which one is not immediately connected"[61] [62] Collaboration implies that multiple persons, entities, or both, are capable of working together in ways that support and enhance both student learning and teacher career development.

Collaborative: As an adjective or noun, this word shares similar definitions as above. In this document, 'collaborative' refers specifically to the statewide network of the TEA educational service centers and a multitude of sites at Texas colleges and universities, known collectively as the TRC. Throughout the state, TRC sites have been actively devoted, for 16 years, to providing professional development in science content and pedagogy knowledge for certified Texas educators in grades Pre-Kindergarten through 12th grade high school.[63]

Cooperation: Individuals choosing "to act or work with another or others, to act together or in compliance ... to associate with another or others for mutual benefit."[64] This word is also used interchangeably with collaboration and collaborative, as another way of referring to the need for persons and entities to work together in achieving the overall goal of providing professional development science content and pedagogy knowledge for certified Texas educators in grades Pre-Kindergarten through 12th grade high school.

Culture of education: The integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations or the customary beliefs, social forms, and material traits of a racial, religious, or social group. Also, "the characteristic features of everyday existence (as diversions or a way of life) shared by people in a place or time [e.g., education]. The set of shared attitudes, values, goals, and practices that characterizes an institution or organization ... [the] set of values, conventions, or social practices associated with a particular field, activity, or societal characteristic."[65]

For the purpose of this writing, culture of education defines the social norms enmeshed in local-control school districts across the state of Texas. Such characteristic features of these social norms include community, political, economic, individual, and family views, in addition to required certification levels for all educators (teachers and campus administrators) who are considered part of the educational system.

Curriculum: Numerous educational authors [66] define *curriculum* as individual or groups of courses that constitute an area of specialization (e.g., science) offered by any educational institution. Curriculum, as used in this document, is defined by Tyler as "an instructional program(s) as a functioning instrument of education."[67]

Data-informed decision-making (DIDM): A systematic procedure that utilizes data-informed processes and data support tools to address key district questions. For campus level use, student attendance and student achievement on formative and evaluative measurements are taken into consideration when classroom teachers and campus administrators ruminate over numerous decisions for *best practices* in curriculum selection, annual assessment of teacher performance, and Texas state accountability system and federal AYP requirements.[68]

Data warehouse systems (commercially produced): Data warehouse is a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and analysis. This definition of the data warehouse focuses on data storage. The means to retrieve and analyze data, to extract, transform and load data, and to manage the information are also considered essential components of a data warehousing system.

District created data warehouse systems: Same definition as above for a 'data warehouse system' with the exception that the data information software program is designed and developed specifically by a local educational district.

Elementary school campus administrator: An individual who, in today's educational environment, is expected to provide discipline; set school policies according to district, state, and federal standards; establish appropriate discipline curriculum; evaluate all professional personnel; and function as the campus administrative leader within the elementary campus setting. Additionally, this individual must have completed a graduate level degree in Educational Administration, successfully passed all required certification tests, and taught a minimum of three years as a certified classroom teacher.

*Highly Qualified Classroom Teachers* (HQCT): *NCLB* defines a highly qualified teacher as one who (1) has earned at least a bachelor's degree, (2) holds full state certification, and (3) has demonstrated subject matter knowledge and teaching skill in each core academic subject one is assigned to teach. *NCLB* highly qualified classroom teacher (HQCT) criteria are grouped into two categories:

• Teachers at the Elementary Level (Grades K through 5, and Grade 6 when it is a self-contained classroom), and

• Teachers of Secondary Grade Levels—Middle and High School (Grade 6 only when structured as departmentalized classes, and Grades 7 through 12).[69]

Highly Qualified Classroom Teachers (HQCT): This phrase is from the *No Child Left Behind Act of 2001* that defines the requirements for all teachers possessing current teaching certificates or credentials. The requirements are (1) possess a degree from an accredited institution of higher learning (e.g., B.A.); (2) possess a teaching certificate issued by the state; and (3) demonstrate knowledge of content that is taught.

Highly Qualified Principals: Principals, as a role and function within the educational system, were originally left out of the original federal statute for *NCLB*. In 2005, principal was added to the end of '*highly qualified classroom teachers*'. Now the correct terminology is '*highly qualified classroom teachers and principals*'. Similar credentials are expected for campus principals. The requirements are (1) possess a degree from an accredited institution of higher learning (e.g., M.A. or higher); (2) possess an administrator certificate issued by the state; and (3) demonstrate knowledge required by job function.

For the purposes of this dissertation, *'highly qualified classroom teachers'* or HQCT is used for discussions regarding Teachers, and campus administrator is used when referring to principals.

Highly Qualified *elementary science* Classroom Teachers (HQ*es*CT): *NCLB* has focused attention on teachers by defining requirements for *'highly qualified classroom teachers'*. By December 2006, all teachers in Texas who are certified and possess a college degree are considered to possess qualities for *'highly qualified classroom teachers'* designation.

This phrase is different from the *NCLB* requirement and was created by the researcher as a measure of differentiated pedagogy instruction required for science education, expectation of teachers' science content knowledge, and specific calibration that would apply to Texas elementary teachers. For teachers identified as 'highly qualified *elementary science* classroom teachers', I believe that the addition of science education professional development program attendance through a local TRC regional collaboratives site, and that the teacher continues to incorporate pedagogy and science content knowledge as routine practices in teaching science.

Instructional leadership: An individual who, in today's educational environment, is expected to establish appropriate discipline curriculum, support professional development, evaluate all professional personnel, and provide strong administrative leadership within the elementary campus setting.

Mentor: For a classroom teacher, a certified educator assigned by the campus administrator who has completed mentor training; who guides, assists, and supports the beginning teacher in areas such as planning, classroom management, instruction, assessment, working with parents, obtaining materials, district policies; and who reports the beginning teacher's progress to that teacher's educator preparation program.

Methodology: This term is used when describing the analysis, or examination process, of principles or procedures of inquiry in a particular field.

*No Child Left Behind Act of 2001 (NCLB*), PUBLIC LAW 107–110—JAN. 8, 2002 115 STAT. 1425: On Wednesday, January 3, 2001, Public Law 107-110, (introduced as HR 1) became known as *No Child Left Behind*, was a highly-contested and controversial part of the 107th Congress and President George W. Bush's first year in office. During the 107th Congress, HR 1 was passed in the U.S. House of Representatives on May 23, 2001 and the U.S. Senate on June 14, 2001.[70] President Bush signed *NCLB* into law on January 8, 2002, which also reauthorized the 1967 Elementary and Secondary Education Act. *NCLB* has become one of the most hotly contested federal education laws. Congress based its legislation on this blueprint, proposed by the President. The legislation was co-authored by Representatives John Boehner (R-OH) and George Miller (D-CA), and Senators Judd Gregg (R-NH) and Edward Kennedy (D-MA). The new law's departure from previous legislation was manifested in a number of federal programs aiming to improve the performance of U.S. primary and secondary schools by increasing the standards of accountability for states, school districts, and schools, as well as providing parents more flexibility in choosing which schools their children would attend. Additionally, it promoted an increased focus on reading and writing by re-authorizing the Elementary and Secondary Education Act of 1967. *NCLB* is the latest federal legislation that enacts the theories of standards-based education reform, formerly known as outcome-based education; these reforms are based on the belief that setting high standards and establishing measurable goals can improve individual outcomes in education. *NCLB* requires states to develop assessments for basic skills against which to measure all students in certain grades, if those states are to receive federal funding for their schools. *NCLB* does not assert a national achievement standard; rather, standards are set by each individual state, in line with the principle of local control of schools and in compliance with the Tenth Amendment to the United States Constitution, which specifies that powers not granted to the federal government, nor forbidden to state governments, are reserved for the individual states.[71]

Overall, the purpose of *NCLB* remains to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind. For the purpose of this writing, *NCLB* is used in reference to the state of Texas educational standards for K-12 education.

<u>Organizational systems and/or Organizational development (OD)</u>: As defined by Richard Beckhard, OD is a planned, top-down, organization-wide effort to increase the organization's effectiveness and health. OD is achieved through interventions, with behavioral science knowledge, in the organization's processes. According to Mink, OD is a complex strategy intended to change the beliefs, attitudes, values, and structure of organizations so that they can better adapt to new technologies, markets, and challenges.[72] Garth emphasizes that OD is not simply anything done in the name of bettering an organization, but a particular change process designed to bring about a specific end result. OD involves organizational reflection, system improvement, planning, and self-analysis.[73] Finally, Stephen Robbins describes how organization systems are “more than the sum of their individual member groups,” in that they “[include] the design of the formal

organization, technology and work processes, and jobs; organizational human resource policies and practices … the internal [and external] culture; and levels of work stress.

The term organization system is often used interchangeably with organizational effectiveness or organization development, especially in the context of defining methods for maximizing an organization's potential. All of these definitions and applications will be used within this document.

Pedagogy: This term specifically defines the art, science, or profession of teaching. Precisely, it refers to the instructional choices and procedures teachers execute. As defined by the Texas Administrative Code[74], pedagogy is the art and science of teaching, incorporating instructional methods that are developed from scientifically-based research.

Professional development (PD): According to Thomas Guskey,[75] four principles are common to the practices and strategies required for successful efforts to provide teachers and campus administrators with appropriate learning and career development opportunities. These tenets are systemically interconnected and integral to the process of improving student learning: (1) A clear focus on learning and learners, (2) an emphasis on individual and organizational change, (3) small changes guided by a grand vision, and (4) procedurally embedded ongoing professional development.

Student achievement: This concept focuses on students' cognitive learning, which can and should be assessed in numerous ways. As discussed in Guskey's *Evaluating Professional Development*,[76] recent research by the Consortium for Policy Research in Education points to specific instructional practices that demonstrate success in supporting student achievement: (1) Achievement as a school system's primary goal for all attending students, (2) enhancing the curriculum and ensuring that students are engaged in challenging academic programs designed for learning, and (3) school-level leadership demonstration of appropriate management of finances, resources, people, and time through data-informed decision making problem solving programs.

Student Information System: a software application for educational establishments to manage student data. Student information systems provide capabilities for entering student test and other assessment scores through an electronic grade book, building student schedules, tracking student attendance, and managing many other student-related data needs in a school, college or university.[77]

Teacher: An educator employed by a school district who teaches the majority of the instructional day in an academic instructional setting and is responsible for evaluating student achievement and assigning grades.

Texas accountability system: As required by *NCLB* federal policy, each campus and district are monitored annually by the state-level mandated standardized tests. These tests, and other measures, compose the basis for the Texas accountability system. Science testing was not included until 2008 as part of this system, and at this point for elementary schools only, there are no consequences for failure or reaching minimal achievement levels on state-level mandated standardized tests.

Texas Assessment of Knowledge and Skills (TAKS): TAKS is the state of Texas' set of mandated, annual tests for measuring students' achievement levels throughout their nine years in the public school system. These annual exams start in Grade 3 with Reading and Mathematics and continue each year until the student has graduated. The U.S. Department of Education measures accountability as AYP for each Texas campus and school district by how well, or poorly, students score on a content-specific TAKS. These results are published as *report cards* on the TEA web site and in local newspapers. In Texas elementary schools, the Texas accountability system is used for annual monitoring of students' achievement in Language Arts and Mathematics.

Texas Education Agency (TEA): The Texas Education Agency is a state agency charged with the mission of providing leadership, guidance, and resources to help schools meet the educational needs of all students. TEA is the administrative unit for primary and secondary public education. Under the leadership of the Commissioner of Education, the TEA (1) manages the textbook adoption process; (2) oversees development of the statewide curriculum; (3) administers the statewide assessment program (TAKS); (4) administers a data collection system on public school students, staff, and finances; (5) rates school districts under the statewide accountability system; (6) operates research and information programs; (7) monitors compliance with federal guidelines; and (8) serves as a fiscal agent for the distribution of state and federal funds.

TEA operational costs are supported both by state legislation and federal funds. It is comprised of the Commissioner of Education and agency staff. The TEA and the State Board of Education (SBOE) guide and monitor activities and programs related to public education in Texas. The SBOE consists of 15 elected members representing different regions of the state. One member is appointed chair by the governor.[78] Staff of the TEA assigned by the commissioner of education to perform the SBEC's administrative functions and services.

Texas Essential Knowledge and Skills (TEKS): According to the Texas Education Agency's *Learning Standards for Texas Students* pamphlet,[79] and the Texas Administrative Code 19,[80] the State Board of Education adopted a curriculum framework for Texas schools, known as the Texas Essential Knowledge and Skills (TEKS). The Kindergarten-Grade 12 state curriculum in Texas adopted by the State Board of Education and used as the foundation of all state certification examinations. TEKS are structured as learning standards to help ensure that all students are prepared to meet the challenges ahead as they move forward with their education. TEKS are written for all grade levels (Kindergarten to $12^{th}$ grade) and for each discipline. These standards identify the skills and knowledge that each student must become adept in according to grade level expectations, and starting in Grade 3, students' proficiencies are tested annually through the TAKS standardized tests. Examples of these standards include, but are not limited to one's (1) ability to become a more effective reader; (2) knowledge and application of more complex mathematics; (3) development of a stronger understanding of science concepts, especially in biology, chemistry, and physics; (4) mastery of the social studies skills and content necessary to be a responsible adult citizen; (5) realization of a wider range of technological skills; (6) adoption of skills in fine arts, including art, music, and theatre; and (7) gaining of skills in languages other than English; (8) understanding of health education; and (9) success in physical education.

For the purpose of this dissertation study, all TEKS references herein pertain to elementary science standards.

<u>Texas Regional Collaboratives (TRC)</u>: The Texas Regional Collaboratives For Excellence in Science and Mathematics Teaching (TRC) is an award-winning network of P-16 partnerships that provides sustained, high-intensity professional development to P-12 science and mathematics teachers. This TRC network boasts 37 science regional collaboratives and 21 mathematics collaboratives, located at 20 Education Service Centers (ESC) and 17 universities, colleges, and community colleges throughout the state of Texas.

Further, TRC has established two new collaboratives in Louisiana with plans of expanding to other states as well. Its central administration offices reside at the University of Texas at Austin.

Triangulation: This may also be referred to as *calibration* and is described as a process to determine data-informed decision-making methodology. Educational researchers are expected to utilize multiple measurement levels in order to reduce random occurrences that may be caused by different types of error. This process is crucial when one attempts to determine what is real. The systematic progression epitomizes the necessity for three independent data sources to verify and validate reality.

## OVERVIEW DESIGN OF CHAPTERS WITHIN THIS DISSERTATION

Chapter 1 provides an overview and introduction of this dissertation's research format. The reader is engaged in the story of Texas elementary-level science education and the complexities surrounding all public education realms during the current age of accountability. Chapter 2 takes the reader along the path of prior research studies pertinent to the eight aforementioned topical areas of this dissertation. Furthermore, this section uncovers what is missing from the research on science education issues in elementary schools, which is where this study hopes to shed light. Chapter 3 details research methodology choices. Chapter 4 provides analysis of and insight toward the collected survey data. And, finally, Chapter 5 focuses on the results and implications of this study as well as identifies future areas of research.

# Chapter 2 - Literature Review

The purpose of this dissertation research is to determine the impact of educational policy decisions, made by Texas elementary school campus administrators as *Campus Instructional Leaders* (CIL), on elementary science education curriculum.

This chapter's focus includes educational policy and the implications of Texas Legislation, specifically the *4-by-4 graduation plan*; principal effectiveness and data-informed leadership; the utilization of sustained professional development for science education, as provided through the Texas Regional Collaboratives model; and future business need for Science-Technology-Engineering-Mathematics (STEM) graduates.

## EDUCATIONAL POLICY

As discussed in *The Carnegie Report* (2006), campus principals, along with other campus administrators, were left behind by the lack of adequate CILs professional development programs, skill enhancement in best utilization of available highly-technologically based data warehouse systems,[81] as well as by the minimal standards within federal educational policy definition of *highly qualified classroom teachers* (HQCT).[82] Additionally, the fact that science is not part of the federal AYP reporting structure or required by the Texas accountability system is obvious in the TAKS 5$^{th}$ grade science test scores from 2003 to 2008.[83] Although *NCLB*, as of 2008, has called for the federal AYP inclusion of 5$^{th}$ grade science TAKS test scores from the Texas elementary assessment system, the statue does not mandate penalties for low science scores in the same manner that Mathematics and Language arts test scores are held. Language arts and mathematics remain the only AYP determining factors for federal standards and numerous Texas campuses and districts are using some of the federal guidelines to measure students' academic success as part of the Texas accountability system.

### *No Child Left Behind Act of 2001*

The most current national interest in public education is Public Law 107-110, better known as the *No Child Left Behind Act of 2001 (NCLB)* this educational reform law continues to expose a skewed view of America's public educational system.

On January 8, 2002, a new educational law passed and adopted by the 107th session of the U.S. Congress. The first statement of this law, called *The Act*, written as: "To close the achievement gap with accountability, flexibility, and choice, so that no child is left behind." This follows another statement that says, "Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled."[84] These are powerful words, and no single state in the United States, nor any individual citizen, expressed a desire for substandard education of our nation's children. Thus, how is can equitable and fair *science education* achieved in Texas?

Buried in the policy were multiple hidden agendas and meanings, which reached far beyond educational goals: insidious and vindictive politicking, power, control, and other such qualities that have little, if anything, to do with regard to educating children. Such hidden agendas have sparked debates with state governments over the topics that follow:

- disagreement regarding state school accountability to the federal government[85];

- differences between Congress and the last administration overstepping boundaries in a domain historically left to individual states (i.e., improving achievement among disadvantaged students).[86] Even though many of these issues were modified,[87] U.S. Department of Education (USDoE) Secretary Margaret Spellings announced in policy letters and other statements to the nation's school leaders that she is not willing to change permanently the intent of *NCLB*.[88]

The narrow pinpointed vision of *NCLB* shaped in public education that all children will be receive equal education and be on grade level by 2012 began decades ago. With few exceptions,[89] it seems that very few research endeavors have critically examined how this all began in 1983 with the publication of *A Nation at Risk: The imperative for educational reform by the National Commission on Excellence in Education (A Nation at Risk)* and influence on public education in Texas. Many individuals criticized *A Nation at Risk* under the auspices of separate disciplines: political critics of politicians,[90] educational critics of education,[91] or societal critics of sociologists;[92] I, as a critical educational researcher, continue searching for scholarly analysis of how these three components influence each other and interrelate. Questions haunted me throughout my career experiences, such as (a) Has public science education improved or failed over the past 22 years? (b) How are such improvements measured? and (c) By whose standards?

To gain an understanding of what is occurring in public education throughout Texas in the early twenty-first century, it is imperative to start the quest for knowledge at the beginning of this current period of educational reform. Reviewing history is essential to assessing where our nation stands today based upon earlier educational policy decisions.

Mayer and Neustatler's writing, *Thinking in Time: The uses of history for decision makers*, the great question concerned not what we, as the American public, should do after a situation has arisen, but rather the process for identifying causes and potential solutions. When problems and solutions addressed in historical references, it is important to examine identifying causes; how solutions are determined; and the ultimate results.[93] What factors are considered when examining how problems are addressed and solved becomes the critical point. If one identifies and thinks about what the problem is, then the how or process for addressing the situation to determine the best possible outcome becomes more instrumental in determining the potential solution.

Diane Ravitch related an earlier educational premise of America's children, which was set forth by The Committee of Ten in 1898: "that all children – especially those who were not headed for college – should have the benefit of a liberal education."[94] If the purpose of the current federal educational policy of *No Child Left Behind Act of 2001* is that all children are to have the benefit of a liberal education, then we as a nation are failing miserably.

As Davidson and Lytle describe in their book *After the Fact: the Art of Historical Detection*, "Historians . . . are in the business of reconstruction."[95] Therefore, this research study will follow educational history as a portion of the critical examination of political and social influences on education. The focus includes an aspect from the federal level of government starting with one foundation document, titled *A Nation at Risk: The imperative for educational reform by the National Commission on Excellence in Education* (1983), and the subsequent state law created by the Texas 71st Legislative Session, H. B. 72 (1986) for K-12 education. Both documents meant to create rigorous reform in public education. *A*

*Nation at Risk* severely criticized the American public education system for failing our nation, our children, and future business interests.[96] The Texas 71st Legislative Session, H. B. 72 (1986) established a new accountability system for students, teachers, and school districts through establishing a statewide standard called the Texas Essential Knowledge and Skills (TEKS).[97] Both documents were noted as cornerstones for federal laws included in the *NCLB* federal mandate two decades later.

Related portions of history also address this enormous puzzle, specifically those dealing with the resultant curricula and impact on public education of science and mathematics education. Many of the issues discussed in *A Nation at Risk* assume the need for a scientifically literate American social structure:

> Our Nation is at Risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world. This report [*The National Commission on Excellence in Education; a Nation at Risk: the Full Account*] is concerned with only one of the many causes and dimensions of the problem, but it is the one that undergirds American prosperity, security, and civility.[98]
>
> Our society and its educational institutions seems to have lost sight of the basic purposes of schooling, and the high expectations and disciplined effort needed to attain them . . . Educational researcher Paul Hurd concluded at the end of a thorough national survey of student achievement that within the context of the modern scientific revolution, "*We are raising a new generation of Americans that is scientifically and technologically illiterate*."[99] . . . John Slaughter . . . warned of "*a growing chasm between a small scientific and technological elite and a citizenry ill-informed . . . on issues with a science component.*"[100] Some worry that schools may emphasize such rudiments as reading and computations at the expense of other essential skills such as comprehension, analysis, solving problems, and drawing conclusions.[101] . . . Paul Copperman has drawn a sobering conclusion, "*Each generation of Americans has outstripped its parents in education, in literacy, and in economic attainment. For the first time in the history of our country, the educational skills of one generation will not surpass, will not equal, will not even approach, those of their parents*."[102] . . . the *average citizen today* is better educated and more knowledgeable than the average citizen of a generation ago – more literate, and exposed to more

> mathematics, literature, and science. Nevertheless, the average graduate of our schools and colleges today is *not as well educated* as the average graduate of 15 or 25 years ago.[103]

Later on, the text discusses science specifically for the importance of America's future dependant on a well-educated populace.

> Public Testimony Hearing "Science, Mathematics, and Technology Education" on March 11, 1982 at Stanford University, Stanford, California noted that science and technology have increasingly become the engine for change and progress in the quality of life, individual health, economic strength, and increasing opportunity. While we [America] are still first in science and technology, we are being challenged by other nations. Meeting our national needs and remaining a strong international economic participant require first-rate education in science, mathematics, and technology.[104]

Future decisions pertaining to business and societal needs in the technology, environment, and health industries will depend upon individuals' strong scientific and mathematical backgrounds. Yet, what is happening in Texas elementary schools today may not be preparing students to meet this prerequisite.

***Comparison of federal and state policies***

*NCLB* demanded an increase in the use of data for the accountability reports submitted by all states. Yet, school leaders do not always use such reports appropriately and increases toward effective measurable change cannot be attributed to the use of such information, as Knapp and Nelson found in their independent research studies.[105] Furthermore, as *The Carnegie Report*[106] clearly indicates, principals and other campus leaders are *'left behind'* when it comes to federal mandates requiring appropriate training and professional development opportunities. Training designed for this level of leadership (i.e., training which would enable understanding of the best ways to interpret and utilize available campus data) is lacking. As Knapp and Wayman found in their individual research programs,[107] a clear vision of teaching and learning must be in place before data-based decision making can realize its potential. Then, best practices will continue to emerge, exactly as defined in Smith and Andrews' 1989 seminal work regarding instructional leadership by campus principals.[108]

However, state-level requirements for meeting all aspects of the Texas accountability system and HQCT under the mandates of *NCLB* were modified, changed, or added to during the biennial Texas Legislative 80th Session. Table 2.1 demonstrates Texas' accountability system accommodation relationships to *NCLB's* federal statutes. A specific line-by-line item summary of Texas state assessments follows in Table 2.1 Texas Accountability Under *NCLB:* Accommodation Comparisons Chart. Table 2.2 compares *NCLB's* accountability standards against those of the Texas Legislature, as well as highlights how current Texas Legislative policy requirements have modified *NCLB* mandates.

| TEXAS ASSESSMENT SYSTEM | HOW TEXAS RELATES TO *"NO CHILD LEFT BEHIND"* FEDERAL POLICY |
|---|---|
| **Accountability** – To determine ratings under the standard accountability procedures, the 2007 accountability rating system for Texas public schools and districts uses four base indicators: | **Adequate Yearly Progress** – The federal statute requires a state to define "Adequate Yearly Progress" in order to determine whether campuses and local education agencies (LEAs) are affecting adequate progress on state assessments and to ensure that all students obtain proficiency by the school year 2013-2014. |
| 1. spring 2007 performance on the Texas Assessment of Knowledge and Skills (TAKS) for math and reading only,<br>2. spring 2007 performance on the State-Developed Alternative | **Accountability** – The federal statute details requirements along with qualifications standards for those who provide instruction. Students in all schools are tested in Language arts and mathematics starting in 3rd grade; science testing in 5th grade was required by |

| | |
|---|---|
| Assessment II (SDAA II) for math and reading only,<br>3. the Completion Rate I for the class of 2006, and<br>4. the 2005-06 Annual Dropout Rate for grades 7 and 8. | 2007-2008. |
| The items used to determine a school's accountability rating include performance of all students on the state's assessment and alternative assessment for students.<br><br>The original structure followed similar documentation reporting by special education programs for students receiving special education services. | *NCLB* requires that states have one system to measure all districts/campuses. Texas uses accountability policies to achieve these measures.<br><br>*NCLB* requires all students to meet standards for proficiency. The percentage of students in each subgroup must make adequate yearly progress. |
| **Student Groups**: *At the federal level*, performance is evaluated for all students and the following student groups: African American, Hispanic, White, Economically Disadvantaged, LEP and Special Education.<br><br>Texas has created this methodology for determining passing rates and for creating a special analysis for campuses with a small number of total students.<br><br>***Best Practices Clearinghouse*** - Adds §7.009, Education Code. This state statute directs the Texas Education Agency to establish an online clearinghouse of best practices for use by school districts. | **School Improvement** – The federal statute strengthens school improvement interventions required when a Title 1, Part A campus, or LEA fails to meet AYP.<br><br>The level of school improvement consequences depends on how many years the campus or district has failed to meet this standard. |
| **Methodology:** Number of students passing [TAKS subject].<br>Minimum Size Requirements:<br>• *All Students.* These results are always evaluated regardless of the number of examinees. However, districts and campuses with a small number of total students tested on TAKS will receive Special Analysis. | |

| | |
|---|---|
| • *Student Groups.*<br>o Any student group with fewer than 30 students tested, they are not evaluated.<br>o If there are 30 to 49 students within the student group and the student group comprises at least 10% of all students they are evaluated.<br>If there are at least 50 students within any unique category sub-group, they are evaluated. | |

Table 2.1. Texas Accountability Under *NCLB:* Accommodation Comparisons Chart

**Changes in Texas State Assessments**
**(from 2003 to 2007)**

- Reading/English Language Arts performance standard increased from 53% to 60% between 2004 to 2007.

- Mathematics performance standard increases from 42% to 50% between 2004 to 2007.

- Science becomes part of accountability ratings during 2007-2008 school year, with Social Studies added in 2010-2011.

- The number of students tested on SDAA II below grade level and meeting ARD proficiency expectations that may be counted as 'proficient' may not exceed 3% of a district's participation denominator (before exceptions).

- The TAKS test for grades 9-11 will be phased out and replaced by the following end-of-course assessments:
  - Algebra (I, II), Geometry, English (I, II, III), Biology, Chemistry, Physics, World Geography, World History, and US History.
  - This new schedule will start in 4 years, when the current class of 5$^{th}$ graders enters high school, 9$^{th}$ grade, in 2011-2012.

- The Texas Education Agency may adopt other end-of-course (EOC) instruments not listed above, and performance on those tests is not subject to the performance requirements for graduation.

- The freshman class of 2011-2012 will be the first group of students to take EOC exams for graduation purposes.

- In order to graduate, students must attain a cumulative score that is at least equal to the product of the number of tests taken in that subject and 70, with each EOC test scored on a scale of 0-100. Students scoring below 70 will receive accelerated instruction and have the opportunity to be re-tested. Students must score at least 60 in order to count the score toward the cumulative number.

- Students graduating under the minimum high school program are only required to take the EOC assessments for courses required for graduation.

- The score a student achieves on the EOC exam shall be worth 15% of the student's final grade for that course.

| |
|---|
| • Each time an EOC assessment instrument is administered; a student failing to achieve at least 60 points shall retake the assessment. Any other student may retake an EOC assessment for any reason. A student is not required to retake a course as a condition of retaking an EOC instrument.<br><br>• All assessments (grades 3-12) shall be developed in a manner that allows a measure of annual student improvement. |

Table 2.2. Changes in Texas State Assessments

| ***NCLB***<br>**HQCT (Elementary)**[109] | **Texas requirements for**<br>**'highly qualified classroom teacher'**<br>**(Elementary specific)** |
|---|---|
| **SEC. 1119. QUALIFICATIONS FOR TEACHERS AND PARAPROFESSIONALS.** | Standard Qualification for <u>Teachers</u><br>• Texas Standard Classroom Teacher Certificate<br>• Texas Alternative Route Teacher Preparation Programs<br>*NOTE: In 2003-2004, Texas certified 24,726 standard certified teachers and an additional 6,902 alternative certified teachers – ranking as the second highest state in the nation for alternatively certifying teachers.* |
| **'(a) TEACHER QUALIFICATIONS & MEASURABLE OBJECTIVES —**<br>''(1) IN GENERAL— "Beginning with the first day of [the beginning of] . . . No Child Left Behind Act of 2001, each LEA [Local Education Agency] . . . shall **ensure** that all **teachers hired** . . . **and teaching** . . . with funds under this part are **<u>highly qualified."</u>** | Bachelor's degree (required)<br>• Subject area<br>• Pedagogy courses required<br>• Other prescribed course work<br>Practicum and/or student teaching |
| **''(2) STATE PLAN.*— "** . . . **each State EA** [Education Agency] will develop a plan to ensure that all teachers teaching in core academic subjects within the State are <u>highly qualified</u> no later than the end of the 2005–2006 school year.<br>• [Each plan will include] annual measurable objectives [i.e. professional development | Texas Education Agency submitted plans to ensure all teachers teaching in core academic subjects were 'highly qualified classroom teachers' for the following periods:<br><br>• Submitted plan June 2004 – rejected by USDoE |

| | |
|---|---|
| within core subject areas] shall include:<br>• (A) an annual increase in the % of highly qualified teachers at each LEA [Local Education Agency's] and schools [and that]<br><br>all teachers teaching in core academic subjects in each public elementary school and secondary school are highly qualified not later than the end of the 2005–2006 school year. | • Submitted plan Dec. 2004 – rejected by USDoE<br>• Submitted plan June 2005 – rejected by USDoE<br>• Submitted plan June 2006 – rejected by USDoE<br>• Submitted revision Sept. 2006 – rejected by USDoE<br>• Submitted revision Oct. 2006 – rejected by USDoE<br>**Submitted revision Dec. 2006 – ACCEPTED** by USDoE *(see below)* |
| ''**(B)** shall include an annual increase in the % of teachers who are receiving **high-quality professional development** to enable such teachers to become highly qualified and successful classroom teachers; and | The accepted plan from Texas included:<br>**(1) Educational Service Centers** (ESCs) – 20 throughout the state<br><br>**(2) Texas Regional Collaboratives** (TRCs) – 37 science programs and 20 mathematics programs throughout the state [located at ESCs and many universities/colleges] that provide science or mathematics education professional development for K-12 classroom teachers |
| ''**(C)** may include such other measures as the State educational agency determines to be appropriate to increase teacher qualifications. | **Assessments** – benchmark testing throughout the school year of to measure student learning and the Texas Assessment of Knowledge and Skills (TAKS) |
| ''**(3) LOCAL PLAN.**—As part of the plan described in section 1112, each local educational agency receiving assistance under this part shall develop a plan to ensure that all teachers teaching within the school district served by the local educational agency are highly qualified not later than the end of the 2005–2006 school year."* | The final and accepted state plan submitted from Texas to meet and achieve 'highly qualified classroom teachers' throughout the state indicated that professional development services would be available through:<br>**(1) Educational Service Centers** (ESCs) – 20 located throughout the state, and<br><br>**(2)Texas Regional Collaboratives** (TRCs) – 37 science programs and 20 mathematics programs throughout the state [located at ESCs and many universities/colleges] that provide science or mathematics education professional development for K-12 classroom teachers.<br><br>**This plan was accepted by U.S. DoE on Dec. 17, 2006.** |

** NOTE: Not ONE STATE met the federal requirement date of May 31, 2006.*

Table 2.3. *NCLB* 'HQCT' comparison with Texas accountability system requirements

## EDUCATIONAL POLICY REFORM

Educational policy reforms in the United States started as early as the late 1890's in the United States. The most significant changes happened in two twenty-year periods: 1900-1920 and 1965-1985. *NCLB* was enacted in 2001 and educational researchers[110] have expressed their disappointment with this latest educational policy reform of accountability, curriculum rigor, exams, and teacher certifications are increasingly scrutinized. Historically, according to Michael Kirst "theory and practice have not always coincided [and] overall there has been a gradual increase in fragmentation and complexity."[111] These changes reflect major alterations in the socioeconomic environment that America has faced over the past 100 years: two world wars, the Great Depression, waves of immigration, and more recently Sputnik, the civil rights movement, and international economic competitions. However, large-scale change in educational reform have occurred at local discretion with influence and change in school board directives, local superintendents of school districts and central administrations waxing and waning over influence and power.

Starting in the late 1960s to early 1970s, a new direction for models of educational policy reforms involving campus leadership began when business leaders became involved in the business of education. W. Edwards Deming[112] leadership and management approach for improving production was presented to the top three American automobile manufacturers in the mid-1960. All three refused to embrace his approach to regain competitive positions in international commerce through the *theory of constraints* model, so he approached Toyota Inc. Japan where his management concepts were accepted. Deming belief that management was wrong in their approach of leadership that he informed what was a better management system and demonstrated a concept of transformation. His *14 points for management change* provides a basis for transformation of American industry[113] that can be easily applied to education leadership.

| | **14 Points of Management Transformation** |
|---|---|
| 1 | Create constancy of purpose for improvement of product and service. |
| 2 | Adopt a new philosophy. |
| 3 | Cease dependence on mass inspection. |
| 4 | End the practice of awarding business on the basis of price tag alone. |
| 5 | Improve constantly and forever the system of production and service. |
| 6 | Institute training. |
| 7 | Adopt and institute leadership. |
| 8 | Drive out fear. |
| 9 | Break down barriers between staff areas. |
| 10 | Eliminate slogans, exhortations, and targets for the work force. |
| 11a | Eliminate numerical quotas for the work force. |
| 11b | Eliminate numerical quotas for people in management. |
| 12 | Remove barriers that rob people of pride of workmanship. |
| 13 | Encourage education and self-improvement for everyone. |
| 14 | Take action to accomplish the transformation |

Table 2.4. Deming's 14 points for management transformation [114]

For educational leadership, the transformation of management strategies may do well to head Deming's model when addressing concerns of science education for improving student achievement and teacher content learning of science. Furthermore, Deming's use of *The Shewhart Cycle*[115] brings a constant procedure to follow when one deals with improvement at any stage.

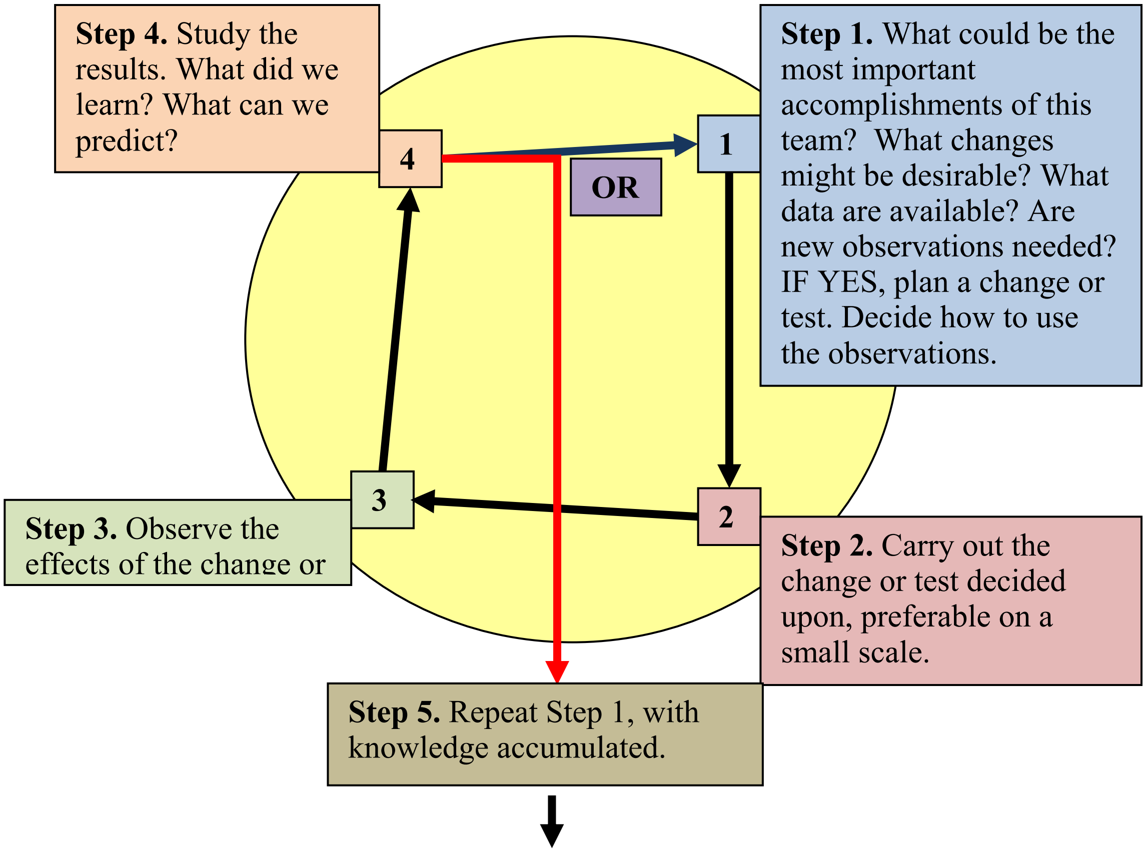



Illustration 2.1. The Shewhart Cycle [116]

## ORGANIZATIONAL SYSTEMS OF EDUCATION (SCHOOLS)

Sociologist Jeanne Ballantine describes schools as an organizational system in this manner:

> [Schools each have their] own culture and subcultures, complete with legends, heroes, stories, rituals, and ceremonies … organizational facts [that] are relevant to any discussion of schools. [t]he size of a school is correlated with the type of organization structure and degree of bureaucratization – the larger the school, the higher the degree. The region of the country and a school's setting affect the degree of centralization – many rural schools tend to become more centralized because the area covered is more sparsely populated; community residents in urban school districts often push toward decentralization because of the diverse needs of large populations. The community's class and racial composition influence

the school structure and climate, and private or religious schools are affected by other unique variables.[117]

Her model of school as an organization demonstrates the parts of the school as it is influenced by these external entities.

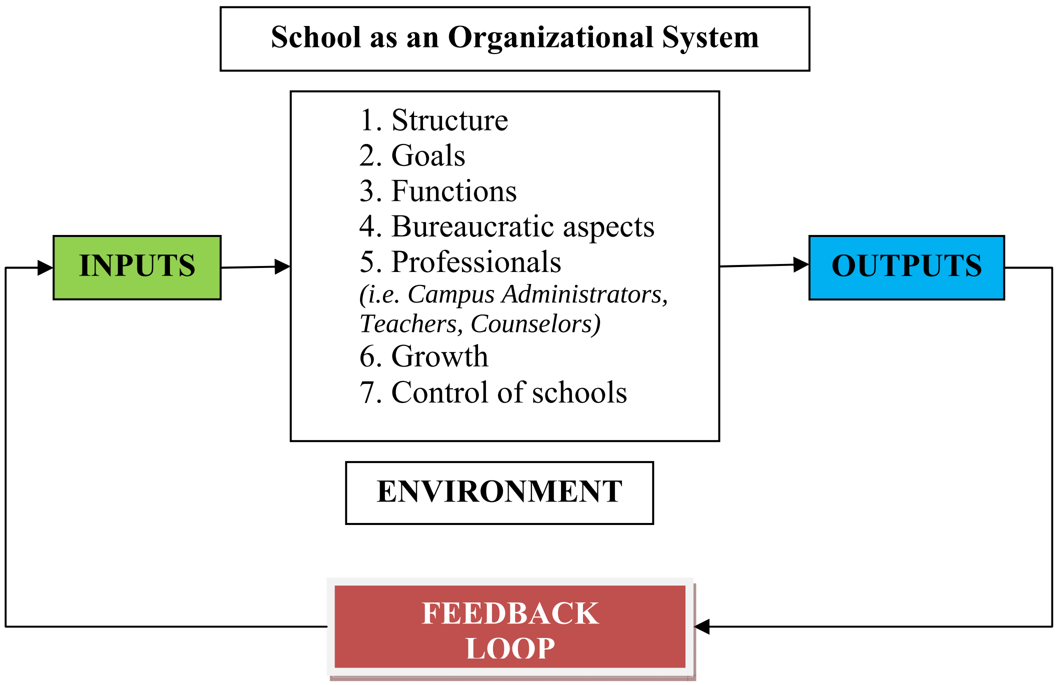



Illustration 2.2. Ballantine's open system model of educational organization [118]

As a school functions as an organizational system is composed of multiple, distinct subsystems with individual goals. Together, all of these individual parts make up a functioning, singular, and behaves as a whole system with each part dependent on the others for smooth operation throughout the day, for the materials or resources needed to function, and even to exist within the system.[119]

## DATA-INFORMED DECISION MAKING

### *The Issue for Data-based Decision Making*

Therefore, how would professional development in science education for elementary teachers and the process of data-informed leadership decision-making apply to student achievement on TAKS 5th grade science tests? Similarly, how would these apply to campus administrators in their role as campus instructional leaders? Coburn, Honig, and Stein along with Knapp, Swinnerton, Copland, and Monpas-Huber, two completely independent research studies,[120] noted that the process of using evidence and data to make decisions to improve educational outcomes is exceedingly complex, non-linear, inherently interpretive, and influenced by myriad moderating and mediating variables. Although a number of studies [121] support evidence that data use results in improved teaching practices (e.g., better understanding of student needs, effective instructional practices, and efficiency of effort), regarded only teacher effectiveness, the campus administration role is, additionally, crucial to the appropriate use of data-informed decisions in the aforementioned areas. Additionally, newer[122] research studies specifically delve deeper into how districts, and campuses, actually utilize the wealth of data warehouse formats available to produce accurate data-informed decisions, an area of interest for educational research. However, it is important to recognize that the *extent* to which districts use data in decision-making may vary depending upon the *type* of decision (e.g., curriculum vs. professional development), as Coburn, Honig, and Stein discussed.[123]

As Kirst described, the educational policy debates and reform included the choice of the decision maker for determining substantive goals and the capacity to achieve such goals.[124] Kirst describes this as institutional choice and demonstrate educational policy reforms result in different educational choices (i.e. curriculum content, accountability) is "often motivated by desires to change school priorities and policies. Replacing those in power with those who are out of power is one way to attempt policy changes. The 1983 report, *A Nation At Risk*, implied that local control of curriculum standards was not optimal and that therefore state government should assume more control of local curricular policies." [125] The state government of Texas implemented the State Department of Education (later named Texas Education Agency) to establish standards for curricular policy for each grade level and subjects from elementary through high school and assigned the responsibility for implementation on to local districts. Kirst's illustrated how these influences on curriculum and educational policy reform is shared across the national, state and local entities in the following table.

| Type | National | State | Local |
|---|---|---|---|
| General legislative | Congress | State legislative | (City councils have no influence) |
| Educational legislature | House Committee on Education & Labor | State school board | Local school board |
| Executive | President | Governor | (Mayor has no influence) |
| Administrative | U.S. Dept. of Education | State Department of Education | School superintendent |
| Bureaucratic | OERI, NSF (Div. of Curriculum Improvement) | State department (Division of Instruction) | Department chair, teacher |
| Professional association | National testing agencies, subject matter organization, NCTM, NSTA | Accrediting associations, NEA, state subject matter affiliates | County association of superintendents |
| Other private interests | Foundation & business corporations, College Board | NSF systemic state initiatives | NAACP, National Organization for Women |

Abbreviations: NAACP, National Association for the Advancement of Colored People; NCTM, National Council of Teachers of Mathematics; NEA, National Education Association; NSF, National Science Foundation; NSTA, National Science Teachers Association; OERI, Office of Educational Research & Improvement.

Table 2.5. Illustrative Influences on Curriculum Policy Making [126]

This period also resulted in the start of bringing data into the educational organizational structure as a tool for determining student learning and ultimately student achievement. Each initiative incorporated as a school restructuring strategy included such names as Site-Based Management (SBM) continued until the late 1980s, followed by Shared-Decision Making (SDM) into the mid-1990s, when Data-Driven Management (DDM) and, finally, Campus Leadership Teams (CLT) emerged. Today, one can find various formats of CLT used as mechanisms to increase student achievement.

Studies as early as 1984 find these models of leadership reform were followed and found that the use of data could influence student achievement through changes of teacher practice.[127]

Knapp, Swinnerton, Copland, and Monpas-Huber's longitudinal study in the state of Washington found that community and parental involvement in decision-making processes was encouraged, and at times mandated, as schools struggled to address the learning needs of unique student populations.[128] Multicultural educational requirements, low social economic status (SES), changes in communities, as well as major federal and state educational reform initiatives all contributed to the ever-changing landscape of the Texas elementary campus.

## USES OF DATA THROUGH TECHNOLOGY

Using data to inform practice is not a new concept, but improved access to better data through technology has the potential to improve the field of education.[129] Knapp et al., and Wayman, Conoly, Gasko, and Stringfield[130] remind researchers that it is important to recognize that data informs, rather than drives, decisions.[131] For example, the Corpus Christi Independent School District (CCISD), on the Texas Gulf Coast, incorporates rapid uses of student learning and achievement data through data warehouse systems and is able to keep a vigilant watch on transient students, so that even "one efficient day or week of education might make a difference for the students."[132] In their use of data while monitoring curriculum and state standards, when transient students move throughout the district campuses, teachers and administrators are able to assess and evaluate each student's learning so that few of the TEKS standards are skipped or missed. In this closely monitored system, students do not fall behind in their learning and are able to stay closer on grade level with their individual learning. Often, as Coburn et al. discovered[133], a significant number of decisions (e.g., five out of fourteen) in a school district are made with no references to data, which can have disastrous impact on student achievement overall.

Campus leadership in a variety of ways can use data, such as to identify organizational problems, inform practice, justify a course of action, or weigh alternatives.[134] As Wayman, Cho and Johnson describe in their extensively detailed, and thorough research of the Natrona County school district in Wyoming, "[If] principals are to be leaders in the crusade for effective data use, they too must find a way to reduce portions of their current duties to make time for such learning opportunities as participating in and receiving appropriate sustained professional development."[135] There are wide ranges of ways educational leaders use data, though not all leadership activities require specific decisions, as numerous research studies have described.[136] Campus instructional leaders can use data as the basis of decisions, but not all of their actions necessitate that they actually use data to make those decisions. Coburn, Knapp, and Bernhardt illustrate that what CIL know about data defines how much they use the information available to them and what actions or decisions they are then able to decide.[137]

## PROFESSIONAL DEVELOPMENT AND THE IMPACT ON STUDENT ACHIEVEMENT

Professional development incorporation into the data accessed information for CILs who determine the *best match* for classroom assignment of teachers, thus promoting the best circumstance and environment to promote elementary student learning,[138] as *The Carnegie Report* by Grosso De León determined. The need for teachers to understand scientific concepts and the use of data for promoting the best student learning and achievement at all levels is not only obvious, but also necessary, as more current studies have documented.[139] For science education, there is a national commitment to meeting goals, and enhancing teaching and student learning across our nation's classrooms. This commitment has been stated as early as 1993 by such noteworthy associations as the NSTA, the National Science Resources Council, the American Association for the Advancement of Science (AAAS), and the National Research Council (NRC).[140]

As part of data-informed decision-making, sustained professional development inclusion goes beyond the need of addressing restrictions of demographic use, especially when working with science educators, as currently espoused in literature by Sparks and Hirsh.[141] Decades of research[142] studies indicate that when students are engaged in inquiry of significant questions in science and able to investigate complex problems in mathematics through supportive collegial communities, their achievement and learning increase.

The ideal classroom environment requires a dedicated, professional educator, committed to lifelong learning of their subject of interest that they teach. Sustained professional development serves as the mechanism for providing these professional educators opportunities to learn and explore the inquiry approaches for teaching through PD experiences. Students come to understand deeply, important science and mathematics ideas, and master complex skills and reasoning processes that are essential to scientific and mathematical literacy. To achieve this vision, campus administrators and teachers also need new knowledge, skills, behaviors, and dispositions. They must assume ownership in the new vision and feel competent to create appropriate learning environments for their students. This includes feeling secure in their knowledge of the content they will help their students learn. Consequently, campus administrators and teachers benefit immensely from opportunities for professional growth, ones in which they learn what they need to know to achieve this new vision, in ways that model how they can work with their students.[143]

Teacher exposure to professional development is not only well documented in research literature, but also required by *NCLB* and Texas educational policies.[144] Yet, similar professional development experiences for campus leaders are not mandated through policy by many states or school districts.[145] At present, such data and objective evidence may well play one of five crucial stages in administrative decision-making as defined by Loucks-Horsley, Love, Stiles, Mundry, and Hewson: (1) instrumental, (2) conceptual, (3) symbolic, (4) sanctioning, or (5) no role whatsoever.[146] One of the first two stages, instrumental or conceptual, must be incorporated in any successful district or campus plan designed around data-informed decision making processes in order to achieve organizational and systemic change.[147]

Accountability policies contained within *NCLB* function as catalysts for focusing on using student data to inform decisions.[148] Data-informed decision-making processes are powerful when accountability and change are the impetus (e.g., teachers, schools, or districts). Overall data-informed leadership outcomes are more evocative to broaden the scope and thinking within educational organizations in order for productive actions that require responding to educational challenges requiring broader interpretation for values and insights (e.g., general public or policy) as described by Knapp, Swinnerton, Copland, and Monpas-Huber.[149] Knapp, et al. additionally relates that while data can inform conversations about possible actions; data-informed leadership can turn information into meaningful actions for systemic change.[150]

## LINK FROM CAMPUS ADMINISTRATION TO STUDENT ACHIEVEMENT AND TEACHER LEARNING

Throughout research literature over the past three decades, additional associations were found between teacher professional development and student test scores. Wayman, Cho, and Johnson's[151] exhaustive research within the Natrona County, Wyoming schools found that elementary schools could, at times, be more advanced in using data-informed decision-making processes than middle schools and high schools for how data is used to improve student achievement. The results from two independent research teams within Wayman and Stringfield's 2006 study substantiated the work of Lachat and Smith, whose data supports a direct and positive correlation between effective use of student data and student achievement levels.[152]

In a 1996 report, Loucks-Horsley, Stiles, and Hewson presented results and conclusions from the Professional Development Project of the National Institute for Science Education (NISE). By exploring aspects of professional learning experiences, the authors presented seven principles they commonly see in effective professional development.[153]

> Professional development should:
>
> (1) relate to a clear, well-defined image of effective classroom learning and teaching;
>
> (2) provide teachers with opportunities to develop knowledge and skills and broaden their teaching approaches so they can create better learning opportunities for students;
>
> (3) use instructional methods to promote learning for adults which mirror the methods to be used with students;
>
> (4) build or strengthen the learning community of science and mathematics teachers in an effective learning community where collegiality and collaborative professional exchanges are valued and promoted;
>
> (5) prepare and support teachers to serve in leadership roles and to move beyond their classroom to play roles in the development of their school and district;
>
> (6) provide links to other parts of the educational system; and
>
> (7) include continuous assessment.[154]

In a 2003 revision, Loucks-Horsley, et al.  proposed a modified framework for math and science teachers professional development that take into account: (1) knowledge and beliefs; (2) context; (3) critical issues; (4) strategies; (5) action; and (6) evaluation.

## TEXAS REGIONAL COLLABORATIVES

The TRC, as a highly successful program for seventeen years, has provided free, or at minimal cost, science education professional development for Pre-Kindergarten (PK) to 12th grade public school teachers throughout the state of Texas. This professional development opportunity fosters collaborative efforts in training and resources among professional science educators of all grade levels. Many of the teachers continue through the program as Science Teacher Mentors (STM) for other teachers within their campuses, districts, or regions and are able to extend the positive results of the TRC experiential program far beyond the 37 higher education and ESC regional locations. As described in the TRC publication *Dynamic Partnerships for Twenty-First Century Education* from August 2005 to July 2008, 7,324 science teachers were mentored and received science education PD from STMs and taught science to over 590,000 students in their classrooms in subsequent years.[155] Additionally, a decade of research studies conducted by TRC research teams guided by Barufaldi, Jbeily and Fletcher have demonstrated positive correlations between teachers' participation in structured, science education professional development programs and students' significantly improved TAKS standardized test scores in science. Consistent, sustained, and content-specific professional development was found to be essential to help educators incorporate data into their instructional processes, as other researchers have reported.[156]

As described earlier, the TRC reaches over 3,000 K-12 teachers every year are trained at local regional Collaboratives as Science Teacher Mentors' (STM) through long-term, sustained, and content-focused science professional development. Then, as STMs, they in turn, train a minimum of 5 classroom teachers, or CM, who use this new PD knowledge by teaching students. This *trainer-of-trainer* TRC model has an estimated impact reaching 500,000 students in Texas K-12 classrooms.[157] As a highly successful program providing science education professional development opportunities to K-12 teachers, it is being duplicated in the state of Louisiana with two local Collaboratives started in 2006 and recent legislation for expansion.[158]

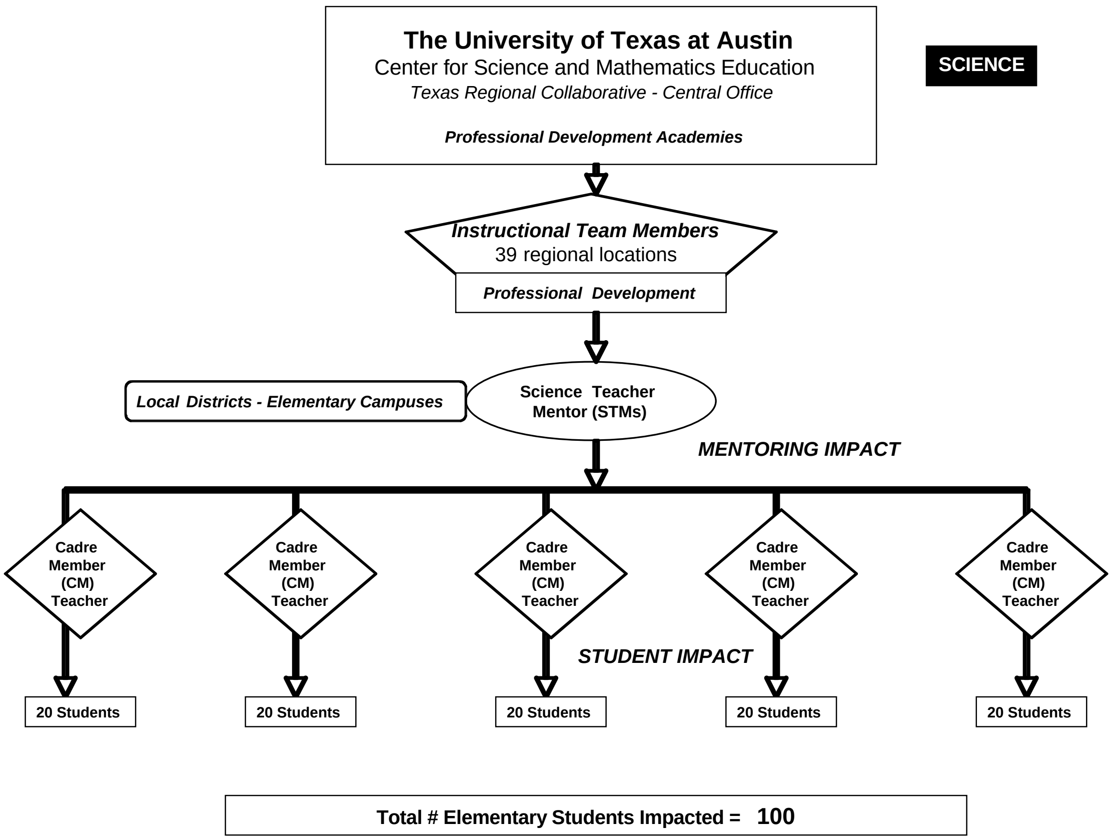



Illustration 2.3. Overview of Texas Regional Collaboratives Model

### *Organizational Involvement* [159]

The TRC program is an outreach and service component of the Center for Science and Mathematics Education (CSME). Its administrative offices are headquartered at the CSME at The University of Texas at Austin. The CSME is a funded center at The University of Texas. Illustration 2.4 illustrates the flow of communication between and among each organizational unit.[160]

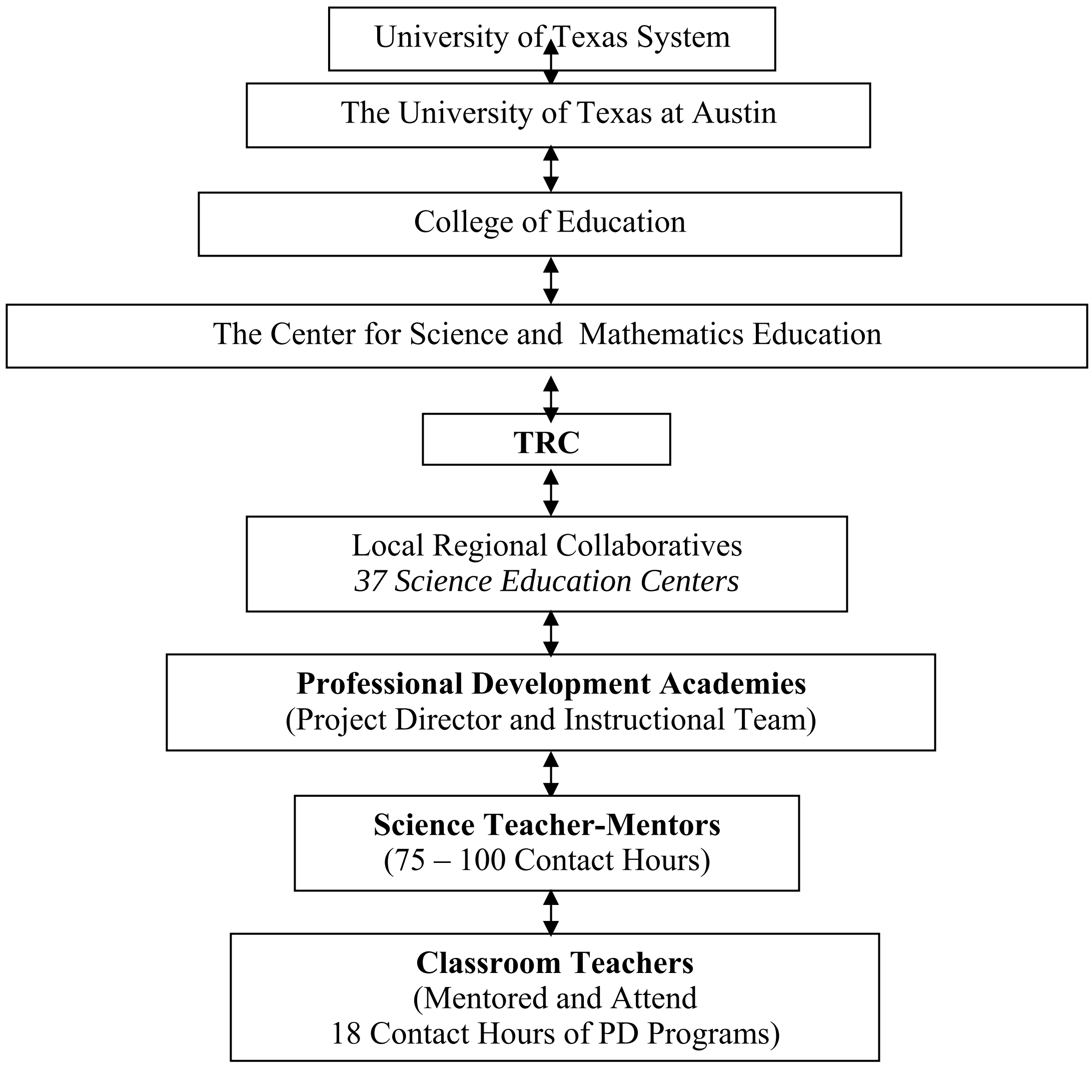



Illustration 2.4. TRC Organizational Scheme

During the 2007-2008 school year, the local regional science collaboratives served 2,324 school campuses, 784 school districts, 7,894 teachers, and 497,322 students. During this same period of time, the collaboratives in mathematics served 2,153 campuses, 818 school districts, 8,033 teachers, and 433,782 students.[161] The TRC focuses on bringing science and mathematics pedagogy and content to teachers through a *trainer-of-trainer* model that results in improved student learning and achievement in science and mathematics standardized tests, the Texas Assessment of Knowledge and Skills. The 60 science and mathematics regional collaboratives partner with 46 institutions of higher education universities (public and private) and community colleges across Texas.[162] The twenty Education Service Centers in Texas and many individual school districts that serve unique populations of students form a collegial relationship with the TRC network. Grants from Shell Oil Company established two collaboratives in Louisiana.

***Organizational Matrix of the Texas Regional Collaboratives Science Network***

Each of the 37 science collaborative sites include a project director and Instructional Team Members (ITMs) who deliver 75-105 contact hours of instruction to approximately 25 teachers annually. These instructional teams consist of master teachers, mathematicians, scientists, instructional specialists, and science and mathematics educators. Although each regional local collaborative remains autonomous, as part of the TRC network each must adhere to important common elements of PD such as (1) commitment to collaboration, high standards, alternative assessment, experiential learning, and constructivism; (2) to the philosophy of bringing the real world into the classroom;

and, (3) to integrating instructional and communication technology into their educational programs.[163]

The TRC's mission of providing Texas teachers of science and mathematics a support system of scientifically researched, sustained, and high intensity PD and mentoring for implementing the Texas Essential Knowledge and Skills (TEKS) the state standards.

Pedagogy, rigor, and accountability permeate the TRC statewide distributive networked system. The structure of the program is based on the basic design principles of Guskey, Loucks-Horsley, and Darling-Hammond & Richardson. Four primary activities are offered through the TRC network and these activities include PD Academies (PDAs), PD Programs (PDPs), Honoring the Teachers events, and an Annual Meeting.

- PDAs are provided to ITMs who then conduct workshops and courses within their regions for science or mathematics teacher mentors to initiate the *trainer-the-trainer* cycle.

- PDPs are designed by ITMs at each regional collaborative and provide 75 to 105 contact hours of TEKS-based PD in content and pedagogy to prepare teachers to become Science Teacher Mentors (STMs), or Mathematics Teacher Mentors (MTMs). Once the STMs and MTMs are adequately prepared, they share their knowledge with teachers on their respective campuses, within their districts.

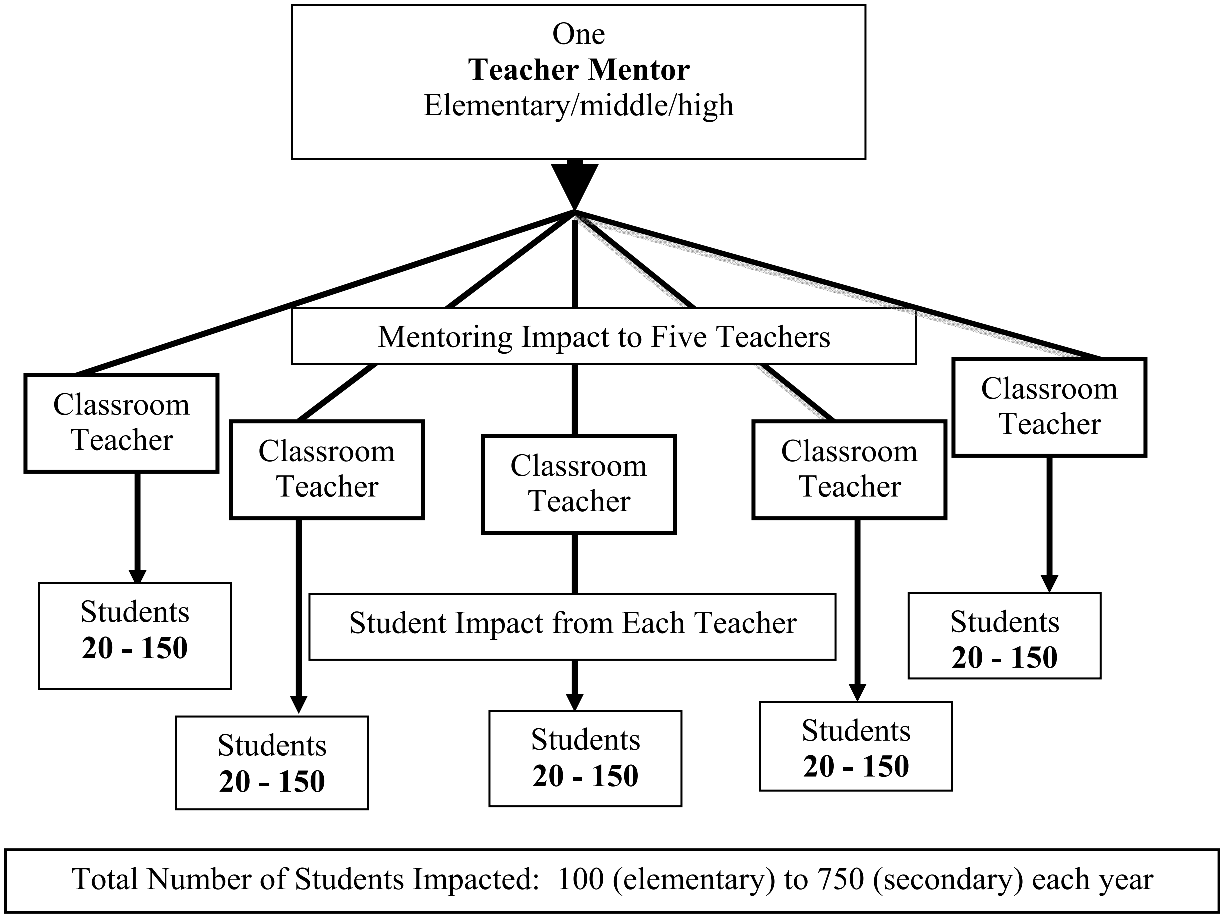



Illustration 2.5. Teachers Mentoring Teachers [164]

The Dynamic Professional Development System (DPDS)[165] can be described as a *Logic Model* for the teachers' PD focusing on the role for each component and the intended connection and flow from teacher to student.[166] The PD program is an idealized program designed by a team of scientists, mathematicians, curriculum specialists, and master teachers at various sites that make up the TRC.

## PRINCIPAL EFFECTIVENESS

Elementary campus principals are tasked with numerous jobs, one of which is to function as a '*campus instructional leader*' (CIL). An elementary campus principal is expected to provide discipline; set school policies according to district, state, and federal standards; establish appropriate discipline (for both students and campus personnel); curriculum standards; and evaluate all professional personnel; and function as the campus administrative leader within the elementary campus setting. Additionally, this individual must have completed a graduate level degree in Educational Administration, successfully passed the state-level required certification tests, and taught a minimum of three years as a certified classroom teacher. Smith and Andrews,[167] in the 1970s and '80s, researched how "the principal as instructional leader [was] accountable for the academic achievement of students"[168] and subsequently established this defining aspect in a work which would remain a crucial document for educational administration programs and researchers throughout the United States.

However, many principals do not consider this definition part of their functional role as school leader or campus administrator.[169] In Texas, many districts emphasize annual performance ratings of campus principals based entirely on student achievement indicators from TAKS scores. As such, elementary campus principal longevity beyond five years is rare.[170]

**Teacher and Principal Certification**

Teacher certification in Texas is achieved by one of two routes: (1) a Texas Standard Classroom Teacher Certificate through a four-year college degree program in which one earns either a Bachelor of Arts or a Bachelor of Science with an Education specialization; or (2) a Texas Alternative Route Teacher Preparation Program for those considering a mid-career change and who already possess a Bachelor of Arts or Bachelor of Science degree. The latter teacher certification path requires participants to attend an intensive one-year educator preparation program designed to identify, select, train, and certify top quality teacher-candidates through a series of workshops, seminars, field activities, and an internship.[171] Upon completion of the degree, participants are required to pass the state-level exam for teacher certification.

A similar certification procedure is required for principals. Principal certification in Texas is achieved by: (1) A Texas Standard Classroom Teacher Certificate through a four-year college degree program in which one earns either a Bachelor of Arts or Bachelor of Science with an Education specialization, in addition to three years of teaching experience and admittance to a higher education program: Master of Education Administration, Principal. Or (2) a Texas Alternative Route Principal Preparation Program for individuals considering mid-career change and already possessing a Master of Arts or Master of Science degree.

This path for principal certification also requires participants to attend an intensive one-year educator preparation program designed to identify, select, train, and certify top quality principal-candidates through a series of workshops, seminars, field activities, and an internship.[172] Upon completion of the degree, participants are required to pass the state-level exam for principal certification.

Within some university programs, such as those offered at The University of Texas at Austin, offer courses in data-informed decision making: Data-Based Decision Making, and Policy Issues in Data Analysis. Only one of these courses is required for principal certification, while none is required for teacher certification.

## Verification of Teacher Certification Credentials

The Texas State Board for Educator Certification was created in 1995[173] to regulate the preparation, certification, continuing education, and standards of conduct for public school educators in Texas.[174] Many district web sites display letters to parents regarding teacher qualifications under the HQCT mandate as well as links to *NCLB* and other Texas Education Agency (TEA) documents. Table 2.4 shows an example of the web-page link to the Texas State Board for Educator Certification. Parents can access this on numerous district web sites in order to learn which type of teacher certificate their children's teacher was issued by the state of Texas. However, there is not a similar web site where one can validate or verify principal or campus administration certification.

| Official Record of Educator Certificates<br>Educator Search Criteria |
|---|
| The information presented on this secure web site is the official record of the educator's certification status and satisfies Section 21.053(a) of the Texas Education Code, which requires individuals to present their certificate prior to employment by a school district. SBEC does not provide individually prepared letters of professional standing or verification of a Texas educator's certification status.<br><br>Instructions - Enter the SSN and last name or last name and first name and middle name of the person for whom you are searching. If an exact match is not found a listing of up to twenty educators will be displayed. You may enter a hyphen into compound last names (e.g. Gomez-Martin).<br><br>Social Security Number:<br>Last Name:<br>First Name:<br>Middle Name: |

from: State Board for Educator Certification,
http://www.sbec.state.tx.us/SBECONLINE/virtcert.asp

Illustration 2.6. State Board for Educator Certification for Teacher Certificates

As required by *NCLB*, all states had to submit a plan for achieving 100% HQCT in all classrooms receiving federal funds by May 31, 2006. However, this deadline was not met by a single state education agency across the nation who was able to submit an acceptable plan to the USDoE to fulfill this federal requirement. Texas began submitting its state plan in June 2004 and submitted seven versions before the eighth was accepted in December 2006.[175] Table 2.6 contains the specific USDoE data-use issues raised and TEA responses.

**USDoE Criteria:** Does the revised plan include an analysis of classes taught by teachers who are not highly qualified

**TEA Response:**

- Percentage of Core Academic Subject Area Classes Taught by Non-Highly Qualified Teachers in Texas: 2004-2005

| | State-wide Taught by Non-HQCT | Low Poverty Taught by Non-HQCT | High Poverty Taught by Non-HQCT | In-equity Between Low &High Poverty | Low Minority Taught by Non-HQCT | High Minority Taught by Non-HQCT | In-equity Between Low & High Minority |
|---|---|---|---|---|---|---|---|
| **Elem. (1 T* = 1 class)** | **2.29** | **1.89** | **2.68** | **0.79** | **1.10** | **3.38** | **2.28** |

* = Teacher
Source: 2004-2005 Highly Qualified Teacher Compliance Report, Revised 6-21-06, and 2005 AYP (federal).

**USDE Criteria:** Does the analysis focus on the staffing needs of schools that are not making AYP (federal)? Do these schools have high percentages of classes taught by teachers who are not highly qualified?

- **TEA Response:** Comparison of Percentage of Highly Qualified Teacher Rate at Districts and Campuses Making AYP (federal) and Not Making AYP (federal); 2004-2005

| | Meeting AYP and 100% HQCT | Meeting AYP and Not 100% HQCT | Not Meeting AYP and 100% HQCT | Not Meeting AYP and Not 100% HQCT |
|---|---|---|---|---|
| Districts | 34.6% | 65.2% | 27.3% | 72.7% |
| Campuses | 64.7% | 35.3% | 33.2% | 66.8% |

**USDE Criteria:** Of the 93 districts and 540 campuses represented before not meeting AYP (federal) and not meeting 100% highly qualified teachers, the majority are above 90% highly qualified.

**TEA Response:** Districts and Campuses Not Meeting AYP (federal) by Percentage of Highly Qualified Teachers; 2004-2005

| | Meeting AYP and 100% HQT | Meeting AYP & Not 100% HQT | Not Meeting AYP & 100% HQT | Not Meeting AYP &Not 100% HQT |
|---|---|---|---|---|
| Districts | 27.3% | 22.7% | 15.6% | 34.4% |
| Campuses | 33.2% | 25.4% | 17.9% | 23.5% |

**USDE Criteria:** Does the analysis identify particular courses that are often taught by non-highly qualified teachers?

**TEA Response:** Statewide Core Academic Subject Area Classes: 2004-2005

| | Statewide Taught by Highly Qualified Teachers | Statewide Taught by Non-Highly Qualified Teachers |
|---|---|---|
| Elementary (1 teacher = 1 class) | 97.71% | 2.29% |

**TEA Response:** Percentage Gap Between Low Poverty/Minority & High Poverty/Minority Campuses: 2004-2005

**TEA Response Overall:**

- Of the 70 elementary campuses not meeting federal AYP standards and not reporting 100% highly qualified teachers, 54 (77.1%) have less than 25% of their classes taught by non-highly qualified teachers.

Table 2.6. U.S. Department of Education Criteria and Texas Education Agency Responses [176]

The final version, accepted by the USDoE, described utilization of the 20 Texas ESCs, along with the 37 science and 20 mathematics professional development (PD) programs for teachers offered by the TRCs. However, none of the PD programs addressed data-informed decision making for teachers or principals, and no PD science education programs were included for elementary campus principals.

**What is Campus Instructional Leadership?**

"*Principals should be instructional leaders.*"[177] Throughout literature regarding principal effectiveness and principal leadership, numerous chapters defining instructional leadership and principals as instructional leaders emerge. As Thomas Hoerr describes, the title principal evolved from principal teacher, implying that the principal had more skill and knowledge than anyone else did in the educational facility.[178] However, with technological and pedagogical changes today, Hoerr's research described how teachers do expect principals to be visionary leaders, with direction toward and expertise in the goals of student achievement and overall campus discipline, among other tasks.[179] Roland Barth's notion of collegiality[180] supports Hoerr's view of principals as instructional leaders. Hoerr states that for "students to grow and learn, their teachers must grow and learn."[181] Moreover, Barth outlines this very process of interactive, cooperative teacher growth and learning by way of his four aspects of collegiality:

1. teachers talking together about students,
2. teachers developing curriculum together,
3. teachers observing one another teach, and
4. teachers teaching one another.

Hoerr adds a fifth component, "teachers and administrators working together to shape a solution for a particular school issue,"[182] which I believe describes the true essence and purpose of campus instructional leadership.

Former Executive Director of the National Association of Elementary and Secondary Principals (NAESP) Vincent Ferrandino defines the instructional leadership role of principals as one that is expanding. He says, "Successful principals are those who know how to use their vision and direction to keep others going."[183] He directs all principals to place student learning at the center of public education and refers to a prior NAESP publication, titled Leading Learning Communities: Standards for what principals should know and be able to do,[184] as a guideline for principals to remain connected to student learning and achievement. Ferrandino strongly advocates for principals to "tear down the barriers we've imposed on ourselves and partners to more effectively create a first-rate new learning day for children" and to "grow and affect student achievement."[185] The strong connection between elementary campus principals as CIL and student achievement has been a standard statement of NAESP leadership for over a decade.

## INSTRUCTIONAL LEADERSHIP AND SCIENCE EDUCATION

Principals are the most powerful decision makers in almost any school.[186] Therefore, involving principals as instructional leaders in knowledge of science education concepts is a key element of positive student achievement results. To foster this level of expertise, corporate foundations, such as the Merck Institute for Science Education,[187] have developed programs "designed to improve science instruction not only by promoting effective teaching, but also by developing principals who know more about the subject."[188] This particular three-year Merck Institute program, called the *Academy for Leadership in Science Instruction*, consists of professionally developing teachers and principals together in science content and is organized on the belief that "good science education requires consistent and creative support from principals."[189] Principals have total control of scheduling, staffing, and influencing curriculum within a campus. As such, the principal can assist teachers by scheduling time to work with them on lesson plans and by prodding reluctant ones, as well as convey to the community and parents the importance of science education.[190]

These values linking principal instructional leadership and science education are reflected in numerous other professional organizations as well, including the National Science Teachers Association (NSTA), the National Association of Elementary and Secondary Principals (NAESP), and the National Association of Secondary School Principals (NASSP). As stated by Dick Flannary, senior director of leadership programs of NASSP, "Principals can, and should . . . convey the importance of science education to students' future job prospects, and make plain many students' shortcomings in that subject – *a point that is not understood by the public at large.* "[191] (emphasis added). The missing link alluded to by Flannary is that between public school education and students' future job prospects, many parents today are not grasping or understanding the importance of science education for their children's overall educational preparation. He summarizes that language arts (reading) and mathematics are tools for applying what is learned, but that science provides relevancy to all that is learned. Science, overall, allows students to use mathematical skills, logic, and expand their reading and vocabulary. Yet it is a difficult academic subject and requires rigor and hard work from both the students' and teachers.

Other leadership development programs are now appearing, in the form of professional conferences and summer institutes. NSTA, supported by General Electric Foundation, held a national five-day leadership institute targeting school educators and administrators in the summer of 2008. In Texas, the TRC holds an Annual Meeting for all local regional Collaboratives that include one day of material specifically designed for school superintendents and principals.

In the realm of formal education, George Mason University offers a Master's Degree program in Education Administration for Science Education. This was the only program of its kind that exists as an advanced academic degree program specific to administration for science education. What follows is the description of the program listed on the George Mason University web site:

> The concentration in Science Education Leadership is a PK-12 program that focuses on education leadership and science teaching and learning. It includes the required course work for the administration and supervision PK-12 license in the Commonwealth of Virginia. Students study the changing nature of science, science teaching, assessment, curriculum, technology, safety, and meeting the diverse needs of learners. Students also develop skills in science teaching and learning, data-driven decision making, systematic and continual improvement, and leading dynamic organizations. Internship experiences in Science Education Leadership include working with a practicing scientist in a research setting and interacting with school leaders on the state and local level who directly and indirectly impact science education.
>
> The Science Education Leadership concentration includes the required course work for state licensure in administration and supervision PK-12. Students who apply for licensure must have three years of successful classroom teaching experience and a master's degree.[192]

The National Science Education Leadership Association (NSELA) web site lists four science education leadership events scheduled for 2009. However, NSELA's mission concerns those individuals who hold a variety of science education leadership positions, including science department heads, supervisors, coordinators, university science and science education faculty members, administrators, science resource teachers, teacher advocates, and elementary science lead teachers.[193] Even though *administrators* are included, it is not apparent that *principals* are a specific group of major focus, since their programs are on the advances in a broad array of topics, such as student learning, safety, curriculum, technology, professional development, assessment, inquiry, and science education reform. Each of these topics is highly applicable to principal training in science education concepts.

## SCIENCE EDUCATION CURRICULUM

The history of science education curriculum and instruction includes numerous notable philosophers, educators, and scientists, each of whom has contributed significantly to this broad field. A few examples of science education leaders are Rodger Bybee, Paul Hurd, Joseph Schwab, and Addison Lee. These four individuals comprise some of the more notable scientists-turned-educators. Rodger Bybee is well known for his contributions through the Biological Sciences Curriculum Studies (BSCS)[194] program and leading the development of the *5-E Model of Science Teaching*, the primary pedagogical method utilized by the TRC network. Paul Hurd and Addison Lee also were widely known biologists prior to their recognizing the need for a separate program in higher education for teaching and developing science educators for the public school system. Lee established the original Center for Science Education[195] at The University of Texas at Austin in 1957; it continues to be deemed one of the premier higher education programs for science educators.[196] Joseph Schwab discusses in *Science, Curriculum and Liberal Education: Essays*

> There will be a renascence of the field of curriculum, a renewed capacity to contribute to the quality of American Education, only if curriculum energies are in large part diverted from theoretical pursuits (such as the pursuit of global principles and comprehensive patters, the search for stable sequences and invariant elements, the construction of taxonomies of supposedly fixed or recurrent kinds) to three other modes of operation. These other modes, which differ radically from the theoretic, I shall call, following tradition, the *practical*, the *quasi-practical*, and the *eclectic*.[197]
>
> Science, overall, falls within Schwab's tradition of *practical* education.

Furthermore, curriculum theorists' work, such as A. Wellesley Foshay's curriculum matrix model[198], Ralph Tyler's continuous cyclical process of curriculum,[199] and William Pinar's theoretical views analyzing educational experiences,[200] has added tremendous support and information to the portion of the field regarding teaching and learning. The process of professionally developing science teachers is equally as important to the process of educating teachers, as described by James Conant's 1963 work;[201] thirty years later, David Tyack and Larry Cuban's[202] research chronicling public school reform supported this. However, Susan Loucks-Horsley's 2003 publication, *Designing Professional Development for Science and Mathematics Teachers*, is considered best practices specific to science and mathematics education professional development.

All of these noted authors and practitioners, spanning forty years, provided insights into the complex nature of science teaching. Nevertheless, the lack of well-prepared scientists, engineers, information technologists, and mathematicians supplying American industry and business continues to be lamented as a shortfall of public schools.[203]

## BUSINESS THEORETICAL APPLICATIONS TO EDUCATION

Business thinkers and leaders such as W. Edwards Deming, Dietrich Dörner, Dee Hock, Eliyahu Goldratt, and Gareth Morgan[204] have presented complex aspects of organizational systems, which can easily be applied to facets of educational systems as well. Events resulting within educational organization systems are not reductive, essentially preventing one from returning to a back-to-basic roots approach and distinguishing what would happen again in real time. These authors discuss how events in time always change. As such, complexity is not only considered a general entity; it is impossible to return to any original point in time due to technological occurrences or other scientific advancements. Even within complex organizational systems that surround our natural environment, there continues to be more interactions involved if one attempts to determine all causes and effects. This task may be impossible, and the influence or impact of some organizational systems may never be revealed entirely.

### Theory of Constraints

Furthermore, it is human tendency to focus on solving a problem; however, an individual may not realize that solving one problem potentially creates other problems.[205] As physics professor Eliyahu Goldratt describes in his novel *The Goal,* Alex Rogo's fight to save his manufacturing plant incorporates the business principals of the 'Theory of Constraints' through his finding and closely examining the existing bottlenecks, developing appropriate repairs for the issues creating the bottleneck situations, and then discovering what new situations arise out of every solution. The *Theory of Constraints* business model determines best practice solutions by identifying each bottleneck and implementing variety of solutions until the manufacturing line functions efficiently while eliminating complications. Illustration 2.6 is a representative model of the *Theory of Constraints* image that Goldratt purports in his novel.

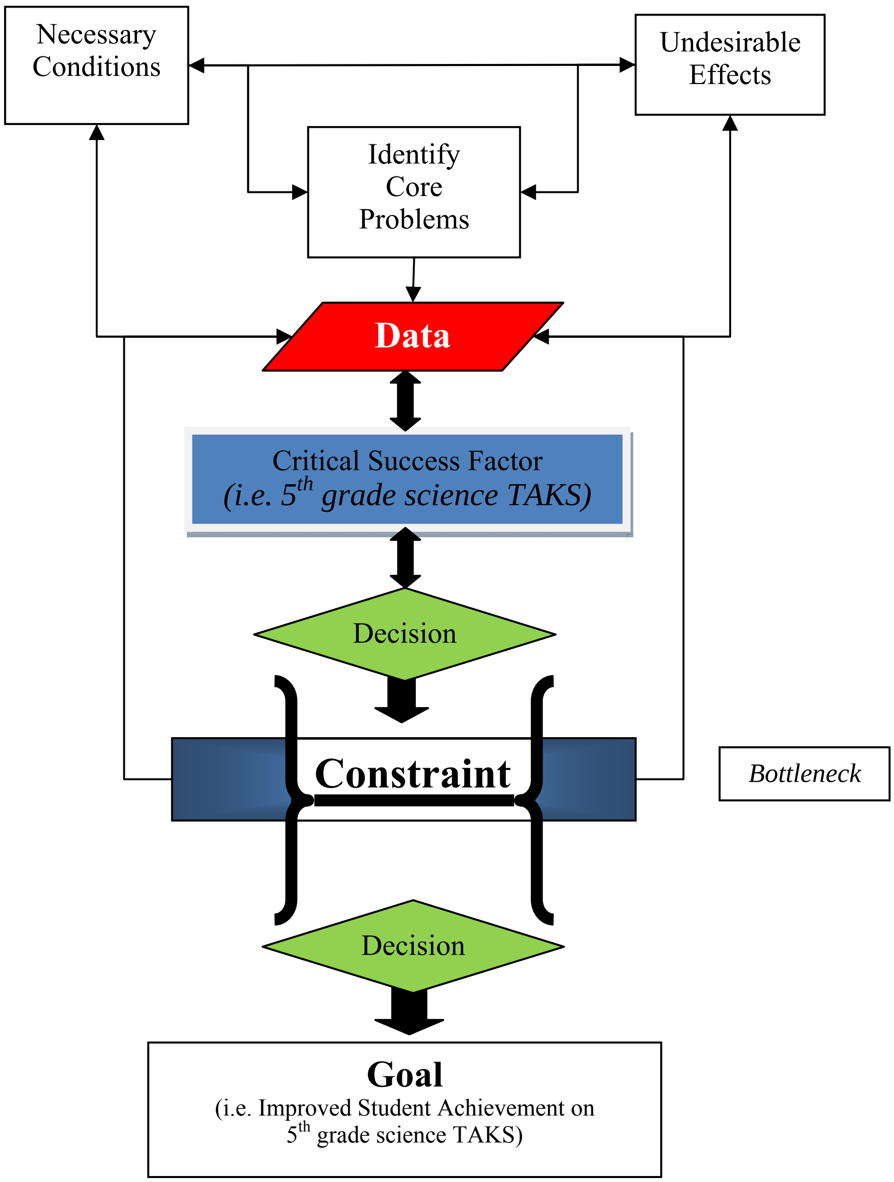



Illustration 2.7. Theory of Constraints

## WEAVING LESSONS LEARNED FROM BUSINESS TO EDUCATION

The three novels by physicist Eliyahu Goldratt[206] focused on continuous improvement within organizations that created a revolutionary phenomenon throughout the American semiconductor business.[207] Peter Senge[208] promoted collaboration among and cooperation within organizational management toward the end of the twentieth century when he pushed education administration to follow successful manufacturing business models, such as those of Goldratt and Deming. One of the most well known innovators who have been credited with changing Japan's Toyota automotive industry, W. Edwards Deming, known best for the Total Quality Management (TQM) model, concentrated on methods of cooperation and transformational ideas from a *ground up* approach within the manufacturing line for product improvement. Deming's original attempts when he approached the three major American automobile manufacturing companies (General Motors, Ford, and Chrysler) with his innovative ideas were not well received so he went across the Pacific and history shows the impact of Japan's Toyota automobile manufacturing explosion on world market sales**.** Deming's foresight of American automotive manufacturing and organizational systems thinking in the 1960s was scoffed at for his radical ideas of including those who were on the front lines of manufacturing to be included in the engineering problem-solving processes paid off in the end for Japan's industry.[209] Thus, he took what lessons he gleaned from the American business industry, methods of incorporating, to Toyota and re-designed an entire industry.[210]

In 2000, Deming shifted his concentration to implementing what he learned from his lifetime's work within business industry toward finding solutions for educational woes.[211] Many of the concepts suggested by Deming, Senge, and Goldratt were attempted within educational formats, but most failed due to lack of training, understanding, or buy-in from education professionals. However, *collaboration*, is one concept that Deming, Senge, and Goldratt and many other business leaders support that remains and maintains staying power, continuing to have a positive influence not only between business and education, and also within education's own complex organizational systems.

## Business Models for Education

The Industrial Revolution that occurred in the 19th century was of great importance to the economic development of the United States. Industrialization in America involved three important developments. First, transportation expanded coast to coast. Second, the age of electricity was harnessed. Third, improvements to industrial processes were discovered. All of these developments were the result of American innovators such as Thomas Edison. His laboratory submitted over 1,000 patents including the phonograph, the incandescent light bulb, and the motion picture. Other innovators such as Samuel Morse (e.g. telegraph and Morse code), Alexander Graham Bell (e.g. telephone), Elias Howe and Isaac Singer's sewing machine revolutionized the garment industry and made the Singer Corporation one of the first modern industries. George Westinghouse held the patents of many important inventions. Two of his most important inventions were the transformer that allowed electricity to be sent over long distances and the air brake. The latter invention allowed conductors to have the ability to stop a train. Previous to the invention, each car had its own brakeman who manually put on the brakes for that car.

The need for better-educated and skilled workforce increased with each improvement. As Besson discusses, “Employers’ investments supplemented employee investments and the total investments were comparable to those made by craft apprentices.”[212] These advances corresponded with new technologies and the employer’s investment in human capital. As labor became more stable, human capital became more profitable and employers responded by their involvement in education.[213] This relationship between American business and education continued to evolve and grow through both World Wars to the Space Age era of Sputnik. As Bybee writes “After World War II, debate about the quality of American education escalated.”[214] The Progressive Era of education was on the decline; the Cold War and the period of McCarthyism were in full swing. Bybee posits that many educators during this period remained silent, perhaps doubting that criticism would make no differences.[215]

However, the fall of 1957 created a point-of-no-return for education when Sputnik, a satellite launched by Russia into low-Earth orbit, sped across American skies. National interest changed with new fervor for mathematics and science curriculum. Prior to 1957, the American public shied away from federal involvement in public schools in the belief that such aid would lead to higher federal controls. After Sputnik, public demand for a federal response was unusually high and Congress passed the National Defense Education Act in 1958.[216] Additionally, curriculum reformers of the Sputnik era believed in a common vision,

> …with a curriculum based on the conceptually fundamental ideas and the modes of scientific inquiry and mathematical problem solving. The reform would replace textbooks with instructional materials that included films, activities, and readings. No longer would schools’ science and mathematics programs emphasize

information, terms, and applied aspects of content. Rather, students would learn the structures and procedures of science and mathematics disciplines.[217]

As described by Rudolph in *Scientists in the Classroom,* by September 1958 Eisenhower signed the National Defense Education Act (NDEA) providing $1 billion over four years to Health-Education-Welfare (HEW) for need-based loans and fellowships for college students, purchase equipment for school laboratories, foreign language courses, and supporting research on using educational media in the classroom.[218] At the same time, the National Science Foundation (NSF) budget tripled in fiscal year 1959, most notably for the Course Content Improvement Program. This program reignited school curriculum starting with the Physical Science Study Committee (PSSC). During this period, from 1959 to 1964, NSF sponsored numerous curricula and is now referred to as the 'alphabet curriculum period. As Randolph noted "the disparity in funding between HEW and NSF was considerable … HEW budget of $1 billion … dwarfed congressional funds for NSF education programs during the same period nearly seven to one."[219] The influence of scientists on the nation's science curricula is difficult [220] to ascertain, however the NSF's efforts with programs such as the PSSC set a national standard curriculum projects such as the School Mathematics Study Group (SMSG), Biological Science Curriculum Study (BSCS), the Earth Sciences Study Curriculum (ESSC) and many others.[221] As Randolph describes, "The intellectual contest with the Soviets had provided the opportunity for scientists to try their hand at revitalizing the science curriculum; Sputnik prompted the Eisenhower administration and a large segment of the public to pin their hopes on the scientists' success."[222]

During the fall of 1959, a group of thirty-five scientists, scholars, and educators converged at Woods Hole on Cape Cod, Massachusetts. Jerome Bruner, a noted psychologist, led this group in a discussion about how education in science could improve for the nation's elementary and secondary public schools. During this 10-day period, the attendees were divided into five work groups: *Sequence of a Curriculum*, *The Apparatus of Teaching*, *The Motivation of Learning*, *The Role of Intuition in Learning and Thinking*, and *Cognitive Processes in Learning.* [223] Over the summer, this esteemed group developed four themes for education for a practical approach to education[224] with the primary function for science to follow intuitive and analytical thinking.[225] Focus for this curriculum included activities and tasks that would enhance students' problem solving abilities while developing other skills like observing.[226] The *alphabet soup curricula,* as it was known, continued well into the early to mid-1970 and many programs such as BSCS remain viable.

However, critics of the alphabet soup curricula pointed to the cookbook approaches used for scientific laboratory investigations. As Randolph described "…the goals of the PSSC program … were to create a more 'accurate' image of the nature of postwar scientific researcher and … instill the 'power of scientific reasoning and logic' into every educated person."[227] Efforts of the scientific community were admirable in the development of a "social and intellectual environment favorable to scientific advances …"[228] but this effort at educational reform did not address all of the people who needed help in education. As Randolph surmised

> "The reason the scientists decided to volunteer their services to the cause of education reform were fundamentally political and tied directly to the rapid integration of science into the national security infrastructure of the United States

> … science as an institution devoted to the discovery of the most esoteric knowledge of the physical world."[229]

Over the past two decades, advocates for educational reform compare public schools to businesses.[230] As England described in her book, *None of Our Business*, the assumption that the front-end management style of business and increasing presence on open, global markets that schools could experience success like that of corporations.[231] In light-hearted yet serious prose, she compares business standards and objectives to those common to educational settings. As reported in *None of Our Business*, an excerpt from the McReal Web site www.mcreal.org described this business-oriented rationale:

> Amid growing concerns about the educational preparation of the nation's youth, President George Bush and the nation's governors called an Education Summit in Charlottesville in September 1989. That summit concluded with the establishment of six broad goals for education that were to be reached by the year 2000. The goals and their rationale are published under the title *The National Education Goals Report: Building a Nation of Learners* (National Education Goals Panel [NEGP], 1991). Two of the goals (#3 and #4) related specifically to academic achievement like this:
>
> **Goal 3:** By the year 2000, American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.
>
> **Goal 4:** By the year 2000, U.S. students will be first in the world in science and mathematics achievement.[232]

Although these goals have been repeated in a variety of forms, including the current *No Child Left Behind Act of 2001* (*NCLB*) during President George W. Bush's tenure, U.S. students remain in the lower 25% when compared to other industrial societies. High-stakes testing, data-informed decision-making, teacher accountability and many other concepts continue to remain in the forefront of American education. The morale of public education, as England describes, insists that the *NCLB* policy "states that if schools are to be held to high standards, they must have the freedom to meet those standards...an oxymoron of contradictions."[233] She argues that if students were a product like frozen pizza, then such mandates would be realistic. However, students are no more a 'product' or a 'widget' that is easily contained and replicated. When Bonstingl, a leadership development, full-service international consulting firm specializing in Baldrige-based Quality solutions for world-class leaders, applied W. Edward Deming's *Fourteen Points of TQM* to public education, he reached the following conclusions:

- Maximization of test scores and assessment symbols is less important than the progress inherent in continuous learning.
- Cynical application of the new philosophy, with the self-intent of improving district-wide test scores, destroys the inter-personal trust essential to success.
- Reliance on tests as the major means of assessment of student production is inherently wasteful and often neither reliable nor authentic.
- Learning is best shown through student performance in applying information and skills to real life challenges.
- Fear is counterproductive in schools. It is destructive of the school culture and everything good that is intended to take place within it.
- When educational goals are not met, [one should] fix the system instead of fixing blame on individuals.
- When grades [and subsequently test scores] become the bottom line product, short-term gains replace student investment in long-term learning.
- Learning is helping, not threatening or punishing.[234]

In the end, children cannot become products to be poked, standardized, prodded or manufactured so that each one is the same. The external forces of within local communities of social, political, economic, and overall public expectations demand that schools perform well - there is no flexibility for individual differences. The CIL is missing as well as the Teacher and the Student needs are not being met in the current structure of public education. An assembly-line approach to education cannot function in the same manner as business requirements when schools need the ebb-and-flow of fluid and flexible educationally organized systems.

# Chapter 3 - Methodology

## Introduction

The purpose of this dissertation research is to determine the impact of educational policy on elementary science education curriculum based on the decisions made by Texas elementary school campus administrators as *Campus Instructional Leaders* (CIL).

This research has focused on clarifying whether a Texas elementary campus with high or consistently improving state-mandated standardized assessments, 5$^{th}$ grade science TAKS test scores, owes this success to CIL monitoring science education curriculum programs that value a highly qualified *elementary science* classroom teacher.[235] Prior research shows that sustained professional development (PD) and use of data-informed decision making processes can lead to improved student test scores on standardized assessments.[236]

For the purpose of this research, a highly qualified elementary science classroom teacher is defined as a fifth grade teacher who has experience with the TRC science education PD opportunities.

In Texas, the authority to interpret and implement educational policy remains within the local district administration.[237] This research focuses on Texas elementary campus administrators' application of that authority, as they, through data-informed decision making processes, determine appropriate science curriculum for the unique learning characteristics of individual student populations, in order to carry out one of their CIL job functions: staffing. Ergo, the crux of this research study is how Texas elementary campus administrators, as CILs, are able to influence student achievement in science through the selection of elementary science educational programs.

## RESEARCH QUESTIONS

The primary research question for this study: How do Texas elementary school campus administrators influence student achievement in science education?

Note that elementary school campus administrators may not be the single entity that selects science education curricula. Ensuing secondary questions beg answers:

1. What formats of data analysis are used to support science education instructional decisions determined by Texas elementary campus administrators?

2. How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?

3. Do the CIL decisions support the selection of preeminent teacher staffing arrangements to enhance student learning through teacher instruction?

4. How does the science education professional development opportunity for teachers impact TAKS fifth grade students' science scores?

5. Is education policy's designation of a *highly qualified classroom teacher*, as currently defined by the *No Child Left Behind Act of 2001*, necessary for elementary science education?

### Hypotheses

**Hypothesis 1:** Fifth grade teachers who participate in Texas Regional Collaborative (TRC) science education professional development programs **influence** how campus administrators apply federal educational policy regarding the development of Highly Qualified Science Teachers (HQST). The changes in campus policy resulting from this **influence** will increase student achievement on the $5^{th}$-grade TAKS science test and, therefore, the percentage of students passing the science TAKS test will increase significantly.

**Hypothesis 2:** Fifth grade teachers who participate in TRC science education professional development programs **do not influence** how campus administrators apply federal educational policy regarding the development of highly qualified science teachers; that is, **no significant changes in campus policy** are made based on the teachers' TRC experiences. Therefore, the percentage of students passing the science TAKS test <u>will not</u> increase significantly (i.e., the percentage will remain essentially the same, or it will decrease).

| | **TRC~ Prof. Develop.** | **TRC Participants influence Campus Admin.** | **Campus Admin. change policies regarding development of HQCT^** | **TAKS* Test Scores Change** |
|---|---|---|---|---|
| **Hypothesis 1** | Yes | Yes | Yes | Increase in the percentage of students passing subsequent 5th grade science TAKS test |
| **Hypothesis 2** | Yes | No | No | No increase (or decrease) in the passing rate on subsequent 5th grade science TAKS test |

~Texas Regional Collaborative
*Texas Assessment of Knowledge and Skills
^Highly Qualified Classroom Teachers

Table 3.1. Hypotheses

The multifaceted nature of this research may also find that when teachers' participate in science PD training and are able to influence Campus Administrators' but no policy changes occur that TAKS test scores on the 5th grade science test may increase, decrease or remain the same. A similar event could happen if there is no influence on

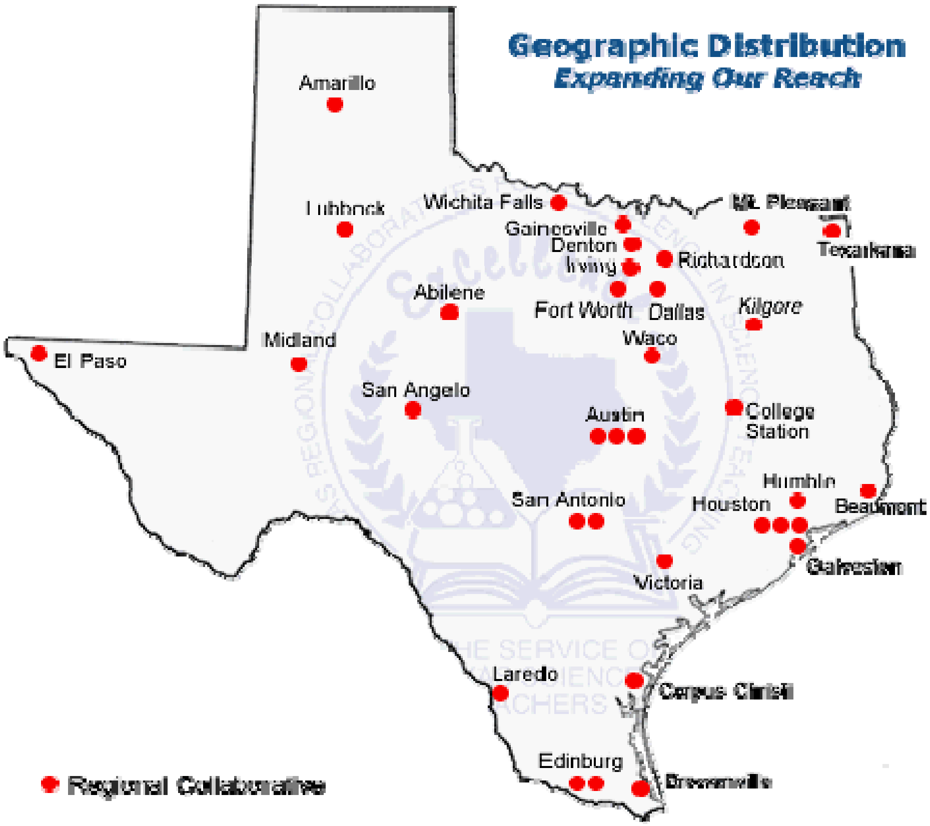
Campus Administrators' decisions but policy does change and the 5th grade science TAKS tests scores may increase, decrease or remain the same.

In order to address these complex questions, one must start by determining whether elementary school campus administrators and fifth grade teachers utilize data for improving content teaching and student learning. The answer is equally revealing regarding science education across Texas public elementary school campuses, as federal requirements for highly qualified *elementary science* classroom teachers and *NCLB* continue to dominate America's educational industry. When one examines whether CIL's decisions shape student success or failure in learning and achievement, one gains insight into the effects of implementing educational policy and *NCLB's* standard for HQCTs.

## RESEARCH DESIGN

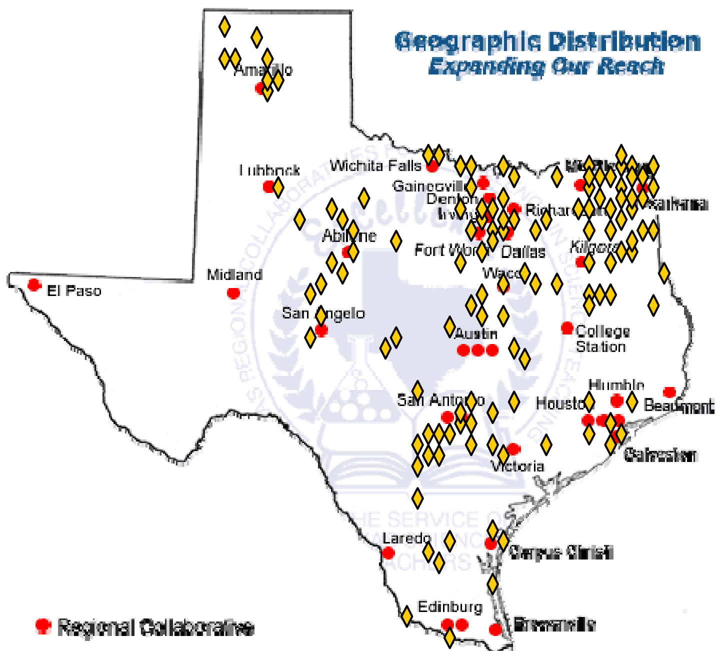
### *Setting 1: Texas Elementary Campuses Selected for Research Study*

The Texas elementary school campuses selected for this research are located throughout the state. Figure 3.1 illustrates locations of the 37 science regional collaboratives. Figure 3.2 illustrates 487 approximate locations of the elementary, middle, and intermediate schools in this research. Although TRC initiatives have extended into 95% of Texas counties at the elementary school level, they have not reached the same saturation throughout middle, intermediate, or high school campuses. Each elementary school campus selected contained one or more fifth grade teachers who attended a TRC science education professional development program between 2003 and 2008.




http://ci06.edb.utexas.edu/trc/collaboratives.html

Illustration 3.1. Texas Regional Collaborative science locations




◊ Elementary / Middle or Intermediate School Participants

Texas Regional Collaboratives map from
http://ci06.edb.utexas.edu/trc/collaboratives.html

Illustration 3.2. Elementary and Middle or Intermediate School Participants

***Setting 2: Texas Regional Collaboratives - A 5-E Model of Science***

**Education Professional Development**

The TRC model for science education professional development is based on a successful 17-year, nationally recognized program for training science educators in grades PreK-12.[238] Training consists of (1) inquiry-based pedagogy, (2) addressing the nature of science, and (3) science content. The PD sessions focus on Texas standards, known as TEKS. Professional development and the state-level standardized exams from grades 3 through 12 of student learning are accountability requirements of *NCLB* and each state is allowed to determine how the process of accountability documentation. The goal of this TRC professional development model is for teachers to understand and practice effective strategies of teaching science concepts. Additionally, to further develop teachers' science content knowledge in relation to the assigned grade levels, vertical relationships of science curricula from grades PreK-12 should also be a focal point.[239]

The TRC network utilizes a *train-the-trainer* format, as illustrated in Illustration 3.3, which is similar to many American corporate industries' training practices.[240] A core group of Instructional Team Members (ITMs), representing all regional collaboratives, are brought together and thoroughly trained in any preselected science content. Upon returning to their regions, the ITMs provide the same learning opportunity for the teacher leaders, known as Science Teacher Mentors (STMs). The STMs are expected to mentor other teachers known as Cadre Members (CMs), further distributing this knowledge within their schools and districts through supporting, training, and assisting their colleagues.[241] This level of support collaboration is noted as being responsible for providing science education PD to over 7,000 science teachers in Texas, and for reaching 450,000 students in Texas public, private, and non-profit schools last year alone.[242]

| | |
|---:|---|
| 37 | TRC Science Collaboratives |
| 784 | Texas School Districts involvement |
| 2,324 | Campuses |
| 7,894 | Teachers (all grade levels) |
| 497,322 | Students (all grade levels) |

One Year Data: August 1, 2007 – July 31, 2008. Student numbers based on a student / teacher ratio of 63/1 in science for middle school / high school. Elementary student / teacher ratio is usually 20/1.
From "TRC Fact Sheet" available electronically at
http://thetrc.org/trc/download/TRC_Fact_Sheet_11_17_08.pdf

Table 3.2. TRC Regional Science Collaboratives – 2007 - 2008

TRC's close-knit infrastructure model for ITMs, STMs, and CMs is executed each school year as PD for science educators. The training conducted at any of the 37 TRC Science Regional Collaborative at higher education or ESC locations throughout Texas. Benefits for teachers include:

- An average of 100 hours of science content education for STMs <u>or</u> an average of 12 hours of science content education for CMs,
- Continual contact with a mentor throughout the school year via multiple communication modes (e.g., verbal, electronic, coaching, pod-casts, and on-site visits),
- Class sets of science laboratory equipment appropriate to grade level and TEKS requirements,
- Reimbursed tuition costs and, in many cases, consumable science materials,
- Access to scientifically-based, grade-level-appropriate research as well as to the successfully proven *5-E Model*[243] for science lesson instruction,
- Follow-up mentoring with each teacher,[244] who is also asked to act in the capacity of a mentor, peer coach, and technical assistant to a minimum of five other teachers, or CMs, on the campus, or in the district or region.

Science education PD opportunities through the regional Collaboratives foster efforts to share acquired training and resources among numerous professional PreK-12 science educators. Many teachers enhance their own instructional skills as they perform in the capacity of STMs for other teachers within their campuses, districts, or regions and are able to extend the positive results of the TRC program. Additionally, research studies spanning a decade have demonstrated positive correlations between teachers' participation in structured science education PD programs and students' significantly improved standardized science test scores.[245]

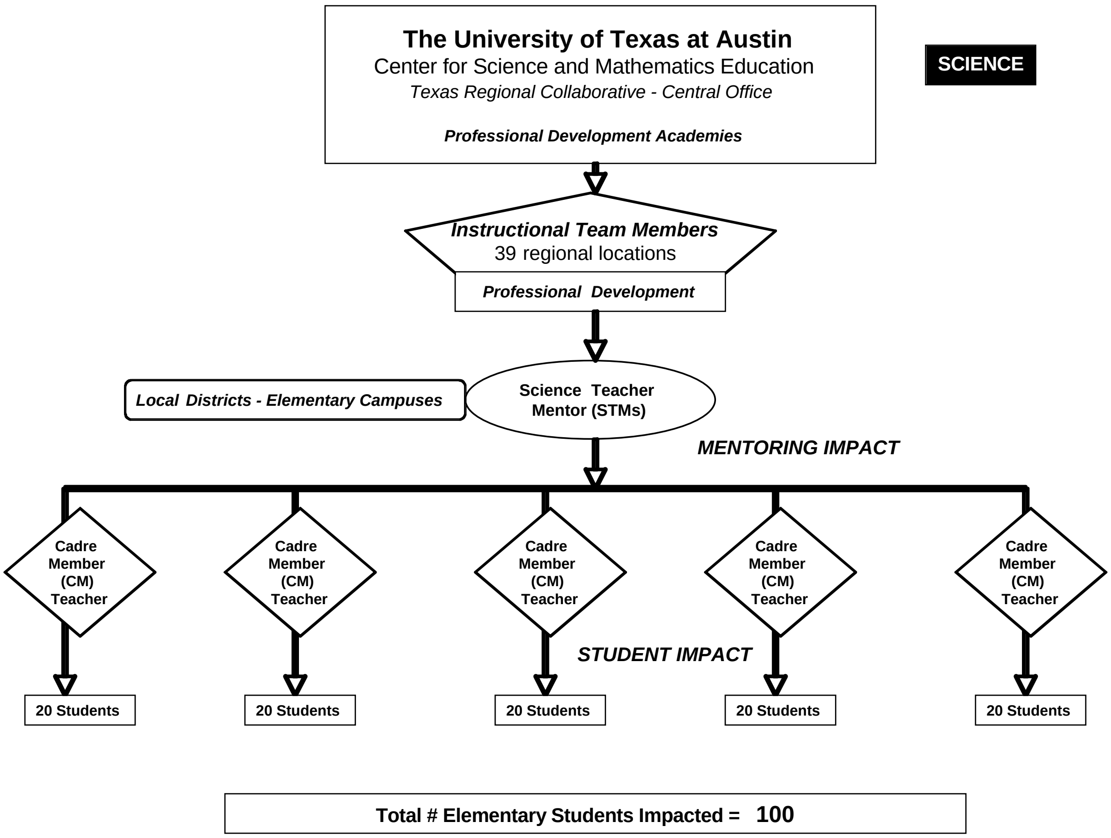



Illustration 3.3. Texas Regional Collaboratives *Train-the-Trainer* Model Diagram (repeated from Illustration 2.3)

### *Setting 3: Participant Sample Selection*

The Texas Regional Collaborative central office at The University of Texas at Austin generated a list of fifth grade teachers who participated in at least one regional collaborative program from 2003 through 2008.

Fifth grade science TAKS test scores from Texas elementary, middle, or intermediate campuses are made available through publicly accessible data[246] that provide all norm curve equivalent TAKS Aggregate Data System[247] test scores per campus for the 4,303 fifth grade elementary teachers who attended the regional TRC PD science education programs offered from 2003 to 2008. Information about the students test scores for an individual classroom teacher is not available within publically accessible data.

Based on preliminary information from the TRC database, the researcher located the fifth grade science TAKS test scores for the majority of the selected Texas public school districts elementary, middle, or intermediate campuses from 2003 to 2008 as well as the majority of private and charter campuses. Within the TRC 'train-the-trainer' model, attending teachers are expected to share their knowledge gained amongst their colleagues, district or region. As such, this study anticipated finding consistent improvement of 5th grade TAKS science test scores once a teacher has attended the TRC PD program and continued student achievement improvements for each following year. This research study anticipated that the importance of the CIL influence on student achievement of standardized testing will be evident through support of the teachers' professional development for science education. The direct correlation by elementary campus administration's support for teachers supporting constant participation in sustained continuous PD once the TRC network is accessed for science education is demonstrated through student achievement.

**Setting 4: Use of Texas Assessment of Knowledge and Skills (TAKS)**

TAKS is a state-mandated test administered during the spring semester of each school year. Prior to 2003, the TAKS for elementary school students only consisted of third and fifth grade language arts and mathematics tests. During the 1998 Texas Legislation Session, new measures required another standardized exam for fifth grade students, the fifth grade science TAKS test. In the first two years it was administered, 2003 and 2004, this new science assessment instrument was evaluated for reliability and validity; in the same time period, a baseline of knowledge and skills amongst this grade level of students across Texas was established. In 2005, this test was formalized, and it is now an annual exam requirement for fifth grade students. Initially, the Texas Education Agency considered 40% of all students passing with a scaled score of 1250 or higher from within all student sub-groups was considered as a satisfactory passing level for an elementary school campus. Every year since 2005, the acceptable total passing level is raised, and in 2008, the standard required for a campus to receive a rating of 'academically acceptable', 70% of <u>all individual students' would have passed</u> the TAKS test with a scaled score of 1250 or higher <u>and from all student sub-groups</u>. The scaled scores are combined, averaged, and transformed to an average percent passing rate. The average percent passing rate is documented on the Texas Education Agency per district and campus for each subject and grade level. This percentage is considered to be the campus passing rate for the Texas accountability system.

Similar gradual passing levels were established for the Language Arts (Reading and Writing) and Mathematics TAKS when each standardized test began. It is reading and mathematics that are currently closely examined under the federal *NCLB* Act to determine whether student learning and achievement are being met. Science is not part of the federal AYP expectations; however, 5$^{th}$ grade science began to be included for the state-level accountability system in 2008.

**Correlation of Data**

TAKS fifth grade science test scores were identified for each elementary school campus included in this study (See Appendix D). This information was part of the calibration[248] of data from the two surveys, and it allowed the researcher to identify potential trends between data sources.

| Calibration | Triangulation |
|---|---|
| *Multiple Methods & Sources* | *Multiple Sources of Data* |
| • Surveys –<br>1. *Texas Campus Administrator Survey™*<br>2. *Texas Elementary Teacher Survey™* | • Direct information from principals & teachers.<br>• Descriptive comparison between principals and teachers regarding opinions/thoughts of data-informed decision making, PD training, and any impact on student achievement in science education standardized testing |
| • *NCLB*<br>• PD for science educators to meet standards for highly qualified classroom teachers | • Analysis of *NCLB* policy reauthorization of the highly qualified classroom teacher<br>• Implications of the highly qualified classroom teacher<br>• Research literature |
| • TAKS - Texas Assessment of Knowledge & Skills fifth grade science test scores | • Correlation of PD training from TRC and improving student achievement<br>• Data - information from principals regarding highly qualified science classroom teachers<br>• Statewide comparison of TRC and non-TRC campuses |
| • Texas Regional Collaboratives Data Base | • Identification of TRC campuses<br>• Teacher and principal information |

Table 3.3. Calibration and Triangulation Comparison

### *Research Protocol*

The research adhered to quantitative research design. The Texas elementary school teachers who participated in regional collaborative science education professional development programs were not randomly assigned since attendance was specific to where the teachers taught and lived when selected. The elementary campus administrators were selected from the campuses where the teachers were employed during the 2007-2008 school year.

| School Year | # Teachers Attendance at TRC Science PD |
|---|---|
| 2003 to 2004 | 167 |
| 2004 to 2005 | 530 |
| 2005 to 2006 | 1,099 |
| 2006 to 2007 | 1,394 |
| 2007 to 2008 | 1,113 |
| **TOTAL** | **4,303** |

Table 3.4. Total number Teachers attendance at science PD, local regional Collaboratives

The elementary teachers and campuses were identified through the TRC PD database as the *original* schools that employed the fifth grade teachers when they attended a TRC science education PD program between 2003 and 2008. Each year was a separate database that listed the teacher name and grade level, the TRC science regional collaborative attended, the state ESC region, school district, campus name and location, campus administrator that year, and other district information.

The teachers selected for this study originally were chosen on a random sample of every tenth name. However, using that process provided an end result of 95% Caucasian, female teachers which may not be a true representation of the elementary teacher population in Texas. Therefore, a stratified random sample of participants was selected that focused on two criteria; (1) on proportioned male-to-female ratio, approximately 1:5 and (2) ethnic balanced from the available population within the TRC database (Anglo, Hispanic, African-American, Asian American, and Native-American). Last, each school district was contacted either by phone call or via Internet web site to ensure that each teacher was still employed during the 2007-2008 school year and an email address was obtained. If a school email address was unavailable, the individual name was deleted for this study. This final list became the potential teacher participant list for this research.

| **Original # 5th Grade Teachers** | **4,303** |
|---|---|
| *No longer employed at same district* | **<2,667>** |
| | |
| **Potential # Teachers** | **1,636** |
| *By Gender* | |
| Males | 229 |
| Females | 1,407 |
| *By Ethnicity* | |
| Caucasian | 1,120 |
| Hispanic | 374 |
| African - American | 99 |
| Asian - American | 15 |
| Native American | 7 |
| Other | 21 |
| | |
| *Deletion due to no email address available* | <688> |
| | |
| **FINAL # Teachers Available for Study** | **948** |

Table 3.5. Original Number of Potential Teacher Participants

Once the teachers were selected, then a new database was developed to include a list of the 2007-2008 campus administrators assigned to the same campus. These individuals included the principal, any assistant principals and or instructional specialists or other campus-level personnel whose job function focused specifically on curriculum. To determine who the 2007-2008 elementary campus administrators was for each school, various databases were accessed through each individual school districts websites, the Texas Education Agency database of school districts and campus administrators, and the Texas Elementary Principals and Supervisors Association database membership list (http://www.tepsa.org/). The final result was a new database for this research study that now included a list of former TRC teacher participants, the principal, assistant principals, and other campus administrators as applicable.

| **TOTAL Campus Administrators** | 778 | **TOTAL # Districts** | 242 |
|---|---|---|---|
| Total # Principals | 504 | Total # Elementary Campuses | 358 |
| Total # Assist. Principals | 273 | Total # Intermediate Campuses | 86 |
| Other Campus Admin. | 1 | Total # Other Campuses | 43 |

Table 3.6. Original number of Districts, Campuses, and Campus Administrators

Each TRC campus' fifth grade science TAKS test scores were tracked through the Texas Education Agency's publically available web site (Appendix D). Campuses, teachers, and campus administrators are not identified by name, but rather through a coded, assigned numbering system, so there was a consistent way to uniquely identifying each person by campus and district according to the survey results and data set.

The University of Texas Information Technology Service's Research Consulting Statistical Support assisted the researcher with statistical data analyses using Statistical Processing Systems Software (SPSS) software.

**Setting 5: Texas public school campus configuration**

In the Texas public school system, individual campus grade levels are a reflection of two primary components: (1) the economic growth or demise of a district and (2) the local control of the community by school board members. An elementary school campus may contain grades Pre-Kindergarten to second grade and have a separate campus for third to fifth grade students. Intermediate school campuses may consist of grades four to five with the students attending a middle school starting in grade six. In another community, the elementary school may contain all grades from Pre-Kindergarten to fifth or to sixth grade. Some communities have middle schools that may contain grades five through seven, or grades four through six.

The most common configuration of schools in a district was an elementary school campus consisting of grades Kindergarten through fifth grade, the middle school campus consisting of grades six through eight, and high school campus consisting of grades nine through twelve. Within this study there were 487 individual campuses within 242 districts. Of this number, six were religious-oriented schools and seven were independent charter schools. The final number of 229 districts in this study represented 22.3% of 1,027 Texas public school systems.

Additionally, the elementary school principals, assistant principals, and instructional specialists are referred to in this research study as either a Campus Instructional Leader (CIL) or elementary campus administrators. These individuals were employed during the 2007-2008 school year at the selected 487 elementary, middle, or intermediate school campuses where the teachers who were former TRC participants.

Initially, 948 teacher participants and 778 elementary campus administrator participants were contacted via email and asked to respond to the *Texas Campus Administrator Survey*™ or the *Texas Elementary, Middle, or Intermediate Teacher Survey*™. Nonetheless, due to electronic issues of district spam filters, district changes in email servers and email addresses, inaccurate district and school campus personnel web site information, teachers no longer employed in districts, the final number of teacher survey participants was 382. Similar electronic communication issues were encountered with the elementary campus administrator participants resulting in a final number of elementary campus administrator 361 participants.

Teachers response to *Texas Elementary, Intermediate or Middle School Survey™*

| | | |
|---|---|---|
| Original # Teachers Contacted | **948** | |
| Total # Teachers Deleted from survey | <268> | *(i.e. left district / campus; bounced; unable to confirm email)* |
| Total # Teachers who never received survey | <272> | *(i.e. district spam filters, unable to confirm email)* |
| **Total # Teachers Contacted** | **408** | |
| **Final # Teacher Participants** | **282** | Completion rate by Teachers = 68% |

Campus Administrators response to *Texas Campus Administrator Survey™*

| | | |
|---|---|---|
| Original # Campus Administrators Contacted | 778 | |
| Total # Campus Administrators Deleted from survey | <237> | *(i.e. left district / campus; bounced; unable to confirm email)* |
| Total # Campus Administrators who never received survey | <121> | *(i.e. district spam filters, unable to confirm email)* |
| **Total # Campus Administrators Contacted** | **420** | |
| **Final # Campus Administrator Participants** | **332** | Completion rate by Campus Admin. = 79% |

Table 3.7. Final number of participants - Teachers and Campus Administrators

Each participant, regardless of which survey he or she received, was assigned a unique electronic identification access number for the purpose of gaining entry to the electronic survey through *Hosted Survey™*. This access number was sent to individuals in the 'Invitation to Participate' email provided through *Hosted Survey™*.

## Setting 6: Survey Instruments Development

### *Justification for Web-based Survey Methods*

According to Thomas[249]:

> A practical way of gathering information from a large number of people is to use a questionnaire. Asking questions, getting responses, and using that information is what survey research is all about . . . significant time and resources are required to make decisions [and] there's a high cost associated with making a wrong decision. (pp. 1-2)

The electronic survey was a critical element for this study. The purpose of the surveys was to solicit quantitative and qualitative information regarding implementation of *NCLB's* highly qualified classroom teacher requirements, to establish the impact of campus administrators' influence on student achievement for the TAKS 5th grade science test scores, and to determine the data-informed decision-making (DIDM) practices utilized within these schools for monitoring elementary science curricula.

The researcher chose to use a web based survey for this research study due to certain characteristics of the teacher participants who attend a TRC regional collaborative program. Since the TRC incorporates a highly developed, user-friendly web site for disseminating information as well as for providing an avenue for public access, the researcher surmises that the participants frequently visited web sites and possess familiarity with similar Internet communication formats. Additionally, Shannon and Bradshaw[250] speculate that web based surveys are appropriate for use in education since technology is prevalent in the school environment and the Internet is an intrinsic part of required state-level reporting and communication efforts. As such educators, as respondents, fit Dillman's[251] description of those most likely to yield a high response rate to web based or email surveys. Prior web based surveys were distributed to participants through the TRC web site with a return rate above 50%.[252]

As Donnellan[253] surmised in her research studies, "the advantage of email and web based surveys has been studied extensively." Other researchers[254] have reported similar findings. The response rates for electronic surveys may vary to some degree, but given (1) the technological expertise of this researcher, (2) the number of participants involved, (3) the size of Texas, and (4) the nature of the work at hand, an electronic survey was the method of choice for gathering information regarding DIDM within Texas elementary, middle, or intermediate school campuses.

### ***Survey Instrument Development***

Two survey instruments were designed based upon information gleaned from multiple federal web sites, research on the development of web based survey tools, and my personal experience of over 20 years in survey research and design.

### ***Survey Creation and Modification***

The two surveys developed for this research study, the *Texas Elementary, Middle or Intermediate Teacher Survey*™ (Appendix B) and the *Texas Campus Administrator Survey*™ (Appendix A), were modified from the National Center for Education Statistics (NCES), a program within the U.S. Department of Education.

A federal NCES survey titled *Schools and Staffing Survey* (SASS) collects sample information from public, private, charter, and Bureau of Indian Affairs schools across the U.S. on a variety of educational policy topics and characteristics. This national survey was administered four times since the 1987-88 school year, with the most recent survey issued in 2006-07.[255] There are four SASS questionnaires: (1) the School District Questionnaire, (2) the Public School Questionnaire, (3) the Principal Questionnaire, and (4) the Teacher Questionnaire. The researcher requested permission from NCES to modify and develop the two surveys for this research study from this set of federal surveys, or, more specifically, from the five sub-sections within these questionnaires: (1) Decision-Making; (2) Professional Development; (3) Educational Background and Certification; (4) Curriculum and Instruction; and (5) Assessment.

The request to use and modify portions from the *2003-04 SASS* was submitted on June 1, 2007; approval was granted on July 13, 2007. The *2003-04 SASS* (Form SASS-SA [7-3-2003]), OMB No. 1850-0598 approval expired on August 31, 2004, and no copyrights were listed on this federal document. A copy of both the permission letter (Appendix E) is included in the electronic documents file of The University of Texas at Austin's Internal Review Board (IRB) application proposal, as well as on the two survey instruments (Appendix F) developed for this research study.

### *Survey Development*

Besides designing the two surveys according to the aforementioned national resources and background experience, the researcher incorporated data-informed decision-making characteristics identified through the literature review. One survey, the *Texas Elementary, Middle or Intermediate Teacher Survey*™, was directed specifically towards the job function tasks of the fifth grade teacher while the other survey, the *Texas Campus Administrator Survey*™, was specifically geared to the elementary campus administrator job function tasks as CIL and use of DIDM processes.

Both survey instruments employed multiple-choice, yes/no, and Likert-scale question formats.[256] Additionally, to solicit individual opinions regarding the *NCLB's* highly qualified classroom teacher requirement, one open-ended format question with sufficient comment space was provided. Submitting responses through an online survey, the elementary campus administrators and teachers had opportunities to state clearly their ideas and viewpoints.

When an invited participant did not respond to the initial survey invitation, a second email was generated and sent through *Hosted Survey*™ as a reminder to complete the electronic survey instrument. A third, and final, email was sent to anyone who had not responded to the initial survey invitation one week prior to the survey deadline. At the date of the survey deadline, electronic access through the *Hosted Survey*™ was closed to invited participants.

### *Survey Instrument Content*

The two survey instruments were designed to correlate fifth grade teachers' and elementary campus administrators' perspectives of educational policies regarding *NCLB*'s stipulation for HQCT, elementary teachers science education PD, training and the use of DIDM on individual campuses, and the process of teachers' science content learning through PD opportunities and student achievement demonstrated on the 5$^{th}$ grade science TAKS test. Psychometric characteristics of these instruments have not been reported previously. Table 3.8 identifies the data sources deemed necessary for one to analyze descriptively the topics.

| Survey Topic Questions | **TAKS 2003-08** | **TRC Data Base** | **Policy Influences** |
|---|---|---|---|
| ***Part 1 - Demographic Information***: questions with respect to the 5th grade teacher and campus administrator participants | | X | |
| ***Part 2 - Professional Development:*** questions regarding participants' views and opinions in relation to prior (or lack of) courses or training in data-based decision making and science education | X | X | X |
| ***Part 3 - Data-informed Decision Making:*** questions regarding data-warehouse uses, to determine external influences, training, and the processes and procedures of the individual Texas elementary school campus participants. | X | | X |

Table 3.8. Survey Topics

### *Survey Reliability and Validity Process*

The modified survey instruments passed through four analytic processes: (1) original compilation; (2) comparative individual question analysis; (3) peer review; and (4) pilot survey. The initial original compilation of multiple survey formats, questions, and instructions were compiled as resources to draw upon to develop the two surveys necessary for this research. Next, the bank of survey questions were analyzed against each of the research questions posed to ensure a balance of content and informational knowledge. A draft survey was formulated for each participant group.

Four separate peer reviews among colleagues followed during late spring 2007. Doctoral candidates, doctoral-level and masters-level students attending either The University of Texas at Austin, College of Education's programs in educational administration or curriculum and instruction chose to voluntarily participate and provided feedback on the overall survey instrument as well as on these specifics: question content and wording, length of survey and its completion time, analysis of research questions, and recommendations regarding improvements.

**Pilot Studies**

Two pilot studies were conducted during the summer 2007 as the final reliability and validity analysis stage for survey development for both surveys. The initial pilot survey was distributed via the *Hosted Survey*™ web site to twenty-six Texas principals receiving the *Texas Campus Administrator Survey*™ and thirty-four elementary teachers' received the *Texas Elementary, Middle or Intermediate Teacher Survey*™. All were voluntary participants. The first group of pilot participants was selected primarily since no one had experienced or attended any of the science education PD programs offered through the TRC. These school employees responded to the survey questions and provided the researcher detailed feedback and critical information regarding specific clarifications and modifications necessary for the final survey instruments.

The second pilot study group received subsequent revised surveys that were also distributed in the same electronic method via the *Hosted Survey*™ web site. Twenty Texas principals and fifteen elementary teachers' participants volunteered as well. As the initial group of pilot participants, no one in the second pilot study group had experienced or attended any of the science education PD programs offered through the TRC. This multi-step process was necessary to ensure the survey's reliability and content validity. The results from both pilots were reliable and the survey content deemed valid.

The *Texas Campus Administrator Survey*™ initially consisted of thirty questions which evaluated one's knowledge of linking data to student learning and teacher pedagogy; attitudes toward data and the specific ways in which data are used; PD and educational certification; and science education curriculum knowledge. Based on the results of the pilot survey feedback, numerous questions were modified, combined, or deleted.

The *Texas Elementary Teacher Survey*™ initially consisted of twenty-nine questions. The teacher survey questions were relevant for the job function of pedagogy and the use of data for modifying pedagogical instruction to improve student learning and achievement, while the campus administrator survey focused specific questions that addressed the demands of campus-level management along with external federal – state policies, local community, and district influences as pertaining to data-informed decisions in regards to science education curriculum.

Based on the results of the first and second pilot survey feedback, the selected research participants received specific surveys of 15 items in three sections: **Part 1**: Demographic Information; **Part 2**: Professional Development; and **Part 3**: Data-Informed Decision Making. At the end of the survey, instructions were detailed for submitting the final survey so each survey was included within *Hosted Survey*™ program for this dissertation study. Additionally, the teacher survey name was changed to *Texas Elementary, Intermediate or Middle Teacher Survey*™ because 5$^{th}$ grade classrooms are found in a variety of school organizational configurations and many individual 5$^{th}$ grade teachers did not respond to the survey. If an individual teacher was teaching 5$^{th}$ grade in a school designated as an *Intermediate* or *Middle School*, the word "elementary" was viewed as 'does not apply to me'. By adding all three schools organizational descriptors to the title of the survey eliminated most of this issue.

## RESEARCH STUDY IMPLEMENTATION

### Confidentiality of the research data

The *Hosted Survey*™ web site provided security features, such as assigning only the researcher a password to the compiled data information of completed surveys. This allowed the data to be downloaded from the *Hosted Survey*™ web site to a desktop computer for further statistical analysis. The accumulated data will be kept for a five-year period on an Excel spreadsheet stored on the researcher's desktop computer, with an additional copy saved on three different locations for secure backup: a jump drive, an external hard drive, and a CD data disc. Only the researcher has access to these materials, which are kept in her privately owned home. At the end of the stated period, all electronic information will be erased and the CD data disc destroyed.

**Procedures for participating in the survey**

The researcher contacted all 37 of the science regional collaborative project directors as notification of this research study. Information regarding survey accessibility through the *Hosted Survey*™ web site was included, and each person was asked to notify regional elementary campuses that the surveys had been sent to stratified-randomly selected participant teachers and their respective campus administrators. Additionally, the TRC home page (www.theTRC.edu) displayed a brief description of this study, information regarding this research, and a link to the *Hosted Survey*™ web site. These surveys met nationally acceptable standards for online surveys as well as fulfilled requirements for obtaining informed consent.[257]

In the research study participants were contacted in three ways: (1) through verified district email addresses, (2) by personal communication from science regional collaborative project directors, and (3) via posted announcement on the TRC web site. An email that contained specific information inviting the individual to participate in a dissertation research study was sent through *Hosted Survey*™ along with the secure, direct link to the on-line survey document. The first survey was issued November 1, 2007 through February 1, 2008 and the second survey May 15, 2008 through August 20, 2008.

**Procedure for informed consent**

When a teacher applies to the science regional collaborative in his or her area, he or she must complete a participant form and a principal form.

Furthermore, the initial page of each survey contained The University of Texas IRB electronic survey consent form, as was required for human subject research.

**Procedure to Access Survey Online through Hosted Survey™**

Both surveys were available through the secure Web site, *Hosted Survey*™ (https://www.hostedware.com/home.html). It provides a free service for the initial 250 responses and charges moderate fees for additional responses (@ $0.10 per response). This commercial company primarily caters to corporate businesses as well as non-profit business entities by offering multiple survey instruments and statistical information. *Hosted Survey*™ grants special, low pricing for higher education uses (i.e., for graduate researchers and academicians). The *Hosted Survey*™ web site states the following:

> Hostedware Corporation, based in Irvine, California, serves the multi-billion dollar research, education and organizational improvement markets. A pioneer in these fields, we have developed a suite of leading online software applications - *Hosted Survey*™, *Hosted Test*™, and *Hosted Poll*™. These software applications, together with our Customer Services team, provide a cost effective, dependable and easy to use solution.[258]

Since the research study process began as soon as possible after the pilot study, all survey modifications were completely implemented. Individual surveys were administered twice to the initially identified 1,726 stratified, randomly selected participants (e.g. 948 teachers + 778 campus administrators) via district-level email, which directed them to the *Hosted Survey*™ web site[259] where they could respond to the survey questions specifically related to job functions.

The *Texas Campus Administrator Survey*™ and the *Texas Elementary, Middle or Intermediate Teacher Survey*™ was issued from November 1, 2007 to February 1, 2008 to 948 teachers and 778 elementary campus administrators. Emails were sent to each participant through the *Hosted Survey*™ online process with a unique, personal, secure access code and instructions for accessing the survey instrument. The completion rate for the initial issuance of the *Texas Campus Administrator Survey*™ was 44.9% of the campus administrators with 29.9% teachers completed the *Texas Elementary, Middle or Intermediate Teacher Survey*™ after adjustments were made for technological and email issues.

A second attempt to improve the response rate for both surveys was issued from May 15, 2008 through August 20, 2008. For the second survey, an additional incentive to complete the survey was included with a lottery-style drawing for twenty-five faceted gemstones (between 1.5 carats to 4.08 carats) for correctly submitted and completed surveys. The completion rate for the second issuance of the *Texas Campus Administrator Survey*™ was 34.6% of the campus administrators with 38.1% teachers completed the *Texas Elementary, Middle or Intermediate Teacher Survey*™. The final completion rate for the *Texas Campus Administrator Survey*™ was 79.5% of the campus administrators and 68% of the teachers contacted completed the *Texas Elementary, Middle or Intermediate Teacher Survey*™ after adjustments were made for technological and email issues.

At the end of each survey period, the researcher was able to download all participant responses to an Excel spreadsheet, and then transfer the data to SPSS for further statistical analysis.

| **Research Questions** | **TAKS 2003-08** | **TRC Database** | **Surveys** |
|---|---|---|---|
| How do Texas elementary campus administrators influence student achievement in science education? | X | X | X |
| What formats of data analysis are used to support science education instructional decisions determined by | | | X |

| | | | |
|---|---|---|---|
| Texas elementary campus administrators? | | | |
| How are Texas elementary school campus administrators, as Campus Instructional Leaders (CIL), utilizing available data when selecting elementary science curriculum? | | | X |
| Do the CIL decisions support the selection of preeminent teacher staffing arrangements to enhance student learning through teacher instruction? | X | | X |
| How does the science education professional development opportunity for teachers impact TAKS fifth grade students' science scores? | X | | X |
| Is education policy's designation of a *highly qualified classroom teacher*, as currently defined by the *No Child Left Behind Act of 2001*, necessary for elementary science education? | | | X |

Table 3.9. Research Question Matrix

### ***Potential Risks for Participants***

All participants involved in this research study voluntarily agreed to complete the electronic survey. The survey functioned to garner individual opinions and personal values regarding implementation of *NCLB's* educational policy requirements and the use of data-informed decision-making in the selection of elementary science education programs. Since Internet access to the survey was essential for one to complete it, absence of individual knowledge about or experience with computer technology and Internet service provider access created personal frustration for numerous participants and the researcher.

During the pilot study test runs, the average time spent on the *Texas Elementary, Middle or Intermediate Teacher Survey*™ pilot was 41 minutes, and on the *Texas Campus Administrator Survey*™ pilot, 42 minutes. Although the surveys were extensively modified before the true versions were released for this research study, their length still may have caused some annoyance. The average time spent on the final *Texas Elementary, Middle or Intermediate Teacher Survey*™ was 15 minutes, while the *Texas Campus Administrator Survey*™ averaged 30 minutes.

**Surveys Disseminated Twice due to Technological Issues**

Even though unique situations caused some irritation, various levels of computer technology have been available in Texas public schools for no less than two decades, and all of the potential respondents had registered, district-issued email addresses. The researcher had limited resources to alleviate an individual's aversion or avoidance of available Internet technology, which may present a barrier or a risk for those people. Other than anticipating that an electronic survey may be such a risk for some individuals, it is expected that each individual participant, as an adult, professional and reasonable person, would be able to judge for him- or herself how to work with this level of computer technology. *Hosted Survey*™ was chosen specifically due to the ease for the end-user to access the secure web site and complete the electronic survey.

Through *Hosted Survey*™, each participant was able to save his or her answers and return at another date and time during the survey availability period. All other risks were identified and minimized as much as possible. Individual circumstances were dealt with as they occurred. Primarily these circumstances were all due to "spam" filters at the district level that prohibited individuals to connect to *Hosted Survey*™,

Even with all of the advance preparations, less than 50% of the stratified-randomly selected campuses received the survey disseminated Nov. 1, 2007. As a result, there was a 44.9% response rate on the *Texas Campus Administrator Survey*™ and a 29.9% response rate on the *Texas Elementary, Middle or Intermediate Teacher Survey*™. This situation demanded further investigation when the researcher discovered that an individual school district technology department install high-risk filters to prevent unwanted or unsolicited electronic information, known as *spam*, from reaching teachers' or campus administrators' email.

Once this new knowledge was gained, additional actions were necessary: First, the researcher personally contacted school district superintendents, technology departments, and district-level curriculum directors or specialists to involve them in troubleshooting the aforementioned issue. Then, the researcher disseminated a second survey through the *Hosted Survey*™ system on May 15, 2008. Response rates improved overall, with an additional 34.6% response rate on the *Texas Campus Administrator Survey*™ and a 38.1% response rate on the *Texas Elementary, Middle or Intermediate Teacher Survey*™. The final completion rate for the *Texas Campus Administrator Survey*™ was 79.5% of the campus administrators and 68% of the teachers contacted completed the *Texas Elementary, Middle or Intermediate Teacher Survey*™.

**Survey Data Analysis**

The researcher began by seeking an answer to the question: How do Texas elementary school campus administrators influence student achievement in science education? Due to the complexity of the question, data input for calibration,[260] triangulation, and statistical analysis adjustments from numerous sources was required. The details of this analysis are discussed in Chapter 4.

The survey data was expected to describe (1) the effect of the TRC PD program on specific Texas campuses, (2) campus administrators' perceptions of *NCLB's* requirement for highly qualified classroom teachers, and (3) whether science education PD learning opportunities may have improved fifth grade science teaching and student learning and achievement. Chapter 4 discusses the all results from the *Texas Campus Administrator Survey*™ and the *Texas Elementary, Middle or Intermediate Teacher Survey*™, and the impact of elementary campus administrators as Campus Instructional Leaders on student achievement, as measured by the $5^{th}$ grade science TAKS exam.

# Chapter 4 - *Data and Dialogue:* Survey Data Analysis

## Introduction

The purpose of this dissertation research is to determine the impact of educational policy on elementary science education curriculum based on the decisions made by Texas elementary school campus administrators as *Campus Instructional Leaders* (CILs). The research data gathered for this study focused on clarifying whether a Texas elementary campus with high or consistently improving state-mandated standardized assessments, the $5^{th}$ grade science TAKS test scores, may owe this success to a CIL monitoring elementary science education curriculum through DIDM processes which values a *highly qualified* elementary science *classroom teacher*.

## Data Collection Process Review

The data was gathered through online surveys sent via email directly to $5^{th}$ grade teachers who attended a local, regional Texas Regional Collaborative PD program in elementary science education between September 2003 to August 2008, and to the campus administrators where these teacher(s) were employed during the 2007-2008 school year. Teachers received the *Texas Elementary, Intermediate or Middle School Teachers Survey*™, and the campus administrators received the *Texas Elementary Campus Administrator Survey*™. Both surveys were available through Hosted Survey™. The stratified, randomly selected participants accessed an individual survey through a unique, assigned, and secure ID. Each survey was designed for quantitative data compilation, with one question included to garner written responses regarding how each survey participant defined *highly qualified classroom teacher* (HQCT); those comments were analyzed in a qualitative coded data manner.

Both surveys contain three sections that were analyzed quantitatively using Statistical Processing System (SPSS). See Appendix A and B for each survey. A comment section was included at the end of each section that allowed participants to write any additional thoughts, ideas, or personal comments that he or she wanted to convey to the researcher directly. The comments were coded in qualitative analysis approaches of Qualitative Research Software's product *NVivo* and *Naturalistic Inquiry* of Lincoln and Guba.[261]

**Survey Results Highlights**

There are two sections of survey results contained in this chapter. **Part 1** contains statistical analysis of survey question results tabulated through SPSS with the assistance from the Statistics Department at The University of Texas at Austin. **Part 2** is the qualitative analysis of survey comments that was conducted by the researcher of the study according to the *Naturalistic Inquiry.*[262] In the comment areas, the participating campus administrators and teachers throughout Texas provided rich, informative, and descriptive information. The comments from both surveys illuminated how the science education professional development experiences through regional collaboratives improved teachers' science pedagogy, knowledge, and content. Nonetheless, lesson plan improvement and teachers' personal motivation toward science instruction remains the basis for the HQCT requirement of *NCLB.* The survey data reflects participants' descriptions of the applications of DIDM within their campus environments, yet use of DIDM was inconclusive regarding the improvement of 5$^{th}$ grade science TAKS as an indicator of student learning and achievement.

## PART 1 - RESEARCH QUESTIONS – QUANTITATIVE ANALYSIS

Each research question is triangulated with no less than three sources. Table 4.1 defines the triangulation process and Table 4.2 defines survey items that correlated with each specific research question.

| Research Question | TAKS 2005 to 2008 | TRC PD Tch. | Survey Quest. Data Analysis | Survey Comment Analysis |
|---|---|---|---|---|
| *Primary Research Question:* How to determine the impact of educational policy on elementary science education curriculum based on the decisions made by Texas elementary school campus administrators as Campus Instructional Leaders (CILs). | X | X | X | X |
| (1) What formats of data analysis are used to support the science education instructional decisions of Texas elementary campus administrators? | X | | X | X |
| (2) How are Texas elementary school campus administrators, as CILs, utilizing available data when monitoring elementary science? | X | | X | X |
| (3) Do the CIL decisions support the selection of preeminent teacher staffing arrangements to enhance student learning by teacher instruction? | X | X | X | X |
| (4) How does the science education professional development opportunity for teachers influence 5th grade students' science TAKS scores? | X | X | X | X |
| (5) Is education policy's designation of a *highly qualified classroom teacher*, as currently defined by the *No Child Left Behind Act of 2001*, necessary for elementary science education? | X | | X | X |

Table 4.1. Research Question Matrix

| RQ# | Questions | Key Information |
|---|---|---|
| 1 | What formats of data analysis are used to support the science education instructional decisions of Texas elementary campus administrators? | DIDM regarding staffing arrangements |
| 2 | How are Texas elementary school campus administrators, as CILs, utilizing available data when monitoring elementary science? | DIDM on science curriculum |
| 3 | Do the CIL decisions support the selection of preeminent teacher staffing arrangements to enhance student learning by teacher instruction? | TRC influence on campus administrators' determination of teacher assignments |
| 4 | How does the science education professional development opportunity for teachers influence 5th grade students' science TAKS scores? | TRC science PD impact on $5^{th}$ grade TAKS scores |
| 5 | Is education policy's designation of a *highly qualified classroom teacher*, as currently defined by the *No Child Left Behind Act of 2001*, necessary for elementary science education? | Usefulness of *No Child Left Behind* |

Table 4.2. Key Information for each Research Question

The following three tables represent each section from the *Texas Elementary Campus Administrator Survey*™ and its relationship to either necessary demographic information or to one of the research questions in Table 4.2. CA is used in the following three tables to indicate the question is from the *Texas Elementary Campus Administrator Survey*™.

| Survey Question | Topic | Research Question OR Topic |
|---|---|---|
| CA1 | CA Sex | Demographics |
| CA2 | CA Title | Demographics |
| CA3 | CA sponsorship of faculty to TRC | RQ#3 |
| CA4 | Grade Levels on Campus | Demographics |
| CA5 | Grade Levels on Campus for Science Ed. | RQ #2 |
| CA6 | CA knowledge of STMs | RQ #3 |
| CA7 | TEA Performance Rating (2006-2007) | RQ #4 |
| | COMMENTS (*voluntary*) | |

**Section I: Demographic Information**

| Question | Topic | Research Question OR Topic |
|---|---|---|
| CA1 | PD for administrators – internal to District | RQ #1<br>DIDM |
| CA2 | PD for administrators – external to District | RQ #1<br>DIDM |
| CA3 | Percentage of HQCTs on campus | RQ #5 |
| CA4 | CA description of a HQCT (**required**) | RQ #5 |
| CA5 | Evaluating Teacher behaviors PRIOR to attending TRC science PD training | RQ #3<br>RQ #4 |
| CA6 | Evaluating Teacher behaviors AFTER attending TRC science PD training | RQ #3<br>RQ #4 |
| CA7 | CA promotion of TRC science PD training | RQ #4 |
| CA8 | CA evaluation & rating of teachers participating in TRC science PD training **vs.** non-participating teachers | RQ #4 |
| | COMMENTS relating to Professional Development (*voluntary*) | |

**Section II: Professional Development (PD)**

| Question | Topic | Research Question OR Topic |
|---|---|---|
| CA1 | Agency/person influences on science education curriculum used | RQ #1<br>RQ #2 |
| CA2 | Influences regarding teacher assignments | RQ#1<br>RQ #3<br>RQ #4 |
| CA3 | Evaluation of teachers who teach science | RQ #1<br>RQ #2<br>RQ#3 |
| CA4 | Access to data warehouse information for student achievement & learning | RQ #1<br>RQ#2 |
| CA5 | Access to data for teacher assessment | RQ#1 |
| CA6 | Data on school progress | RQ#1 |
| | COMMENTS relating to DIDM (*voluntary*) | |

**Section III: Data Informed Decision Making**

Table 4.3. Analysis of the *Texas Elementary Campus Administrator Survey*™

The next three tables represent each section from the *Texas Elementary, Intermediate or Middle School Teachers Survey*™ and its relationship to either necessary demographic information or to one of the research questions in Table 4.3. TS is used in the following three tables to indicate the question is from the *Texas Elementary, Intermediate or Middle School Teachers Survey™.*

| Survey Question | Topic | Research Question OR Topic |
|---|---|---|
| TS1 | Sex | Demographics |
| TS2 | Inquiry about TRC – STM status | RQ#3 |
| TS3 | Inquiry about TRC – CM status | RQ#3 |
| TS4 | Grade Level Taught on Campus | Demographics |
| TS5 | Inquiry about assignment to teach science | RQ#3 |
| | COMMENTS (voluntary) | |

**Section I: Demographic Information**

| Question | Topic | Research Question OR Topic |
|---|---|---|
| TS1 | PD for teachers – using DIDM for instructional practices, HQCT assessment, science education curriculum, and TRC | RQ #1<br>RQ #2<br>RQ #5 |
| TS2 | PD for teachers – using data for teaching assignments | RQ #1<br>RQ #2<br>RQ #3 |
| TS3 | Teacher description of HQCT (**required**) | RQ #5 |
| TS4 | Promotion of TRC science PD training | RQ #4 |
| TS5 | Continued attending TRC science PD | RQ #3<br>RQ #4 |
| TS6 | Reasons for NOT continuing attendance of TRC science PD (optional) | RQ #3<br>RQ #4 |
| TS7 | Self-Evaluating teaching behaviors PRIOR to attending TRC science PD training | RQ #4 |
| TS8 | Self-Evaluating teaching behaviors AFTER attending TRC science PD training | RQ #4 |
| TS9 | Self-Evaluation of personal experience attending TRC science PD training **vs.** non-participating teachers | RQ #4 |
| | COMMENTS (voluntary) | |

**Section II: Professional Development (PD)**

| Question | Topic | Research Question OR Topic |
|---|---|---|
| TS1 | Agency/person influences on science education curriculum used | RQ #1<br>RQ #2 |
| TS2 | Influences regarding teacher classroom assignments | RQ#1<br>RQ #3<br>RQ #4 |
| TS3 | Self-evaluation - Access to data regarding modification for lessons taught and meeting needs of individual students | RQ #1<br>RQ #2<br>RQ#3 |
| TS4 | Access to data warehouse information for student achievement & learning | RQ #1<br>RQ#2 |
| TS5 | Access to data for student achievement & learning through various assessments or tests | RQ #1<br>RQ#2 |
| | COMMENTS relating to DIDM (voluntary) | |

**Section III: Data-Informed Decision Making**

Table 4.4. Analysis of the *Texas Elementary, Intermediate and Middle School Teachers Survey™*

**Statistical Analysis**

The statistical analysis used repeated measures 2-way ANOVA to look at time vs. dichotomous grouping of variables. This statistical procedure is known as Mauchly's Test of Sphericity. The test was introduced by ENIAC co-inventor John Mauchly in 1940.[263]

Preliminary analysis showed significant deviation of sphericity over time. Sphericity is an assumption of an ANOVA with a repeated measures factor (RMF). Sphericity relates to the equality of the variances of the differences between levels of the repeated measures factor. Sphericity requires that the variances for each set of difference scores are equal. Thus, results from ANOVAs are addressed using Huynh-Feldt corrections. Due to these deviations, Huynh-Feldt corrections are used for all analyses containing time as an independent variable.

Repeated measures are listed as dependent variables. For each measurement taken there should be one variable per repetition.

The *within*-subjects factor is the basis for the repeated measurements. Typically it carries labels representing time such as trials, days, weeks, or years. These labels refer to the nature of the repetition. The *within*-subjects factor will have as many levels as there are repetitions.

Data corrections depend on the Epsilon value. In this study, Huynh-Feldt corrections were used. Huynh-Feldt correction standard is set for significance when Epsilon results are above 0.75. These formats are used for examination of the data *within* groups. SPSS presents Mauchly's Test of Sphericity in the following table once data is analyzed. Items highlighted in **BOLD** were modified as data tables for in this document.

Mauchly's Test of Sphericity[b]

| **Within Subjects Effect** | Mauchly's W | Approx. Chi-Square | **df** | **Sig.** | **Epsilon[a]** | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | **Huynh-Feldt** | Lower-bound |
| **time** | 0.811 | 104.401 | **5** | **0.000** | 0.867 | **0.874** | 0.333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept + Data_Warehouse_System
Within Subjects Design: time

Table 4.5. Example of Mauchly's Test of Sphericity

If Mauchly's test shows violation of sphericity, this may be compensated by an Epsilon adjustment. Specifically, the numerator and denominator degrees of freedom (df) in the F-test are multiplied by Epsilon. SPSS repeated measures offers three Epsilon estimates as discussed above: Greenhouse-Geisser, Huynh-Feldt, and Lower-bound. Greenhouse-Geisser is considered to be a conservative adjustment, especially when sample size is low. Huynh-Feldt is considered less conservative but may assume values greater than 1.0, in which case it is set to 1.0. The Lower-bound method is the most conservative Epsilon adjustment. Since Epsilon is presented in all three formats used for correction, only the pertinent information is documented for each analysis. Therefore, in this study all of the data reported used the Huynh-Feldt correction. Data has been presented as two groups of tables throughout **Part 1** for the statistical analysis of the surveys[264] with graphical representation following the data tables.

Mauchly's sphericity test is a special case of a test that the covariance matrix of a multivariate normal distribution is proportional to a given matrix, in this case the identity matrix. The test is based on the likelihood ratio criterion and involves a scaled comparison between the determinant and the trace of the sample covariance matrix. When the significance level of the Mauchly's test is $< 0.05$ then sphericity cannot be assumed.

There may be one or more categorical variables that group the subjects. These are known as the *between*-subjects factors. Gender would be an example of a common between-subjects factor. In SPSS, *between*-subjects factors can be identified either as a string when text is used as well as numeric coding. SPSS presents **Tests of Within-Subjects Effects** in the following table once data is analyzed. Items highlighted in **BOLD** were modified as data tables for in this document.

| Tests of Within-Subjects Effects | | | | | | |
|---|---|---|---|---|---|---|
| **Source** | | Type III Sum of Squares | **df** | Mean Square | **F** | **Sig.** |
| **time** | Sphericity Assumed | 100396.165 | 3.0 | 33465.388 | 382.257 | 0.000 |
| | Greenhouse-Geisser | 100396.165 | 2.602 | 38585.618 | 382.257 | 0.000 |
| | **Huynh-Feldt** | 100396.165 | **2.622** | 38291.116 | **382.257** | **0.000** |
| | Lower-bound | 100396.165 | 1.000 | 100396.165 | 382.257 | 0.000 |
| **time * Data_ Warehse _Syst** | Sphericity Assumed | 103.195 | 3.0 | 34.398 | 0.393 | 0.758 |
| | Greenhouse-Geisser | 103.195 | 2.602 | 39.661 | 0.393 | 0.729 |
| | **Huynh-Feldt** | 103.195 | **2.622** | 39.359 | **0.393** | **0.731** |
| | Lower-bound | 103.195 | 1.000 | 103.195 | 0.393 | 0.531 |
| **Error (time)** | Sphericity Assumed | 131582.803 | 1503 | 87.547 | | |
| | Greenhouse-Geisser | 131582.803 | 1303.55 | 100.941 | | |
| | **Huynh-Feldt** | 131582.803 | **1313.58** | 100.171 | | |
| | Lower-bound | 131582.803 | 501.00 | 262.640 | | |

Table 4.6. Example of Tests of Within-Subjects Effects

*Estimated marginal means* may be requested in the upper portion of the Options dialog in SPSS. Output will give the predicted marginal means on the dependent variables for levels of within-subjects and/or between-subjects factors, controlling for any covariates in the model. The univariate test of significance below shows that the repeated measures dependent variables (or at least one of them) differs significantly. SPSS presents the Estimated Marginal Means as shown below. Items used in this document are highlighted as **BOLD.**

| Estimated Marginal Means | | | | |
|---|---|---|---|---|
| | | | 95% Confidence Interval | |
| time | Mean | Std. Error | Lower Bound | Upper Bound |
| 1 | 59.999 | 0.800 | 58.428 | 61.571 |
| 2 | 72.751 | 0.704 | 71.369 | 74.134 |
| 3 | 75.050 | 0.667 | 73.739 | 76.361 |
| 4 | 78.822 | 0.587 | 77.668 | 79.975 |

Table 4.7. Example of Estimated Marginal Means

Departures from the assumption of sphericity affect the validity of various statistical tests used in the analysis of variance. Epsilon is the measure of sphericity. When the Epsilon value is 1, this indicates there was no violation within the data. The distance away from 1 indicates the level of correction within the data that will be required. As discussed earlier, once the data has been corrected for sphericity, these corrections alter the degrees of freedom, thereby altering the significance value of the *F*-ratio.

The first pair of tables shows Huynh-Feldt corrections for df (degrees of freedom), the *F*-ratio, and significance for data results subjects.

| Source | | df | F | Sig. |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.622 | 382.257 | 0.000 |
| time * Data_Warehse_System | Huynh-Feldt | 2.622 | 0.393 | 0.731 |
| Error(time) | Huynh-Feldt | 1313.581 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| Data_Warehse_Syst | 1 | 2.340 | 0.127 |
| Error | 501 | | |

Tests of Between-Subjects Effects

Table 4.8. Examples of Tests of Within-Subjects and Between-Subjects Effects.

The second pair of tables shows the range for the data through Mean, Standard of Error and the Lower- and Upper-Bound confidence intervals at 95%. Time represents the year that the 5th grade science TAKS tests were issued – "1" = 2005, "2" = 2006, "3" = 2007, and "4" = 2008.

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 59.999 | 0.800 | 58.428 | 61.571 |
| 2 | 72.751 | 0.704 | 71.369 | 74.134 |
| 3 | 75.050 | 0.667 | 73.739 | 76.361 |
| 4 | 78.822 | 0.587 | 77.668 | 79.975 |

Factor of Time – Estimates

| Data_Warehse_System | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 60.779 | 1.107 | 58.603 | 62.954 |
| | 2 | 74.038 | 0.974 | 72.125 | 75.952 |
| | 3 | 75.905 | 0.924 | 74.090 | 77.720 |
| | 4 | 79.523 | 0.813 | 77.926 | 81.120 |
| Yes | 1 | 59.220 | 1.155 | 56.951 | 61.488 |
| | 2 | 71.465 | 1.016 | 69.470 | 73.460 |
| | 3 | 74.195 | 0.963 | 72.303 | 76.087 |
| | 4 | 78.120 | 0.848 | 76.455 | 79.786 |

Factor of Time*Data_Warehouse_System

Table 4.9. Examples of Estimated Marginal Means.

The average percent passing rate for the 5th grade science TAKS scores was used as the measurement for time. The overall results from the selected survey questions data are presented individually.

**Data-Informed Decision Making: Survey Analysis**

*Research Question #1: What formats of data analysis are used to support science education instructional decisions determined by Texas elementary campus administrators?*

The three formats of data storage systems available to Texas elementary campuses are included on both surveys: (1) Data Warehouse Systems (commercially-produced), (2) District-created Data Warehouse Systems, and (3) Student Information Systems (SIS).

1) Data Warehouse Systems (commercially-produced)

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. The Tests of Within-Subjects Effect's factor of Time $F(2.622, 1313.581) = 382.257$, $p < 0.05$, is significant. The Tests of Within-Subjects Effect's factor for the use of a commercially-purchased Data Warehouse System <u>was not</u> significant: $F(1, 501) = 2.340$, $p = 0.127$. The Tests of Between-Subjects Effect's interaction of the Factor of Time*Data Warehouse System, $F(2.622, 1313.581) = 0.393$, $p=0.731$, the interaction <u>was not</u> significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.622 | 382.257 | 0.000 |
| time * Data_Warehse_System | Huynh-Feldt | 2.622 | 0.393 | 0.731 |
| Error(time) | Huynh-Feldt | 1313.581 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Data_Warehse_Syst | 1 | 2.340 | 0.127 |
| Error | 501 | | |

Tests of Between-Subjects Effects

Table 4.10. Data Warehouse Systems - Tests of Within-Subjects Effect and Between-Subjects Effect

| | | | 95% Confidence Interval | |
|---|---|---|---|---|
| time | Mean | Std. Error | Lower Bound | Upper Bound |
| 1 | 59.999 | 0.800 | 58.428 | 61.571 |
| 2 | 72.751 | 0.704 | 71.369 | 74.134 |
| 3 | 75.050 | 0.667 | 73.739 | 76.361 |
| 4 | 78.822 | 0.587 | 77.668 | 79.975 |

Factor of Time – Estimates

| | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|
| Data_Warehse_System | time | Mean | Std. Error | Lower Bound | Upper Bound |
| No | 1 | 60.779 | 1.107 | 58.603 | 62.954 |
| | 2 | 74.038 | 0.974 | 72.125 | 75.952 |
| | 3 | 75.905 | 0.924 | 74.090 | 77.720 |
| | 4 | 79.523 | 0.813 | 77.926 | 81.120 |
| Yes | 1 | 59.220 | 1.155 | 56.951 | 61.488 |
| | 2 | 71.465 | 1.016 | 69.470 | 73.460 |
| | 3 | 74.195 | 0.963 | 72.303 | 76.087 |
| | 4 | 78.120 | 0.848 | 76.455 | 79.786 |

Factor of Time*Data_Warehouse_System

Table 4.11. Data Warehouse Systems - Estimated Marginal Means

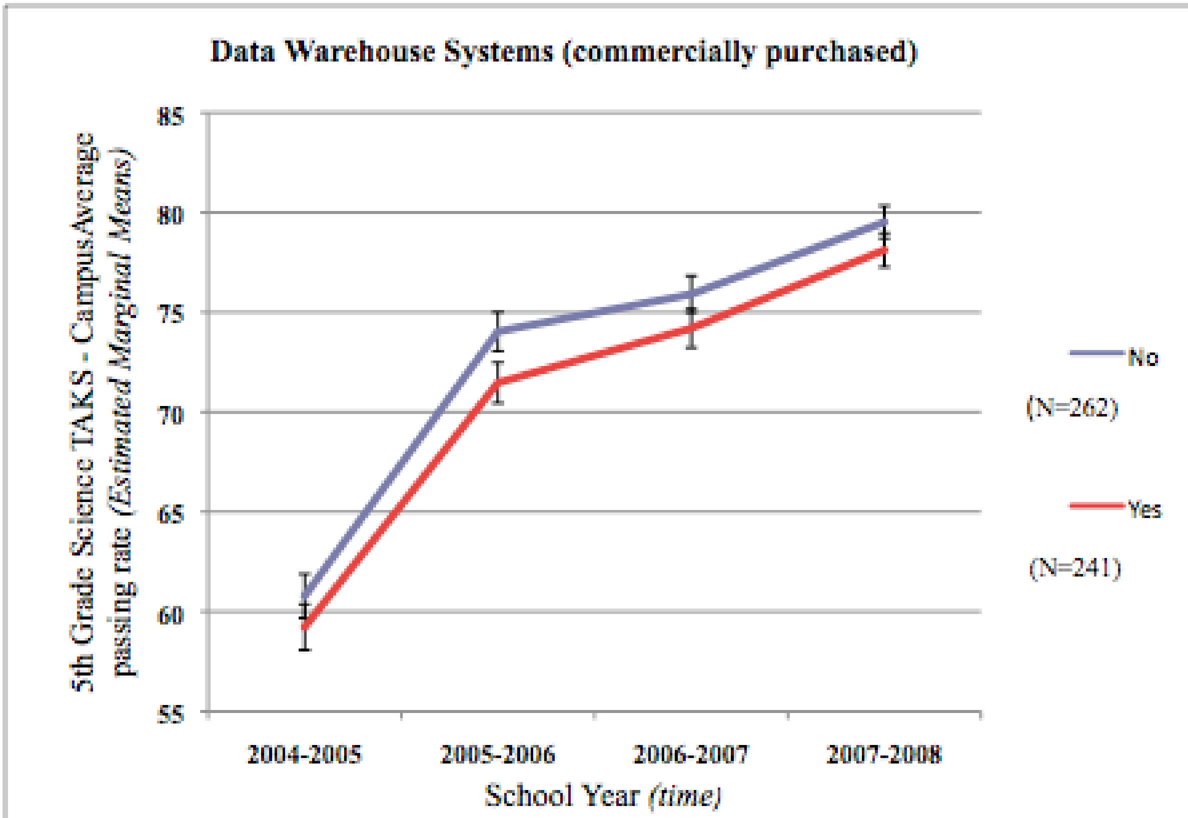



Figure 4.1. Data Warehouse System (commercially purchased)

*Summary regarding Data Warehouse Systems (commercially produced):*

At this stage, it is impossible to predict the improvement of 5th grade science TAKS scores when a school or district utilizes a commercially purchased Data Warehouse System.

The change over time observed in the TAKS scores did not depend on the use of a commercially purchased Data Warehouse System. The only event seen in the data was that something did happen to TAKS scores over time with the use of a commercially purchased Data Warehouse System. In general, standard errors are below 1.00%, which may have been a factor of time. Therefore, the use over time of a commercially purchased Data

Warehouse System was not significant for the improvement of 5th grade science TAKS scores.

2) District-created Data Warehouse System

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. The Tests of Within-Subjects Effect's factor for Time $F(2.625, 1315.065) = 361.337$, $p<0.05$ is significant. The Test of Between Subjects Effect's factor of a District-created Data Warehouse System, $F(1, 501)= 0.183$, $p= 0.669$, was not significant. The Tests of Within-Subjects Effect's between Time*Data Warehouse System, $F(1, 501) = 0.560$, $p= 0.618$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.625 | 361.337 | 0.000 |
| time * District_created_Data_Warehouse | Huynh-Feldt | 2.625 | 0.560 | 0.618 |
| Error(time) | Huynh-Feldt | 1315.065 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| District_created_Data_Warehouse | 1 | 0.183 | 0.669 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.12. District-created Data Warehouse System - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 59.976 | 0.832 | 58.341 | 61.611 |
| 2 | 72.925 | 0.734 | 71.483 | 74.366 |
| 3 | 75.167 | 0.695 | 73.802 | 76.532 |
| 4 | 78.997 | 0.611 | 77.797 | 80.198 |

Factor of Time - Estimates

| District_ created_ Data_ Warehouse | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 59.775 | 1.330 | 57.162 | 62.388 |
| | 2 | 73.357 | 1.172 | 71.054 | 75.660 |
| | 3 | 75.462 | 1.110 | 73.281 | 77.642 |
| | 4 | 79.527 | 0.976 | 77.610 | 81.445 |
| Yes | 1 | 60.178 | 1.001 | 58.210 | 62.145 |
| | 2 | 72.492 | 0.883 | 70.758 | 74.226 |
| | 3 | 74.872 | 0.836 | 73.230 | 76.514 |
| | 4 | 78.467 | 0.735 | 77.023 | 79.911 |

Factor of Time*District-created Data Warehouse

Table 4.13. District-created Data Warehouse - Estimated Marginal Means

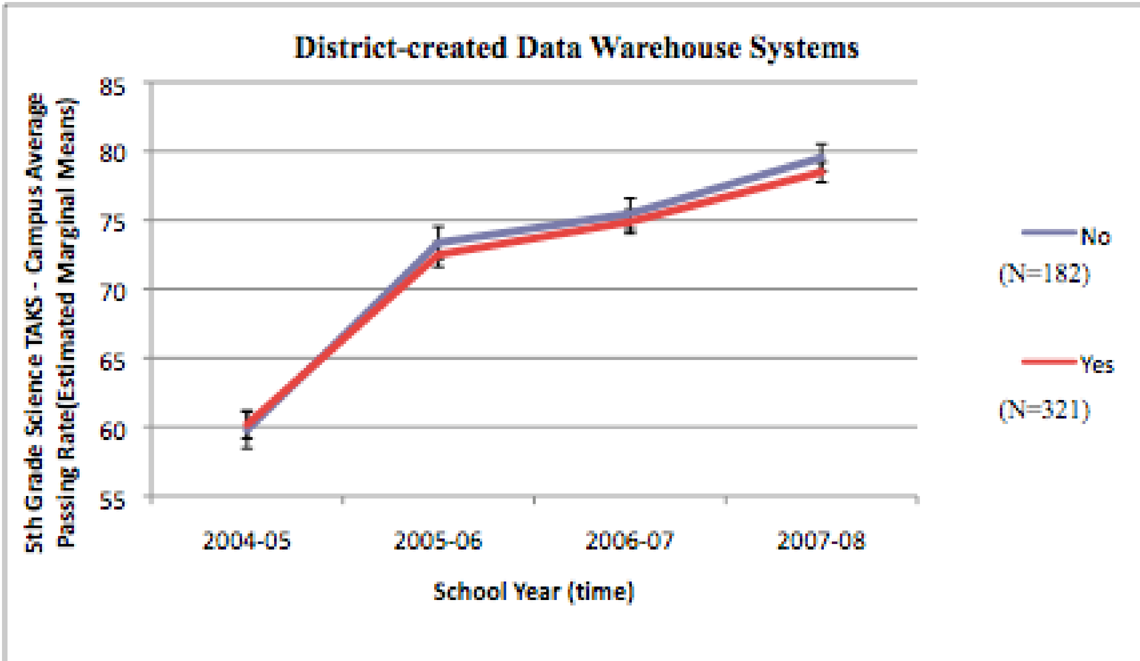



Figure 4.2. Use of District created Data Warehouse Systems

*Summary regarding District-created Data Warehouse Systems:*

As in the commercially-purchased Data Warehouse System, results of this data suggest that it is impossible to predict the improvement of 5$^{th}$ grade science TAKS scores when a school or district utilizes a District-created Data Warehouse System.

The change noticed over time for TAKS scores did not depend on the use of a District-created Data Warehouse System. The only event seen in the data was that something did happen over time to TAKS scores when a District-created Data Warehouse System was not used. In general, all of the standard errors are below 1. Therefore, the use over time of a District-created Data Warehouse System was not significant for the improvement of 5$^{th}$ grade science TAKS scores.

3) Student Information Systems

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. The Tests of Within-Subjects Effect's factor of Time, $F(2.623, 1313.987) = 262.819$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor of the use of Student Information Systems demonstrates an upward sloping trend for the factor Student_Info_Systems: $F(1, 501) = 3.419$, **p=0.065**. However, the Tests of Within-Subjects Effect's interaction between the factor of Time*Student Information System, $F(2.623, 1313.987) = 0.264$, $p=0.825$, the interaction was not significant.

| **Source** | | **Df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.623 | 262.819 | 0.000 |
| time * Student_Info_Systems | Huynh-Feldt | 2.623 | 0.264 | 0.825 |
| Error (time) | Huynh-Feldt | 1313.987 | | |

Tests of Within-Subjects Effects

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Student_Info_Systems | 1 | 3.419 | **0.065** |
| Error | 501 | | |

Tests of Between-Subjects Effects

Table 4.14. Student Information Systems - Tests of Within-Subjects and Between-Subjects Factors

| **Student_ Info_ Systems** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| No | 69.664 | 1.247 | 67.214 | 72.113 |
| Yes | 72.281 | 0.671 | 70.963 | 73.600 |

Factor of Time – Estimates

| Student_Info_ Systems | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 58.372 | 1.686 | 55.060 | 61.684 |
| | 2 | 70.637 | 1.484 | 67.722 | 73.553 |
| | 3 | 72.558 | 1.403 | 69.801 | 75.314 |
| | 4 | 77.088 | 1.236 | 74.659 | 79.518 |
| Yes | 1 | 60.513 | 0.907 | 58.730 | 62.296 |
| | 2 | 73.433 | 0.799 | 71.864 | 75.003 |
| | 3 | 75.818 | 0.755 | 74.334 | 77.302 |
| | 4 | 79.362 | 0.666 | 78.054 | 80.669 |

Factor of time*Student Information Systems

Table 4.15. Student Information Systems - Estimated Marginal Means

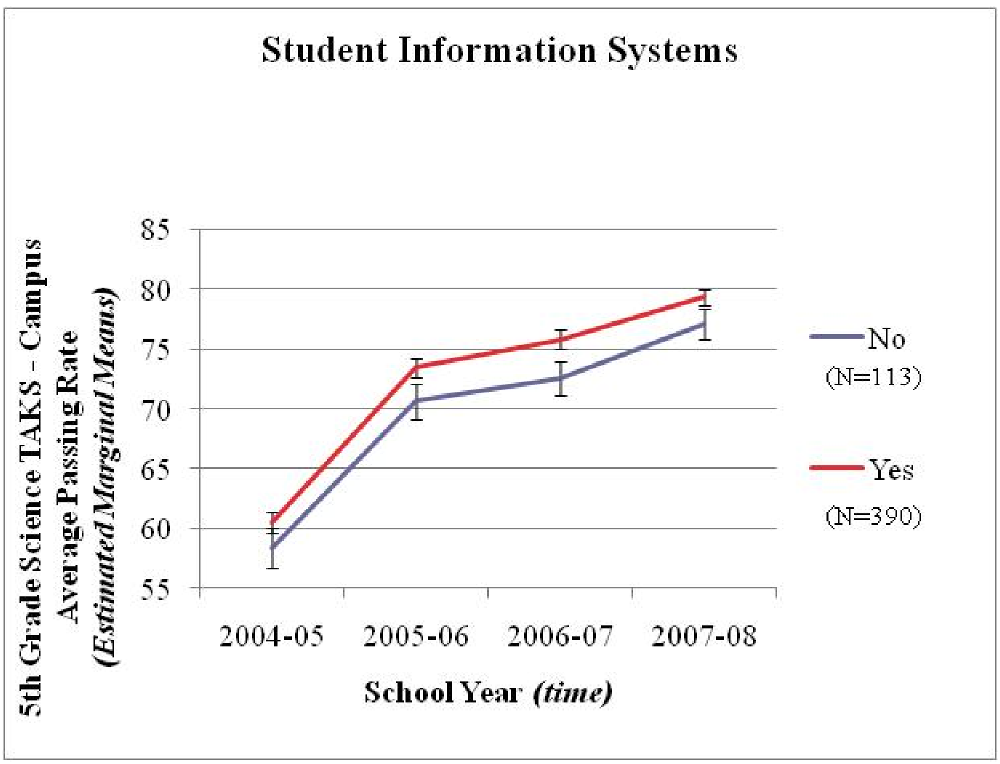



Figure 4.3. Student Information Systems

*Summary regarding Student Information Systems:*

Time is significant and the Tests Between-Subjects Effect's demonstrates no significance ($p = 0.825$). The Tests of Within-Subjects Effect's use of Student Information Systems demonstrates an upward sloping trend: (**p= 0.065**).

Nonetheless, the use of Student Information Systems overall is inconclusive in regard to a singular event over time improving TAKS scores. Schools that utilized SIS demonstrate an upward sloping trend in 5th grade science TAKS scores, yet it is inconclusive as a singular effect.

The change over time noticed for 5th grade science TAKS scores demonstrates an upward sloping trend for elementary campuses that used Student Information Systems (**p=0.065**). TAKS scores increased from year to year over time. The trend in SIS included the distinction of the TAKS scores between elementary campuses that used SIS and those that did not.

## Use of Data-Informed Decision Making to Monitor Elementary Science

*Research Question #2: How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?*

The complexity of this question requires multiple statistical analyses. As with all analyses of this research, Sphericity was corrected with Huynh-Feldt.

The first sub-analysis examines the relationship between 5th grade science TAKS campus-level scores and selected currently available assessment tools for improving student learning and achievement. These assessment tools include the use of state mandated test assessments (e.g., TAKS), criterion referenced tests, formative assessments, curriculum-embedded assessment tests, and nationally normed tests (e.g., the Iowa Test for Basic Skills (ITBS)).

The second sub-analysis examines the relationships between 5th grade science TAKS campus-level scores, participants' experience, and their attitudes towards utilizing DIDM for improving student learning. Each survey sought the viewpoint of campus administrators and teacher participants as far as when, or if, DIDM was used for modifying teachers' practices to address or improve individual student learning. Teachers could modify practices via changes in lesson plans, changes in pedagogy, or changes in their thinking about improving student learning through the application of DIDM.

**Selected Assessment Tool Analysis**

1) Use of state mandated test assessments (e.g., TAKS) to improve student learning.

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of state mandated test assessments (TAKS) with the Tests of Within-Subjects Effect as a factor of Time, $F(2.623, 1313.918) = 20.800$, $p< 0.05$, time is significant. Furthermore, Tests of Within-Subjects Effect as the factor of Time*State mandated test assessments, $F(2.623, 1313.918) = 0.202$, $p = 0.871$, the interaction was not significant. However, the Tests of Between-Subjects Effect for using state mandated test assessments (TAKS) verified the interaction of time was not significant: $F(1, 501) = 2.569$, $p = 0.110$.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.623 | 20.800 | 0.000 |
| time*State_mandat_test_assess | Huynh-Feldt | 2.623 | 0.202 | 0.871 |
| Error(time) | Huynh-Feldt | 1313.918 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| State_mandat_test_assess | 1 | 2.569 | 0.110 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.16. State-mandated tests assessments - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 56.566 | 3.411 | 49.864 | 63.267 |
| 2 | 67.901 | 3.002 | 62.004 | 73.799 |
| 3 | 70.889 | 2.844 | 65.301 | 76.476 |
| 4 | 75.685 | 2.504 | 70.766 | 80.604 |

Factor of Time – Estimates

| State_mandate_ test_assess | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 53.000 | 6.774 | 39.691 | 66.309 |
| | 2 | 62.857 | 5.962 | 51.144 | 74.570 |
| | 3 | 66.571 | 5.648 | 55.475 | 77.668 |
| | 4 | 72.429 | 4.972 | 62.659 | 82.198 |
| Yes | 1 | 60.131 | 0.805 | 58.550 | 61.712 |
| | 2 | 72.946 | 0.708 | 71.554 | 74.337 |
| | 3 | 75.206 | 0.671 | 73.887 | 76.524 |
| | 4 | 78.942 | 0.591 | 77.781 | 80.102 |

Factor of Time*State_mandated_test_assessments

Table 4.17. State-mandated test assessments - Estimated Marginal Means

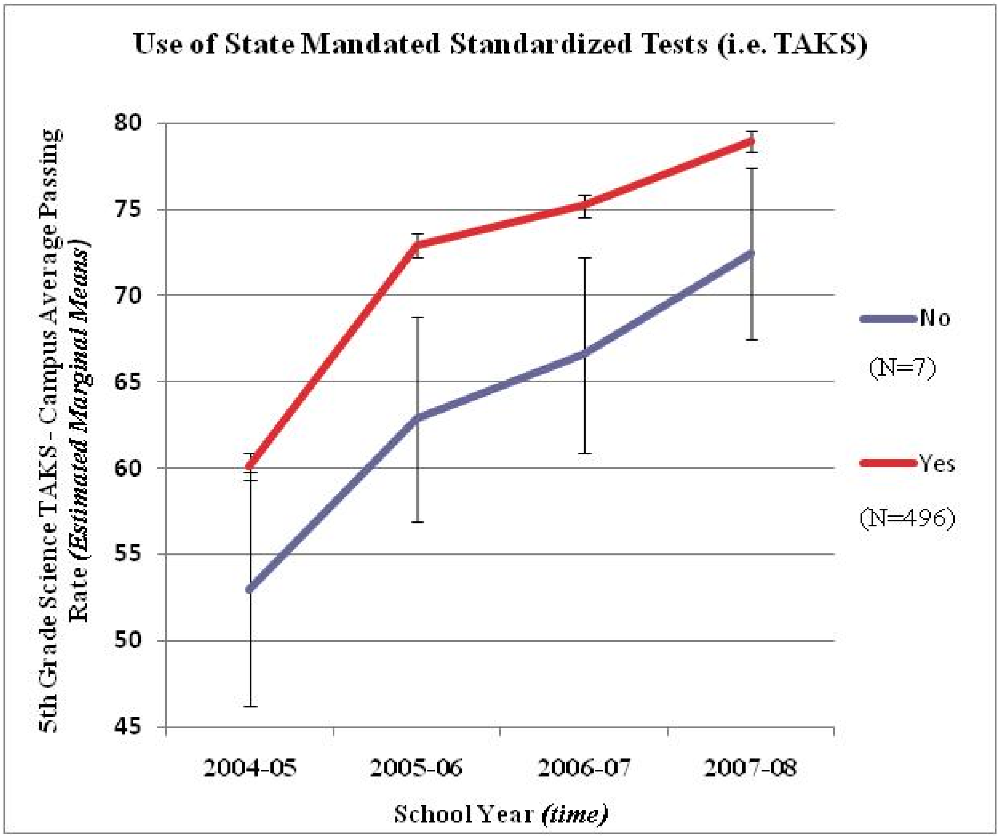



Figure 4.4. Use of state mandated test assessments

*Summary of the use of state mandated test assessments*:

Based on this data set, to predict improvement from the use of state mandated tests assessments, such as 5th grade science TAKS scores, is difficult to assess. Time demonstrates significance, yet the interaction between use of the state mandated test assessments and time was not significant (p= 0.871). Huynh-Feldt statistical correction indicates there was no significance within-subjects interactions (p= 0.110).

The change over time observed for TAKS scores could have been influenced by the use of the state mandated test assessment of TAKS. The only event seen in the data was that something did happen to TAKS scores over time when the state mandated test assessment of TAKS was used.

2) The use of criterion referenced tests to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of criterion referenced test assessments to improve student learning, the Tests of Within-Subjects Effect's factor of Time $F(2.623, 1314.158) = 160.875$, $p < 0.05$, time is significant. The Tests of Between-Subjects Effect's use of criterion referenced tests <u>was not</u> significant: $F(1, 501) = 0.000$, $p = 0.987$. The Tests of Within-Subjects Effect as the Factor of Time*Criterion Referenced Tests, $F(2.623, 1314.158) = 0.062$, $p = 0.970$, verified it <u>was not</u> significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.623 | 160.875 | 0.000 |
| time*Criter_Ref_Tests | Huynh-Feldt | 2.623 | 0.062 | 0.970 |
| Error (time) | Huynh-Feldt | 1314.158 | | |

Tests of Within-Subjects Effects

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Criter_Ref_Tests | 1 | 0.000 | 0.987 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.18. Criterion Referenced Tests - Tests of Within-Subjects Effect and Between-Subjects Effect

Factor of Time – Estimates

| | | | 95% Confidence Interval | |
|---|---|---|---|---|
| time | Mean | Std. Error | Lower Bound | Upper Bound |
| 1 | 60.076 | 1.234 | 57.651 | 62.500 |
| 2 | 72.644 | 1.088 | 70.507 | 74.782 |
| 3 | 75.034 | 1.030 | 73.010 | 77.058 |
| 4 | 78.973 | 0.906 | 77.192 | 80.754 |

| Criter_Ref _Tests | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 60.133 | 2.316 | 55.583 | 64.684 |
| | 2 | 72.433 | 2.042 | 68.421 | 76.445 |
| | 3 | 74.967 | 1.934 | 71.168 | 78.766 |
| | 4 | 79.133 | 1.701 | 75.791 | 82.476 |
| Yes | 1 | 60.018 | 0.852 | 58.343 | 61.693 |
| | 2 | 72.856 | 0.751 | 71.379 | 74.332 |
| | 3 | 75.102 | 0.712 | 73.703 | 76.500 |
| | 4 | 78.813 | 0.626 | 77.583 | 80.043 |

Factor of Time*Criterion_Referenced_Tests

Table 4.19. Criterion Referenced Tests - Estimated Marginal Means

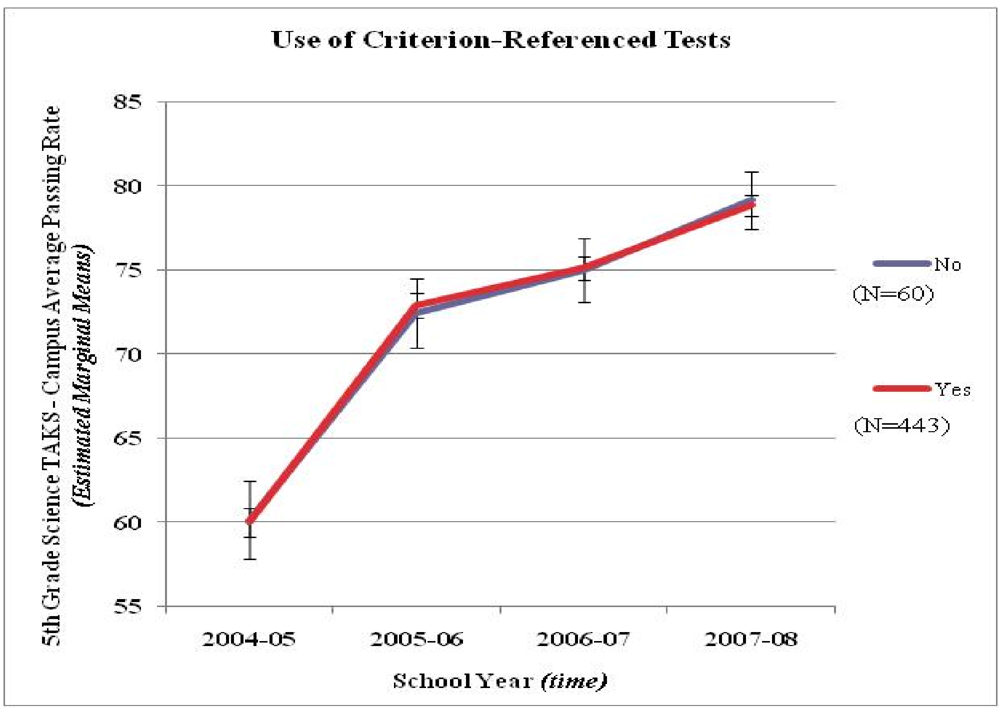



Figure 4.5. Use of criterion referenced tests to improve student learning

*Summary of the use of criterion referenced test assessments:*

Based on this data set, to predict the improvement of 5th grade science TAKS scores when examining the use of the criterion referenced test assessment <u>is not</u> significant (p= 0.970). Time is significant, but the relationships between criterion referenced tests and the interaction of time <u>were not</u> significant (p= 0.987). The change over time observed for TAKS scores <u>did not depend</u> on the use of criterion-referenced tests. Huynh-Feldt corrections demonstrates no trend possibilities. The only event that occurred was that something happened to TAKS scores over time.

3) The use of formative assessments to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of formative assessments to improve student learning with the Tests of Within-Subjects Effect's factor of Time $F(2.620, 1312.767) = 98.110$, $p< 0.05$, time is significant. The Tests of Between-Subjects Effect's factor of formative assessments <u>was not</u> significant: $F(1, 501) = 1.627$, $p = 0.203$. The Tests of Within-Subjects Effect's relationships between the Factor of Time*Formative Assessments, $F(2.620, 1.045) = 0.203$, $p = 0.366$, demonstrates that the interaction <u>was not</u> significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.620 | 98.110 | 0.000 |
| time * Form_Assess | Huynh-Feldt | 2.620 | 1.045 | 0.366 |
| Error (time) | Huynh-Feldt | 1312.767 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Form_Assess | 1 | 1.627 | 0.203 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.20. Formative Assessments - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 58.255 | 1.636 | 55.040 | 61.470 |
| 2 | 71.003 | 1.442 | 68.170 | 73.836 |
| 3 | 74.871 | 1.368 | 72.183 | 77.559 |
| 4 | 77.246 | 1.201 | 74.886 | 79.605 |

Factor of Time – Estimates

| Form_Assess | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 56.219 | 3.167 | 49.997 | 62.441 |
| | 2 | 68.938 | 2.790 | 63.455 | 74.420 |
| | 3 | 74.625 | 2.648 | 69.423 | 79.827 |
| | 4 | 75.406 | 2.324 | 70.840 | 79.973 |
| Yes | 1 | 60.291 | 0.825 | 58.669 | 61.913 |
| | 2 | 73.068 | 0.727 | 71.639 | 74.497 |
| | 3 | 75.117 | 0.690 | 73.761 | 76.473 |
| | 4 | 79.085 | 0.606 | 77.895 | 80.275 |

Factor of Time*Formative_Assessments

Table 4.21. Formative Assessments – Estimated Marginal Means

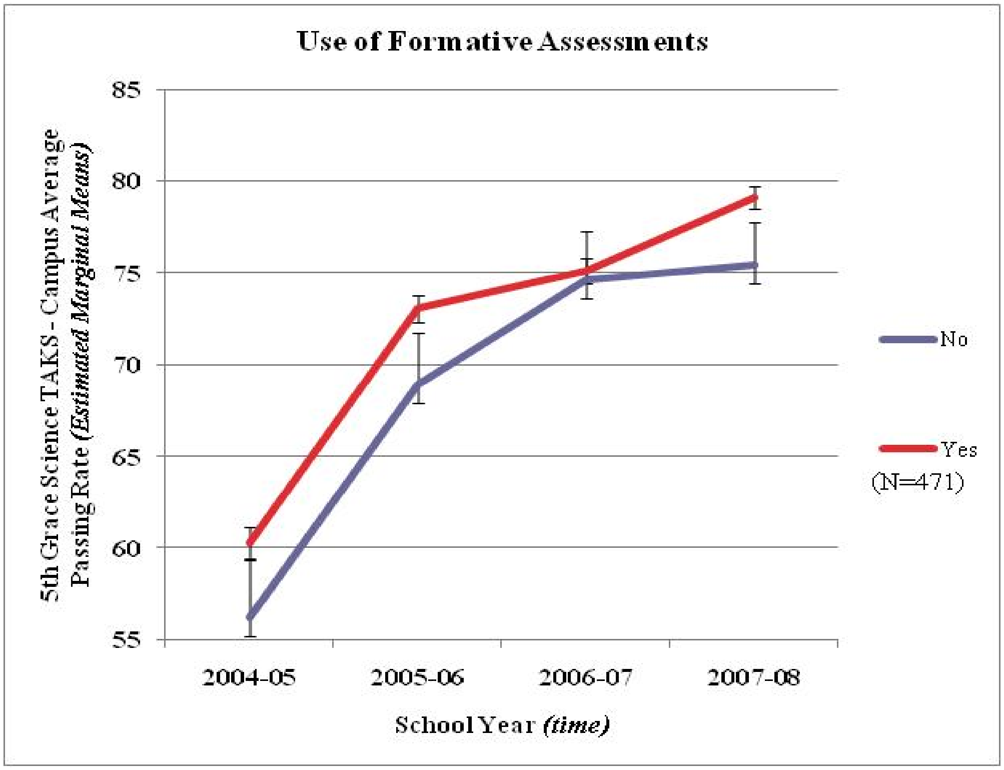



Figure 4.6. Use of formative assessments to improve student learning

*Summary of the use of formative assessments:*

Based on this data set, predicting the improvement of 5th grade science TAKS scores when examining the use of formative assessments is inconclusive. Time is significant, but the Tests of Within-Subjects Effect examining the interaction of formative assessments and time, the interaction was not significant. The change observed over time for TAKS scores did not depend on the use of formative assessments to improve student learning. Huynh-Feldt corrections demonstrate no trend possibilities. The only event that occurred was that something happened to TAKS scores over time.

4) The use of formative assessments to improve student learning, 2-year comparison

The unique relationship between 2006-2007 and 2007-2008 necessitates closer examination. As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of formative assessments in order to improve student learning, the Tests of Within-Subjects Effect's factor of Time $F(1.000, 512.000) = 5.824$, $p < 0.016$, time is significant at the .05 level. The Tests of Between-Subjects Effect's factor of formative assessments was not significant: $F(1, 512) = 0.450$, $p = 0.503$. The Tests of Within-Subjects Effect's factor, relationship between the factor of Time and Formative Assessments, $F(1.000, 512.000) = 2.735$, $p = 0.099$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 5.824 | **0.016** |
| time * Form_Assess | Huynh-Feldt | 1.000 | 2.735 | 0.099 |
| Error (time) | Huynh-Feldt | 512.000 | | |

Tests of Within-Subjects Effect's Factors

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Form_Assess | 1 | 0.450 | 0.503 |
| Error | 512 | | |

Tests of Between-Subjects Effect's Factors

Table 4.22. Formative Assessments, 2-year - Tests of Within-Subjects Effect and Between-Subject Effect Factors

| | | | **95% Confidence Interval** | |
|---|---|---|---|---|
| **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| 1 | 75.240 | 1.332 | 72.624 | 77.856 |
| 2 | 77.576 | 1.170 | 75.278 | 79.874 |

Factor of Time – Estimate

| Form_Assess | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 75.265 | 2.574 | 70.208 | 80.321 |
| | 2 | 76.000 | 2.260 | 71.559 | 80.441 |
| Yes | 1 | 75.215 | 0.685 | 73.869 | 76.560 |
| | 2 | 79.152 | 0.602 | 77.970 | 80.334 |

Factor of Time*Formative assessment, 2-year comparison

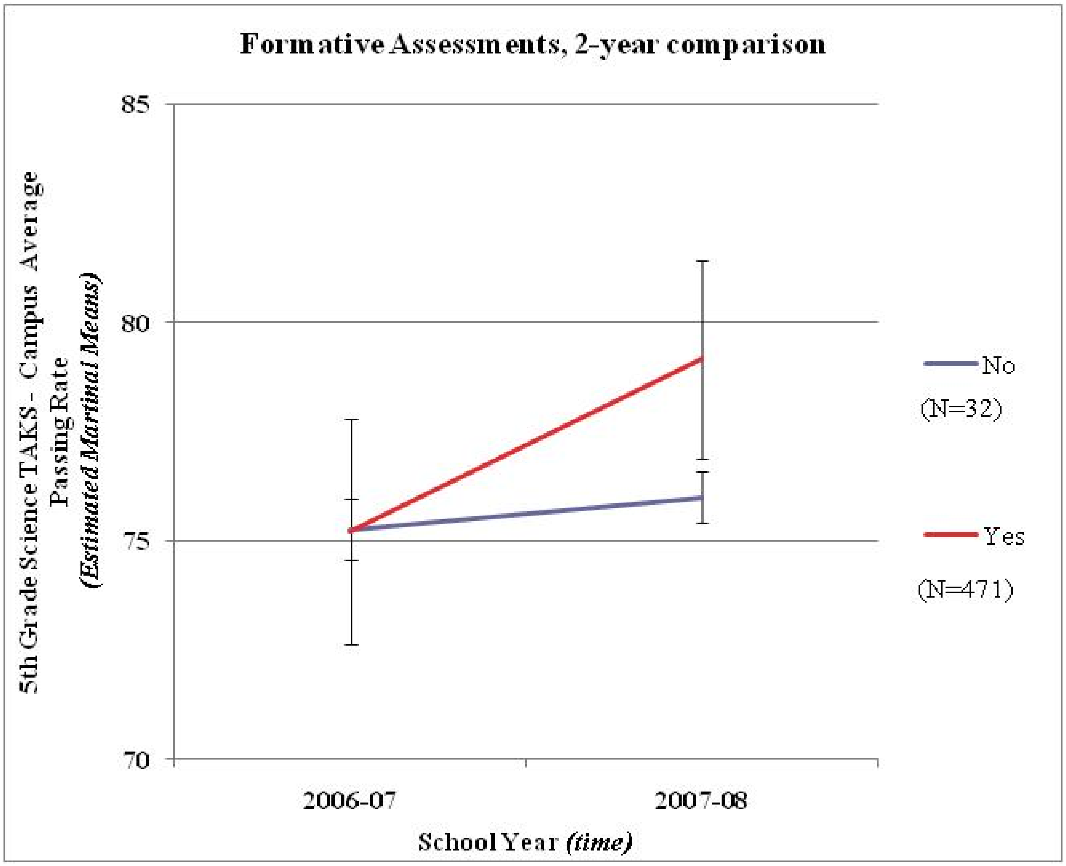



Table 4.23. Formative a

Figure 4.7. Use of formative assessment, 2-year comparison

*Summary of the use of formative assessments, 2-year comparison:*

Based on this data set, predicting the improvement of 5th grade science TAKS scores when examining the use of the formative assessments may be possible. Closer examination of the 2-year period of 2006-2007 and 2007-2008 indicates significant potential for predicting 5th grade science TAKS scores over time. The Tests of Within-Subjects Effect Factor's Time and Formative Assessments over time may depend on the use of formative assessments for increasing student learning ($p = 0.099$). This interaction may demonstrate that Time*Formative Assessments has potential influence on 5th grade science TAKS scores over time. The current use of formative assessments to improve student learning needs to be examined further to confirm whether this 2-year trend continues to be a positive predictor for improving student learning, and ultimately improving 5th grade science TAKS scores.

5) The use of curriculum-embedded assessment tests to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of curriculum-embedded assessment tests to improve student learning with the Tests of Within-Subjects Effect as the Factor of Time, $F(2.624, 1314.723) = 23.755$, $p< 0.05$, verifying time is significant. The factor of curriculum-embedded assessment tests through the Tests of Between-Subjects Effect <u>was not</u> significant: $F(2.624, 1314.723) = 1.378$, $p = 0.250$. The Tests of Within-Subjects Effect's relationship between the factor of Time*Curriculum-embedded Assessment Tests, $F(1, 501) = 0.968$, $p = 0.326$, the interaction <u>was not</u> significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.624 | 23.755 | 0.000 |

| | | | | |
|---|---|---|---|---|
| time*Curr_Embed_Assess_ Tests | Huynh-Feldt | 2.624 | 1.378 | 0.250 |
| Error (time) | Huynh-Feldt | 1314.723 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| Curr_Embed_Assess_Tests | 1 | 0.968 | 0.326 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.24. Curriculum-embedded assessment tests - Tests of Within-Subjects Effect and Between-Subjects Effect

| | | | 95% Confidence Interval | |
|---|---|---|---|---|
| **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| 1 | 60.150 | 2.735 | 54.776 | 65.523 |
| 2 | 69.479 | 2.406 | 64.751 | 74.206 |
| 3 | 73.711 | 2.282 | 69.227 | 78.194 |
| 4 | 75.813 | 2.004 | 71.876 | 79.750 |

Factor of Time - Estimate

| | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|
| **Curr_Embed_ Assess_Tests** | **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| No | 1 | 60.273 | 5.410 | 49.644 | 70.901 |
| | 2 | 66.000 | 4.759 | 56.649 | 75.351 |
| | 3 | 72.273 | 4.514 | 63.404 | 81.142 |
| | 4 | 72.636 | 3.963 | 64.849 | 80.423 |
| Yes | 1 | 60.026 | 0.809 | 58.437 | 61.616 |
| | 2 | 72.957 | 0.712 | 71.559 | 74.355 |
| | 3 | 75.148 | 0.675 | 73.822 | 76.475 |
| | 4 | 78.990 | 0.593 | 77.825 | 80.154 |

Factor of Time*Curriculum-embedded Assessment Tests

Table 4.25. Curriculum-embedded assessment tests - Estimated Marginal Means

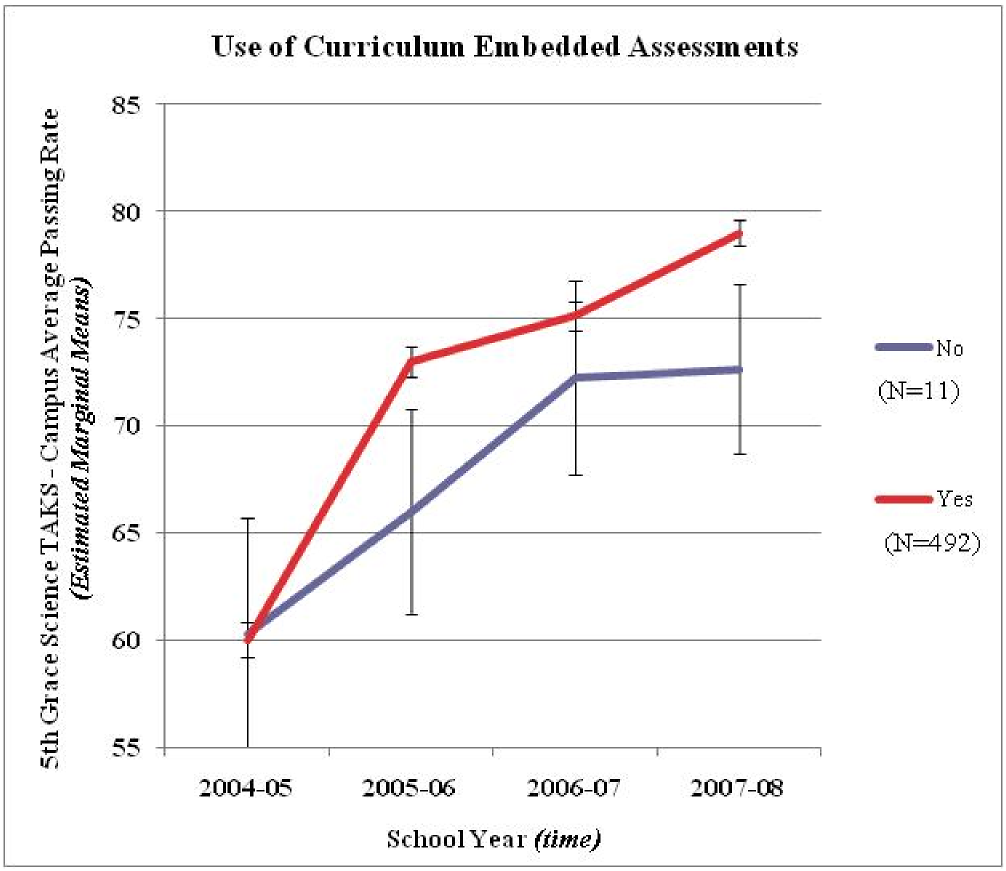



Figure 4.8. Use of Curriculum-embedded assessments to improve student learning

*Summary of the use of curriculum-embedded assessment tests:*

Based on this data set, predicting the improvement of 5th grade science TAKS scores when examining the use of curriculum-embedded assessment tests may not be possible. Time is a significant factor, but the relationship between curriculum-embedded assessment tests and interaction was not significant (p = 0.250). The change over time noticed for TAKS scores did not require the implementation of the use of curriculum-embedded assessment tests to improve student learning. The only event that occurred is that something did happen to TAKS scores over time.

6) The use of Nationally-normed Tests (e.g., ITBS) for improving student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the use of nationally-normed tests to improve student learning with the factor of Time, $F(2.624, 1312.652) = 382.478$, $p< 0.05$, time is significant. The Tests of Between-Subjects Effect's factor of nationally-normed tests was not significant: $F(1, 501) = 2.740$, $p= 0.098$. The Tests of Within-Subjects Effect's relationship between the factor of Time*Nationally-normed tests, $F(2.624, 1312.652) = 2.116$, $p= 0.105$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.624 | 382.478 | 0.000 |
| time*Nation_normed_ tests | Huynh-Feldt | 2.624 | 2.116 | 0.105 |
| Error(time) | Huynh-Feldt | 1314.652 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Nation_normed_tests | 1 | 2.740 | 0.098 |
| Error | 501 | | |

Tests of Between-Subjects Effect

Table 4.26. Nationally-normed tests - Tests of Within-Subjects Effect and Between-Subjects Effect

| **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 59.816 | 0.806 | 58.233 | 61.399 |

| | | | | |
|---|---|---|---|---|
| 2 | 72.588 | 0.710 | 71.194 | 73.983 |
| 3 | 74.979 | 0.674 | 73.655 | 76.304 |
| 4 | 78.816 | 0.594 | 77.649 | 79.982 |

Factor of Time - Estimates

| **Nation_normed _tests** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 61.302 | 1.054 | 59.232 | 63.372 |
| | 2 | 74.083 | 0.928 | 72.260 | 75.907 |
| | 3 | 75.712 | 0.882 | 73.980 | 77.444 |
| | 4 | 79.059 | 0.776 | 77.534 | 80.584 |
| Yes | 1 | 58.330 | 1.219 | 55.934 | 60.726 |
| | 2 | 71.093 | 1.074 | 68.983 | 73.203 |
| | 3 | 74.247 | 1.020 | 72.242 | 76.251 |
| | 4 | 78.572 | 0.899 | 76.807 | 80.338 |

Factor of Time*Nationally-normed tests

Table 4.27. Nationally-normed tests - Estimated Marginal Means

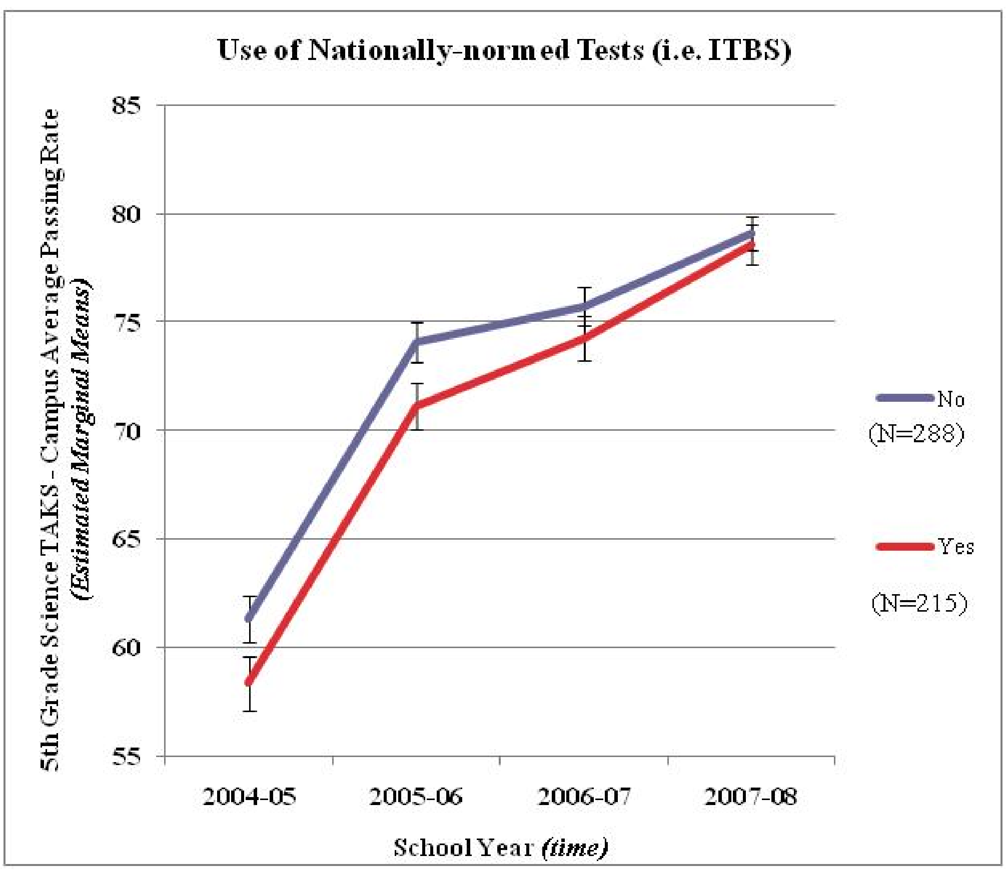


Figure 4.9. Use of Nationally-normed tests

*Summary of the use of Nationally-normed tests:*

Based on this data set, the possibility to predict the improvement of 5th grade science TAKS scores when examining the use of the nationally-normed tests does not have any potential for prediction. The interaction of Time*Nationally-normed Tests may depend on the use of nationally-normed tests such as the ITBS for increasing student learning. The current use of nationally-normed tests to improve student learning needs to be examined further to determine whether it is a positive predictor for improving student learning, and ultimately improving 5th grade science TAKS scores over time.

Additionally, this data may demonstrate that *teaching to the test* might not be the right approach to improving student learning. As revealed here, the elementary campuses that do not use nationally-normed tests for improving student learning show no significance over time for improving 5th grade science TAKS scores.

### ***Summation of Selected Assessment Tool Analysis***

Overall, analysis of the selected assessment tools presents an inconclusive picture for *Research Question #2*: How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science curriculum? The interactions of time and three of the assessments (use of state mandated test assessments, use of criterion referenced assessments, and use of curriculum-embedded assessment tests) does not demonstrate any significance toward improving 5th grade science TAKS scores.

The interaction of time and one of the assessments (use of formative assessments) does demonstrate a trend moving towards positive significance for improving 5th grade science TAKS scores. When data sets are corrected with Huynh-Feldt, a positive trend approaching significance for within-subjects interactions occurs with the state mandated test assessments (e.g., TAKS).

### Analysis of Campus Administrator and Teacher Views of Using Data-Informed Decision Making

As described earlier in this analysis of survey data, the second sub-analysis of *Research Question #2* examines the relationships between 5th grade science TAKS campus-level scores, participants' experience, and their attitudes towards utilizing DIDM for improving student learning. The question asked is: *How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?*

As discussed earlier, these sub-analyses sought the viewpoints of campus administrator and teacher participants when, or if, DIDM is used for modifying teachers' practice to address or improve individual student learning. Modifying teachers' practice includes change in lesson plans, change in pedagogy, or change in their thinking about improving student learning through the application of data-informed decision-making.

1) Campus administrator view of campus faculty uses of DIDM for improving student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining campus administrators' view of the faculty use of DIDM in order to improve student learning, the Tests of Within-Subjects Effect's factor of Time, $F(2.704, 789.711) = 203.052$, $p<0.05$, time is significant. The Tests of Within-Subjects Effect's factor of the nationally-normed tests trend was not significant: $F(2.704, 789.711) = 0.798$, $p = 0.484$. The Tests of Between-Subjects Effect's relationships between the factor of Time* Nationally-normed tests, $F(1, 292) = 0.555$, $p = 0.457$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.704 | 203.052 | 0.000 |
| time*Faculty_use_DIDM | Huynh-Feldt | 2.704 | 0.798 | 0.484 |
| Error(time) | Huynh-Feldt | 789.711 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Faculty_use_DIDM | 1 | 0.555 | 0.457 |
| Error | 292 | | |

Tests of Between-Subjects Effect

Table 4.28. Faculty use of DIDM - Tests of Between-Subjects Effect and Within-Subjects Effect

| **Faculty_use_DIDM** | **Mean** | **Std. Error** | **95% Confidence Interval** Lower Bound | Upper Bound |
|---|---|---|---|---|
| No | 72.742 | 1.212 | 70.356 | 75.127 |
| Yes | 71.571 | 1.000 | 69.604 | 73.539 |

Factor of Time – Estimates

| Faculty_use _DIDM | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 62.286 | 1.585 | 59.166 | 65.406 |
| | 2 | 73.193 | 1.473 | 70.294 | 76.093 |
| | 3 | 75.983 | 1.403 | 73.222 | 78.744 |
| | 4 | 79.504 | 1.197 | 77.147 | 81.861 |
| Yes | 1 | 59.663 | 1.307 | 57.090 | 62.236 |
| | 2 | 72.337 | 1.215 | 69.946 | 74.728 |
| | 3 | 75.154 | 1.157 | 72.877 | 77.431 |
| | 4 | 79.131 | 0.987 | 77.188 | 81.075 |

Factor of Time*Faculty_Use_DIDM

Table 4.29. Faculty use of DIDM - Estimated Marginal Means

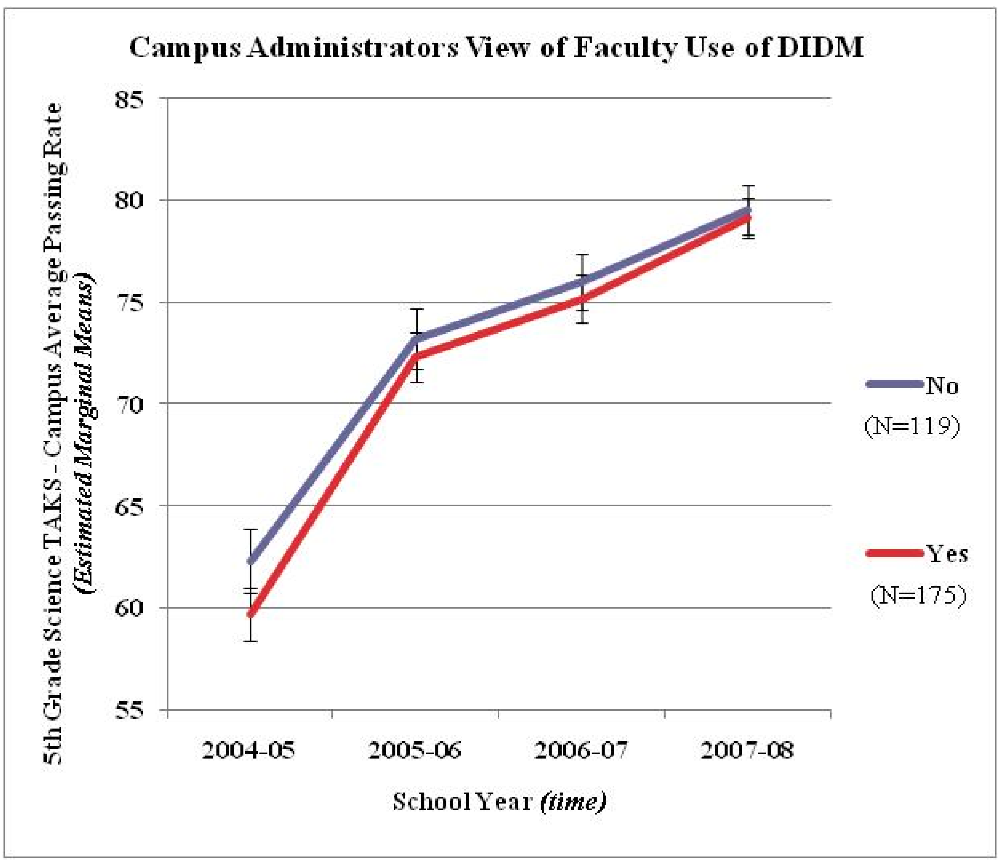



Figure 4.10. Campus Administrators' view of faculty use of DIDM for improving student learning

*Summary of the campus administrators' view of faculty use of DIDM:*

Based on this data set, the interaction of Time and campus administrators' view of Faculty use of DIDM in order to improve student learning <u>was not</u> significant. Time is significant; however, the Tests of Within-Subject Effect's interaction of Time*Campus administrators' view of faculty use of DIDM <u>was not</u> significant ($p = 0.484$) on 5$^{th}$ grade science TAKS scores over time. The Tests of Between-Subjects Effect's of campus administrators' view of faculty use of DIDM was not significant ($p = 0.457$). From this data, the change over time noticed for TAKS scores <u>did not depend</u> on the campus administrator view of campus faculty implementation of DIDM. The only event observed was that something happened to 5$^{th}$ grade science TAKS scores over time. The effect of elementary campus administrator view of campus faculty use of DIDM for improving student learning in order to monitor elementary science education programs appears to have <u>no impact</u> on 5$^{th}$ grade science TAKS scores over time.

2) Campus administrator view of campus faculty uses of DIDM for improving student learning, 2-year comparison

The unique relationship between 2006-2007 and 2007-2008 necessitates a closer examination. As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining a 2-year comparison of elementary campus administrator view of campus faculty use of DIDM to improve student learning, the Tests of Within-Subjects Effect's factor of Time, $F(1.000, 300.000) = 34.994$, $p< 0.05$, time continues to demonstrate significance at the .05 level. The Tests of Between-Subjects Effect's factor of campus administrator view of campus faculty use of DIDM, $F(1.000, 300.000) = 0.097$, $p = 0.756$, this view continues to demonstrate <u>no</u> significance. Also, the Tests of Within-Subjects Effect's relationship between the factor of Time*Campus administrator view of campus faculty use of DIDM, F(1, 300) = 0.183, p =0.669, the relationship showed <u>no</u> significance. The potential of change over time noticed earlier for 5th grade science TAKS scores <u>did not depend</u> on the campus administrator view of campus faculty use of DIDM.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 34.994 | 0.000 |
| time * Faculty_use_DIDM | Huynh-Feldt | 1.000 | 0.097 | 0.756 |
| Error(time) | Huynh-Feldt | 300.000 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Faculty_use_ DIDM | 1 | 0.183 | 0.669 |
| Error | 300 | | |

Tests of Between-Subjects Effect

Table 4.30. Faculty use DIDM, 2-year -Tests of Between-Subjects Effect and Within-Subjects Effect

| | | | **95% Confidence Interval** | |
|---|---|---|---|---|
| **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| 1 | 75.794 | 0.892 | 74.038 | 77.550 |
| 2 | 79.510 | 0.760 | 78.013 | 81.006 |

Factor of Time – Estimate

| | | | | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| **Faculty_use _DIDM** | **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| No | 1 | 76.220 | 1.374 | 73.516 | 78.923 |
| | 2 | 79.740 | 1.171 | 77.435 | 82.044 |
| Yes | 1 | 75.369 | 1.139 | 73.127 | 77.610 |
| | 2 | 79.279 | 0.971 | 77.369 | 81.190 |

Factor of Time*Faculty Use DIDM

Table 4.31. Faculty use DIDM, 2-year -Estimated Marginal Means

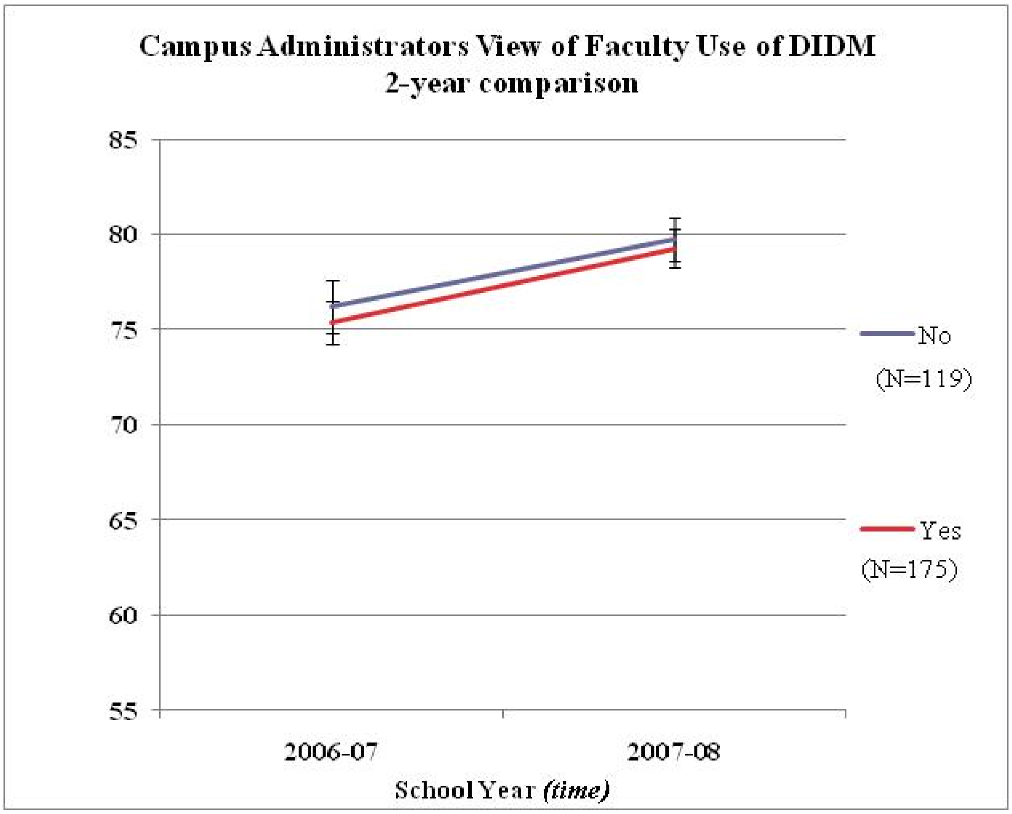



Figure 4.11. Campus Administrators' view of faculty use of DIDM, 2-year comparison

*Summary of the campus administrators' view of faculty use of DIDM for 2-year comparison:*

The closer examination regarding the impact of an elementary campus administrator view of campus faculty use of DIDM for improving student learning in order to monitor elementary science education programs appears to have no impact over time on

5th grade science TAKS scores. Furthermore, the elementary campus administrator view of campus faculty use of DIDM does not demonstrate significance over time to improving 5th grade science TAKS scores.

3) Teachers' view of using DIDM to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the teachers' view of using DIDM to improve student learning, the Tests Within-Subjects Effect's factor of Time, $F(2.519, 634.777) = 176.563$, $p<0.05$, time is significant. The factor of teachers' view of using DIDM to improve student learning was not significant: $F(1, 252) = 0.447$, $p = 0.504$. The Tests Between-Subjects Effect's relationship of the factor of Time*Teachers' view of using DIDM to improve student learning, $F(2.519, 634.777) = 2.624$, **$p = 0.060$,** the interaction shows an upward sloping trend.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.519 | 176.563 | 0.000 |
| time * Use_DIDM_Improve_Tchg | Huynh-Feldt | 2.519 | 2.624 | **0.060** |
| Error(time) | Huynh-Feldt | 634.777 | | |

Tests Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Use_DIDM_Improve_Tchg | 1 | 0.447 | 0.504 |
| Error | 252 | | |

Tests Between-Subjects Effect

Table 4.32. Teachers use DIDM to improve teaching - Tests Within-Subjects Effect and Within-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 58.409 | 1.358 | 55.735 | 61.084 |
| 2 | 72.438 | 1.154 | 70.164 | 74.711 |
| 3 | 74.795 | 1.055 | 72.718 | 76.872 |
| 4 | 79.351 | 0.975 | 77.430 | 81.272 |

Factor of Time – Estimates

| Use_DIDM_Improve_Tchg | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 57.133 | 2.373 | 52.459 | 61.808 |
| | 2 | 70.983 | 2.018 | 67.010 | 74.957 |
| | 3 | 73.950 | 1.843 | 70.320 | 77.580 |
| | 4 | 80.300 | 1.705 | 76.942 | 83.658 |
| Yes | 1 | 59.686 | 1.320 | 57.086 | 62.285 |
| | 2 | 73.892 | 1.122 | 71.682 | 76.101 |
| | 3 | 75.639 | 1.025 | 73.620 | 77.658 |
| | 4 | 78.402 | 0.948 | 76.535 | 80.269 |

Factor of Time*Use DIDM to Improve Teaching

Table 4.33. Teachers use DIDM to improve teaching - Estimated Marginal Means

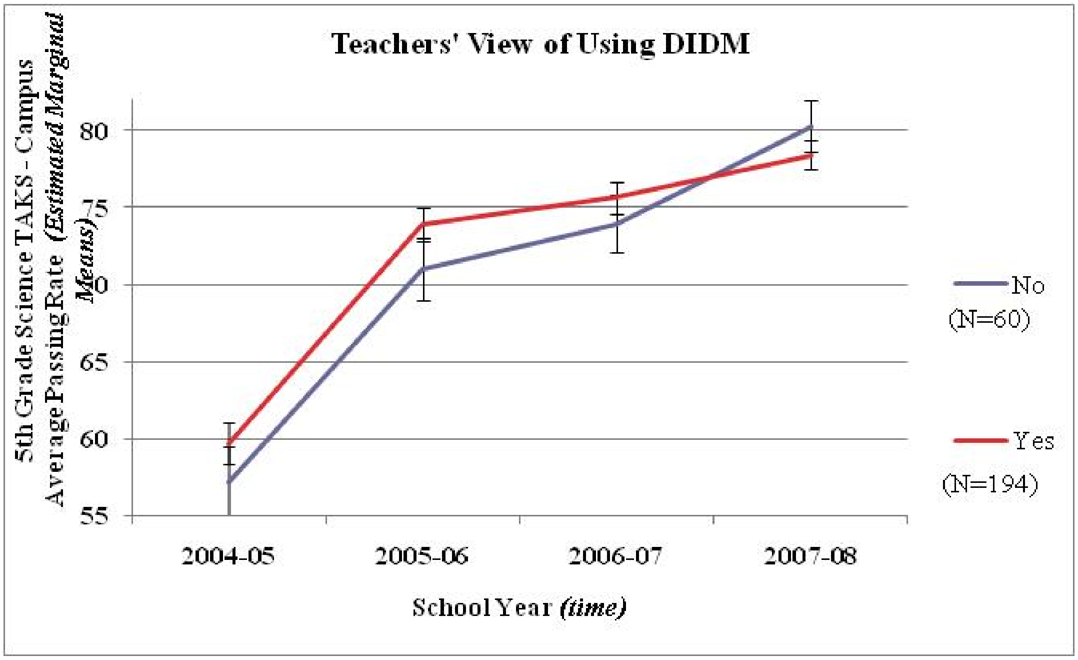



Figure 4.12. Teachers' use of using DIDM to improve student learning

*Summary of the Teachers' view of using DIDM to improve student learning:*

Based on this data set, the teachers' view of using DIDM for improving student learning is significant. Time is significant, and the interaction of Time and Teachers' view of using DIDM for improving student learning demonstrates an upward sloping trend over time on 5$^{th}$ grade science TAKS scores (**p=0.060**). The change noticed over time for TAKS scores may depend on the teachers' view of using DIDM for improving student learning.

The only event observed is that something happened to 5$^{th}$ grade science TAKS scores over time. The impact of teachers' view of using DIDM for improving student learning had an upward sloping trend over time regarding 5$^{th}$ grade science TAKS scores. The beliefs expressed by both elementary campus administrators and teachers overall are significant in their compatibility: using DIDM for improving student learning appears to demonstrate an upward sloping trend, as measured by 5$^{th}$ grade science TAKS scores.

4) Teachers' view of using DIDM to modify their lessons plans to improve student learning of TEKS

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the teachers' view of using DIDM in order to improve student learning of TEKS (e.g., Texas Essential Knowledge and Skills, state level established educational objectives), the Tests Within-Subjects Effect's factor of Time, $F(2.746, 788.222) = 42.166$, $p<0.05$, time is significant. The Tests of Between-Subjects Effect's factor of teachers' view of using DIDM to improve student learning of TEKS is significant: $F(1, 287) = 3.862$, **p = 0.050**. The Tests of Within-Subjects Effect's of the relationship between the Factor of Time*Teachers' view of using DIDM to improve student learning of TEKS, $F(2.746, 788.222) = 0.632$, $p = 0.581$, the relationship was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.746 | 42.166 | 0.000 |
| time*Impact_tchr_lessons_St_lrng_ TEKS | Huynh-Feldt | 2.746 | 0.632 | 0.581 |
| Error(time) | Huynh-Feldt | 788.222 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Impact_tchr_lessons_St_lrng_ TEKS | 1 | 3.862 | **0.050** |
| Error | 287 | | |

Tests of Between-Subjects Effect

Table 4.34. Impact of Teachers lessons on Student Learning TEKS - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 58.987 | 2.054 | 54.945 | 63.029 |
| 2 | 70.064 | 1.911 | 66.302 | 73.826 |
| 3 | 72.533 | 1.826 | 68.940 | 76.127 |
| 4 | 75.549 | 1.539 | 72.520 | 78.579 |

Factor of Time – Estimates

| Impact_tchr_lessons_St_lrng_TEKS | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 57.000 | 3.970 | 49.186 | 64.814 |
| | 2 | 67.105 | 3.695 | 59.833 | 74.378 |
| | 3 | 69.263 | 3.530 | 62.316 | 76.210 |
| | 4 | 71.421 | 2.976 | 65.564 | 77.278 |
| Yes | 1 | 60.974 | 1.053 | 58.901 | 63.047 |
| | 2 | 73.022 | 0.980 | 71.093 | 74.951 |
| | 3 | 75.804 | 0.936 | 73.961 | 77.647 |
| | 4 | 79.678 | 0.789 | 78.124 | 81.231 |

Factor of Time*Impact Teacher Lessons on Student Learning of TEKS

Table 4.35. Impact Teacher lessons on student learning of TEKS - Estimated Marginal Means

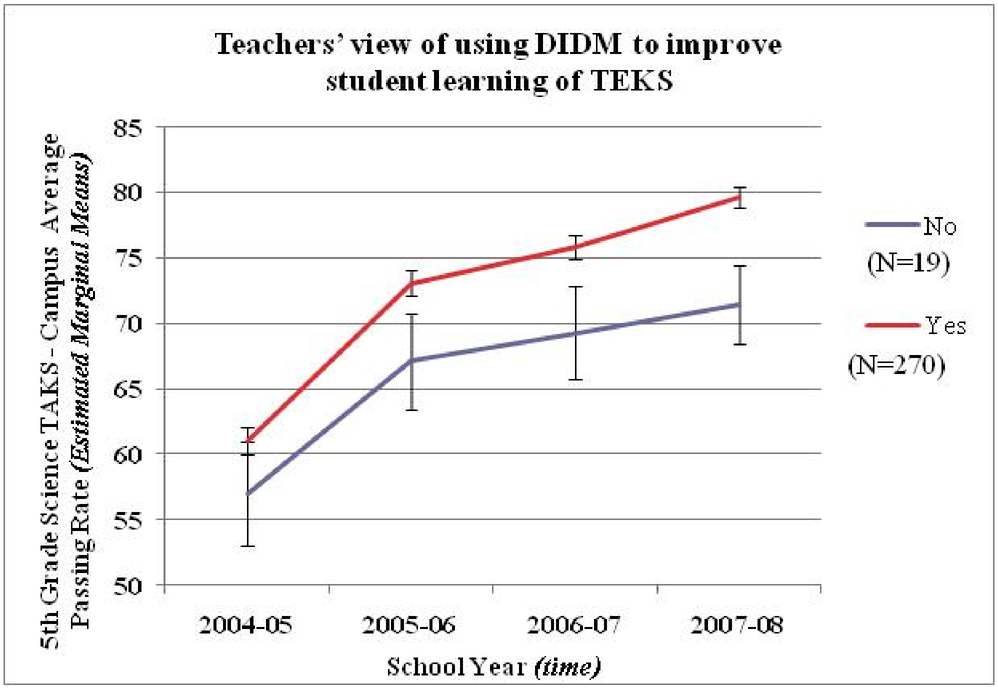



Figure 4.13. Teachers' view of using DIDM to improve student learning of TEKS

*Summary of the Teachers' view of using DIDM to improve student learning of TEKS:*

Time is significant, and the interaction of Time*Teachers' view for using DIDM to modify their lesson plans in order to improve student learning of TEKS is significant (**p = 0.050**) for Tests of Between-Subjects Effect's. However, the Tests of Within-Subjects Effect (p = 0.581) was not significant.

The change over time noticed for TAKS scores could be influenced by teachers' view of using DIDM to modify their lesson plans for improving student learning of TEKS. The significance of this is there could be a positive result when elementary teachers focus on the state standards (TEKS) for teaching science overall, rather than to rely only on TAKS scores. Elementary teachers' view of using DIDM to improve student learning may be significant for improving 5$^{th}$ grade science TAKS scores over time.

5) Teachers' view of using DIDM to modify their teaching practices in order to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the teachers' view of using DIDM to modify their teaching practices in order to improve student learning, the Tests Within-Subjects Effect's factor of Time, $F(2.519, 634.777) = 176.563$, $p<0.05$, time is significant. The Tests of Within-Subjects Effect's factor of teachers' view of using DIDM to modify their teaching practices in order to improve student learning was not significant: $F(1, 252) = 0.447$, $p = 0.504$. The Tests of Between-Subjects Effect's relationship of the Factor of Time*Teachers' view of using DIDM to modify their teaching practices to improve student learning, $F(2.519, 634.777) = 2.624$, **p = 0.060,** the relationship demonstrates an upward sloping trend.

| Source | | df | F | Sig. |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.519 | 176.563 | **0.000** |
| time*Use_DIDM_Improve_ Tchg | Huynh-Feldt | 2.519 | 2.624 | **0.060** |
| Error(time) | Huynh-Feldt | 634.777 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| Use_DIDM_Improve_ Tchg | 1 | 0.447 | 0.504 |
| Error | 252 | | |

Tests of Between-Subjects Effect

Table 4.36 Use of DIDM to improve teaching - Tests of Within-Subjects Effect and Within-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|
| 1 | 58.409 | 1.358 | 55.735 | 61.084 |
| 2 | 72.438 | 1.154 | 70.164 | 74.711 |
| 3 | 74.795 | 1.055 | 72.718 | 76.872 |
| 4 | 79.351 | 0.975 | 77.430 | 81.272 |

Factor of Time – Estimate

| Use_DIDM_ Improve_Tchg_ Practice | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| No | 1 | 57.133 | 2.373 | 52.459 | 61.808 |
| | 2 | 70.983 | 2.018 | 67.010 | 74.957 |
| | 3 | 73.950 | 1.843 | 70.320 | 77.580 |
| | 4 | 80.300 | 1.705 | 76.942 | 83.658 |
| Yes | 1 | 59.686 | 1.320 | 57.086 | 62.285 |
| | 2 | 73.892 | 1.122 | 71.682 | 76.101 |
| | 3 | 75.639 | 1.025 | 73.620 | 77.658 |
| | 4 | 78.402 | 0.948 | 76.535 | 80.269 |

Factor of Time*Use DIDM to Improve Teacher Practice

Table 4.37. Use DIDM to improve teacher practice - Estimated Marginal Means

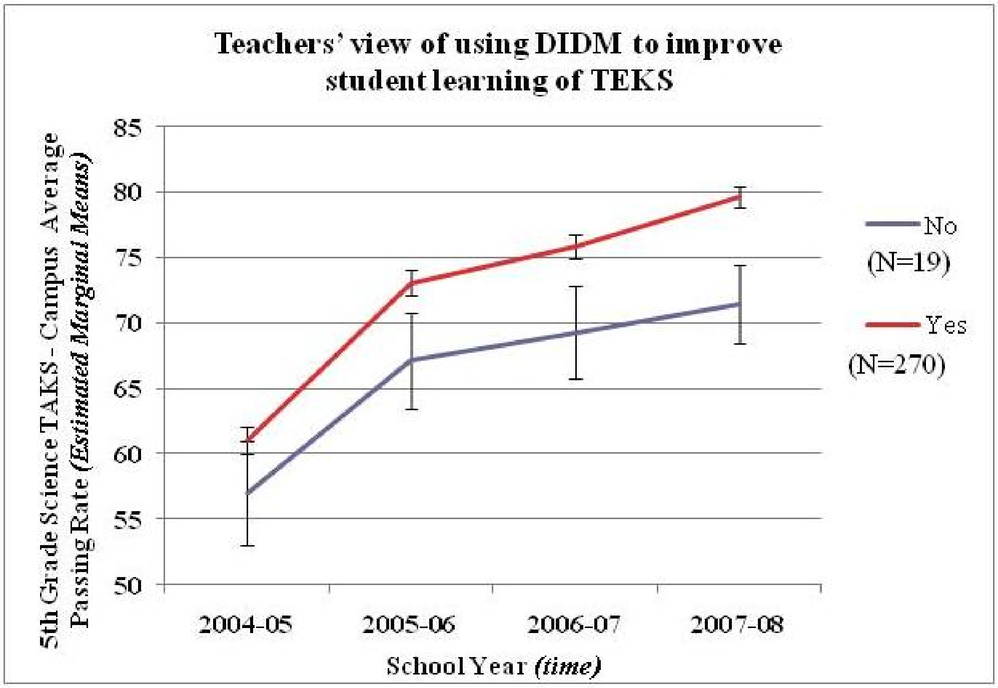



Figure 4.14. Teachers' view of using DIDM to modify their teaching practices in order to improve student learning

*Summary of the Teachers' view of using DIDM for modifying their teaching practices in order to improve student learning:*

Time is significant, and the interaction of Time*Teachers' view of using DIDM to modify their teaching practices in order to improve student learning shows an <u>upward sloping trend</u> (**p = 0.060**). The data <u>were not</u> significant for the Tests of Within-Subjects Effect (p = 0.504) for group differences.

6) Teachers' view of using DIDM to modify their teaching practices to improve student learning, 2-year comparison

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. Upon closer examination of the cross-over effect of 2006-2007 and 2007-2008, the data reveals that within the teachers' view of using DIDM to modify their teaching practices to improve student learning, the Tests Within-Subjects Effect's factor of Time, $F(1.000, 256.000) = 31.809$, $p<0.05$, time <u>is</u> significant. The Tests of Between-Subjects Effect's factor of teachers' view of using DIDM to modify their teaching practices in order to improve student learning continued to show <u>no</u> significance: $F(1, 256) = 0.098$, $p = 0.755$. However, the Tests of Within-Subjects Effect's relationship between the factor of Time*Teachers' view of using DIDM to modify their teaching practices to improve student learning, $F(1.000, 256.000) = 4.856$, **p = 0.028**, the relationship changes dramatically as <u>significant</u>.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 31.809 | **0.000** |
| time* Use_DIDM_Improve_Tchg | Huynh-Feldt | 1.000 | 4.856 | **0.028** |
| Error(time) | Huynh-Feldt | 256.000 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Use_DIDM_Improve_Tchg | 1 | 0.098 | 0.755 |
| Error | 256 | | |

Tests of Between-Subjects Effect

Table 4.38. Use DIDM to improve teaching practices, 2-year - Tests of Within-Subjects Effect and Between-Subjects Effect

| | | | **95% Confidence Interval** | |
|---|---|---|---|---|
| **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| 1 | 74.619 | 1.047 | 72.557 | 76.680 |
| 2 | 79.107 | .971 | 77.195 | 81.019 |

Factor of Time – Estimate

| **Use_DIDM_ Improve_ Tchg** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 73.452 | 1.825 | 69.858 | 77.045 |
| | 2 | 79.694 | 1.693 | 76.360 | 83.027 |
| Yes | 1 | 75.786 | 1.026 | 73.765 | 77.807 |
| | 2 | 78.520 | .952 | 76.646 | 80.395 |

Factor of Time*Use DIDM to Improve Teaching Practices

Table 4.39. Use DIDM to improve teaching practices, 2-year - Estimated Marginal Means

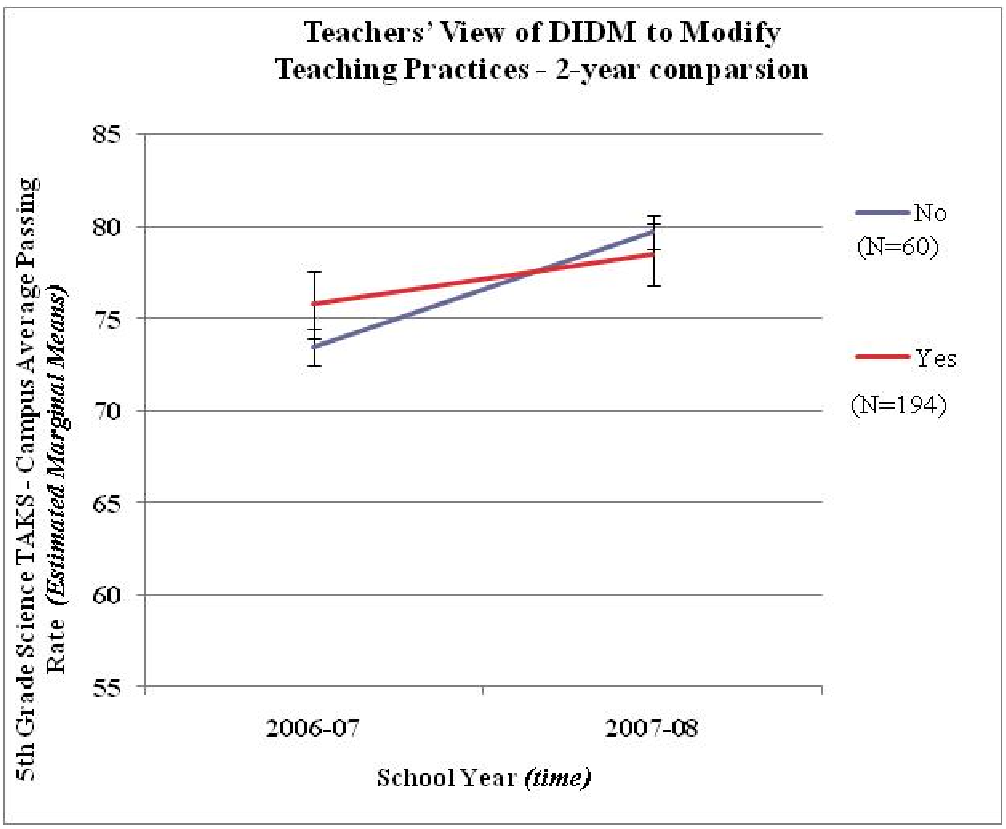



Figure 4.15. Teachers' view of DIDM to modify teaching practices, 2-year comparison

*Summary of the Teachers' view of using DIDM for modifying their teaching practices in order to improve student learning, 2 year comparison:*

Time is significant, and the interaction of Time*Teachers' view of using DIDM to modify their teaching practices in order to improve student learning is significant (**p = 0.028**). The data is significant for the Tests of Within-Subjects Effect (**p = 0.028**); however it was not significant for the Tests of Between-Subjects Effect (p = 0.775) for group differences.

There is a significant change between school years 2006-2007 and 2007-2008. This is important, as it supports the 4-year comparison of the relationship between Time* Teachers' view of using DIDM to improve their teaching practices in order to improve student learning over time.

The change over time noticed for TAKS scores could be the influence of teachers' view of using DIDM to modify their teaching practices for improving student learning. This data set correlates with teachers' view of using DIDM for modifying lesson plans in order to improve student learning of TEKS.

The impact of an elementary teachers' view of using DIDM to modify teaching practices in order to improve student learning demonstrate an upward sloping trend over time on 5th grade science TAKS scores. As such, elementary teachers' view of using DIDM to modify teaching practices in order to improve student learning could be argued as an upward sloping trend for improving 5th grade science TAKS scores.

### Summation of Campus Administrator and Teacher Views of Using Data-Informed Decision Making Analysis

Overall, the analysis of the campus administrator and teacher views of using DIDM portion of *Research Question #2*: *How are Texas elementary school campus* *administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science curriculum?* presented intriguing, yet mixed, data.

When teachers were asked about their use of DIDM in more specific uses (e.g., their view of DIDM to improve student learning of TEKS and their view of DIDM to modify teaching practices in order to improve student learning), there is dramatic change toward significance, compared to how campus administrators viewed faculty use of DIDM. Significance is found in the relationship through the interaction of time and the teachers' view of DIDM for a specific use to improve student learning. When teachers' used DIDM to modify teaching practices and influence student learning of TEKS, the data demonstrates an upward sloping trend for impacting 5th grade science TAKS scores. When data sets were corrected with Huynh-Feldt, there remains an upward sloping trend.

Finally, this data could indicate that *teaching to the test* practices may be teachers' chosen method for assisting student learning. As demonstrated in this research study, the elementary campuses that did not use DIDM for improving student learning demonstrate no significance over time in improving student learning and achievement on the 5th grade science TAKS scores.

### Data-Informed Decision Making Used for Monitoring Elementary Science

The focus of the next research question examines what factors influence a CIL's decision to hire professional elementary science educators: *Research Question #3 Do the Campus Instructional Leaders' decisions support the selection of preeminent teacher staffing arrangements to enhance student learning through teacher instruction?* Section II of both the *Texas Elementary, Middle or Intermediate Teacher Survey*™ and the *Texas Campus Administrator Survey*™ contains eight questions that specifically addresses this subject. With the exception of one question on each survey that solicited written response to the question, *"How would you define a 'highly qualified elementary science classroom teacher?"* all of the Section II questions on both surveys were identical.

1) Influence on CILs view on the selection of preeminent teacher staffing in regards to past student performance on Texas Education Agency's (TEA) standardized test, the 5th grade science TAKS

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the CIL view regarding the influence of Texas Education Agency's (TEA) 5th grade science TAKS for selecting preeminent teachers, the Tests Within-Subjects Effect's factor of Time, $F(2.631, 1423.222) = 260.521$, $p<0.05$, is significant. The Tests of Between-Subjects Effect's factor of the CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the 5th grade science TAKS demonstrates no significance: $F(1, 541) = 2.588$, $p = 0.108$. The Tests of Within-Subjects Effect's relationship between the Factor of Time*CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the 5th grade science TAKS, $F(2.631, 636.917) = 1.183$, $p= 0.313$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.631 | 260.521 | 0.000 |
| time * INFLUENCE_TEA_TAKS | Huynh-Feldt | 2.631 | 1.183 | 0.313 |
| Error(time) | Huynh-Feldt | 1423.222 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| INFLUENCE_TEA_TAKS | 1 | 2.588 | 0.108 |
| Error | 541 | | |

Tests of Between-Subjects Effect

Table 4.40. Influence of TEA's TAKS - Tests of Within-Subjects Effect and Between-Subjects Effect

| **INFLUENCE_TEA_ TAKS** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| No | 73.750 | 1.361 | 71.077 | 76.423 |
| Yes | 71.340 | 0.627 | 70.109 | 72.571 |

Factor of Time – Estimates

| **INFLUENCE_ TEA_TAKS** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 60.916 | 1.835 | 57.311 | 64.520 |
| | 2 | 76.063 | 1.627 | 72.867 | 79.259 |
| | 3 | 76.842 | 1.524 | 73.848 | 79.836 |
| | 4 | 81.179 | 1.346 | 78.535 | 83.823 |
| Yes | 1 | 59.721 | 0.845 | 58.061 | 61.381 |
| | 2 | 72.188 | 0.749 | 70.716 | 73.659 |
| | 3 | 74.929 | 0.702 | 73.550 | 76.307 |
| | 4 | 78.522 | 0.620 | 77.305 | 79.740 |

Factor of INFLUENCE_TEA_TAKS*time

Table 4.41. Influence of TEA's TAKS - Estimated Marginal Means

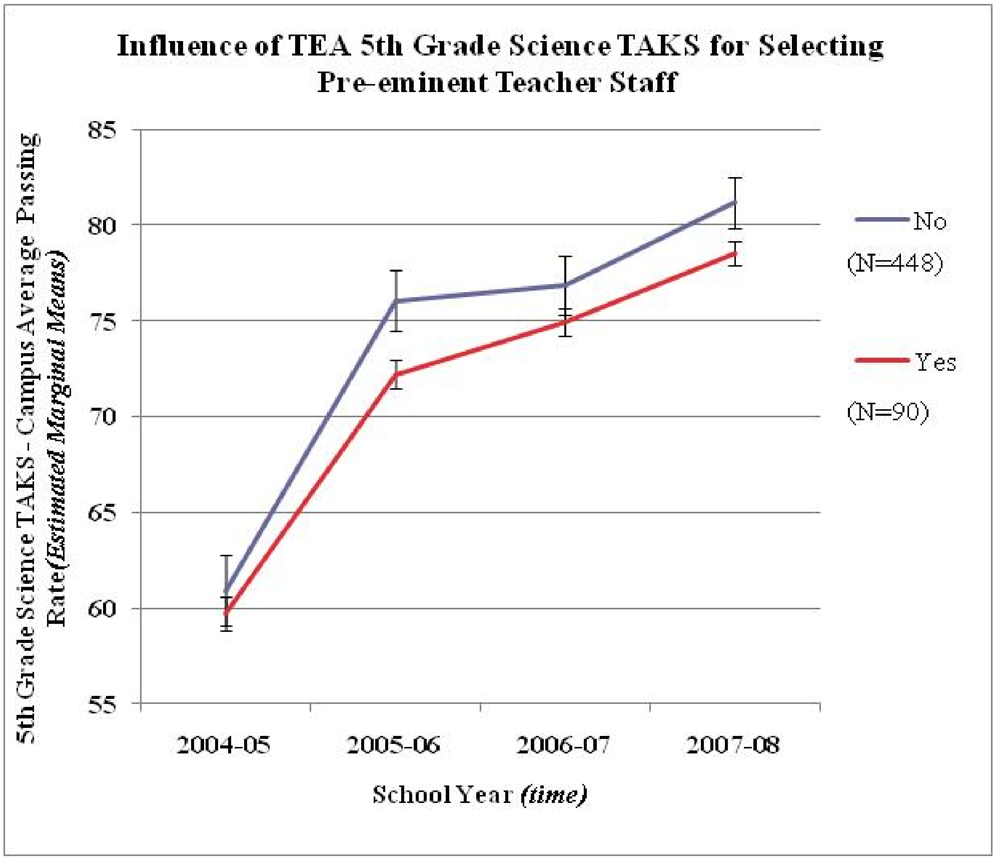



Figure 4.16. Influence of CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the $5^{th}$ grade science TAKS

*Summary of Influence of Texas Education Agency's $5^{th}$ grade science TAKS regarding the selection of preeminent teacher staffing*:

The change over time noticed for TAKS scores approaches significance and might be a factor of the CIL choice of preeminent teacher staff. The influence of TEA's TAKS for improving student learning ($p= 0.108$) shows no improvement.

An event was observed that demonstrated something happened to $5^{th}$ grade science TAKS scores over time. This effect was further examined through a 2-year comparison of 2006-2007 to 2007-2008.

2) Influence of CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, 5th grade science TAKS, 2-year comparison

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the 5th grade science TAKS as a 2-year comparison, the Tests Within-Subjects Effect's factor of Time, $F(1.000, 553.000) = 41.322$, $p < 0.05$, time is significant. The Tests of Between-Subjects Effect's factor of the CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the 5th grade science TAKS as a 2-year comparison was not significant: $F(1, 553) = 2.185$, $p = 0.140$. The Tests of Between-Subjects Effect's relationship between the Factor of Time*CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, the 5th grade science TAKS as a 2-year comparison, $F(1.000, 553.000) = 0.409$, $p = 0.523$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 41.322 | 0.000 |
| time* INFLUENCE_TEA_ TAKS | Huynh-Feldt | 1.000 | 0.409 | 0.523 |
| Error(time) | Huynh-Feldt | 553.000 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| INFLUENCE_TEA_ TAKS | 1 | 2.185 | 0.140 |
| Error | 553 | | |

Tests of Between-Subjects Effect

Table 4.42. Influence of TEA's TAKS, 2-year - Tests of Within-Subjects Effect and Between-Subjects Effect

| INFLUENCE_TEA_TAKS | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| Yes | 76.857 | 0.603 | 75.672 | 78.041 |
| No | 79.011 | 1.327 | 76.404 | 81.617 |

Factor of Time Estimates

| INFLUENCE_TEA_TAKS | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Yes | 1 | 75.080 | 0.694 | 73.718 | 76.443 |
| | 2 | 78.633 | 0.612 | 77.430 | 79.836 |
| No | 1 | 76.842 | 1.526 | 73.845 | 79.840 |
| | 2 | 81.179 | 1.348 | 78.532 | 83.826 |

Factor of Time*Influence of TEA TAKS

Table 4.43. Influence of TEA's TAKS, 2-year - Estimated Marginal Means

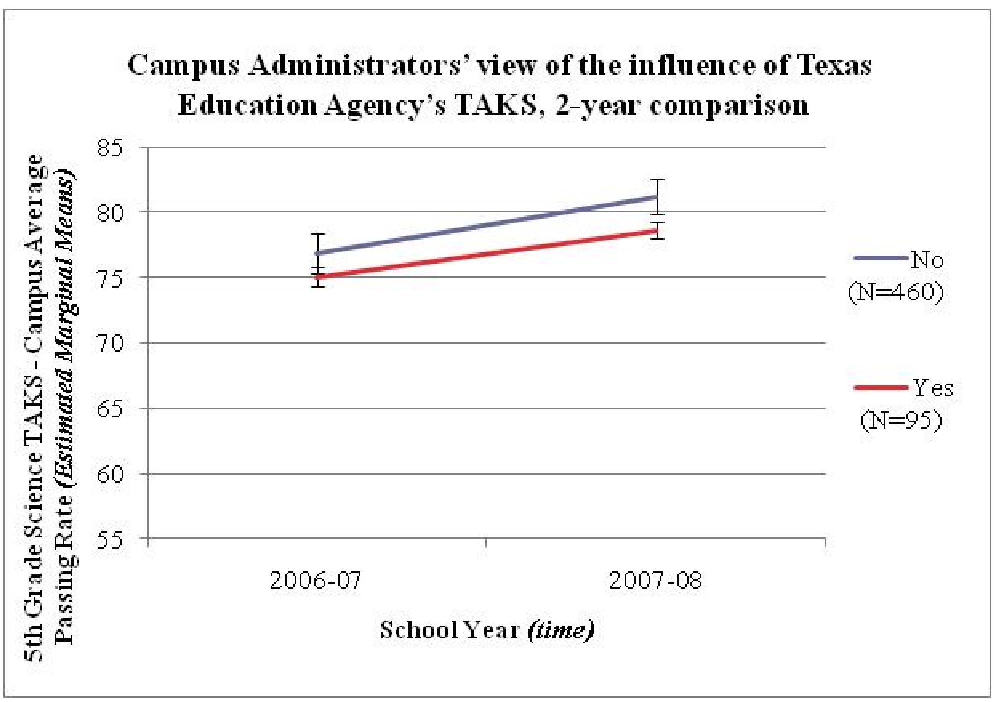


Figure 4.17. Campus Administrators' view of the influence of Texas Education Agency's TAKS, 2-year comparison

*Summary of the influence of CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test, 2-year comparison:*

Time is significant, but on closer examination the interaction between Time*Influence of CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test in order to improve student learning <u>was not</u> significant in a 2-year comparison.

The change over time noticed for TAKS scores <u>was not</u> significant to influence CILs view on the selection of preeminent teacher staffing in regards to past student performance on TEA's standardized test in order to improve student learning ($p=0.140$). An event occurred that demonstrated something does happen to 5$^{th}$ grade science TAKS scores over time.

3) The influence of the U.S. Department of Education's *NCLB* regarding CILs selection of pre-eminent teacher staffing in regards to improving student learning

As with all analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of the U.S. Department of Education's (USDoE) *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning, the Tests Within-Subjects Effect's factor of Time, $F(2.632, 1423.769) = 420.816$, $p<0.05$, time is significant. The Tests of Between-Subjects Effect's factor of the USDoE's *NCLB* influence regarding the selection of preeminent teacher staff demonstrated <u>no</u> significance: $F(1, 541) = 0.225$, $p=0.614$. The Tests of Within-Subjects Effect's relationship of the factor of Time*Influence of the USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning, F(2.632, 1423.769) = 0.337, p = 0.772, the interaction was not significant.

| Source | | df | F | Sig. |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.632 | 420.816 | 0.000 |
| time * INFLUENCE_USDoE_*NCLB* | Huynh-Feldt | 2.632 | 0.337 | 0.772 |
| Error (time) | Huynh-Feldt | 1423.769 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| INFLUENCE_USDoE_*NCLB* | 1 | 0.255 | 0.614 |
| Error | 541 | | |

Tests of Between-Subjects Effect

Table 4.44. Influence of U.S. Dept. of Ed. *NCLB* - Tests of Within-Subjects Effect and Between-Subjects Effect

| | | | 95% Confidence Interval | |
|---|---|---|---|---|
| **INFLUENCE_USDoE_*NCLB*** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| No | 71.504 | 0.765 | 70.002 | 73.007 |
| Yes | 72.084 | 0.856 | 70.402 | 73.766 |

Factor of Time Estimates

| | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|
| **INFLUENCE_USDoE_ *NCLB*** | **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| No | 1 | 59.543 | 1.029 | 57.521 | 61.565 |
| | 2 | 72.526 | 0.916 | 70.727 | 74.326 |
| | 3 | 74.907 | 0.856 | 73.227 | 76.588 |
| | 4 | 79.040 | 0.757 | 77.552 | 80.527 |
| Yes | 1 | 60.415 | 1.152 | 58.152 | 62.678 |
| | 2 | 73.290 | 1.026 | 71.276 | 75.305 |
| | 3 | 75.710 | 0.958 | 73.828 | 77.591 |
| | 4 | 78.921 | 0.848 | 77.256 | 80.586 |

Factor of INFLUENCE_USDoE_*NCLB* * time

Table 4.45. Influence of U.S. Dept. of Ed. *NCLB* - Estimated Marginal Means

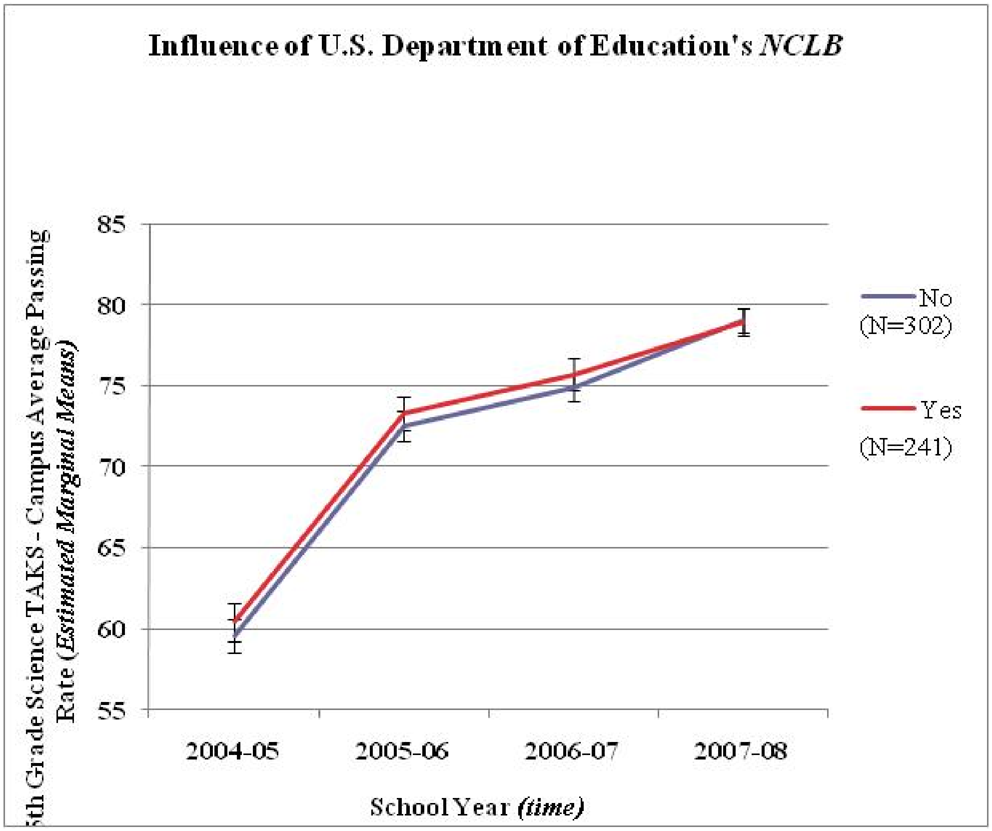



Figure 4.18. Influence of the U.S. Department of Education's *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning

*Summary of the influence of the U.S. Department of Education's NCLB regarding CILs selection of preeminent teacher staffing in regards to improving student learning:*

Time is significant, but the interaction of Time and how elementary campus administrators and teachers view the influence of the USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning was not significant.

The change over time noticed for TAKS scores does not depend on how elementary campus administrators and teachers view the influence of USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning. The only event observed was that something happened to $5^{th}$ grade science TAKS scores over time.

4) Influence of USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing in regards to improving student learning, a 2-year comparison

As with all analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of the USDoE's *NCLB* regarding the selection of preeminent teacher staff to improve student learning in a 2-year comparison, the Tests Within-Subjects Effect's factor of Time, $F(1.000, 541.000) = 59.893$, $p < 0.05$, time is significant. The factor of the influence of USDoE's *NCLB* regarding the selection of preeminent teacher staff in order to improve student learning in a 2-year comparison demonstrates no significance: $F(1, 541) = 0.094$, $p = 0.759$.

The interaction of the Factor of Time*the influence of USDoE's *NCLB* regarding the selection of preeminent teacher staff in order to improve student learning in a 2-year comparison, $F(1.000, 541.000) = 0.942$, $p=0.332$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 59.893 | 0.000 |
| time * INFLUENCE_ USDoE_*NCLB* | Huynh-Feldt | 1.000 | 0.942 | 0.332 |
| Error (time) | Huynh-Feldt | 541.000 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| INFLUENCE_USDoE_*NCLB* | 1 | 0.094 | 0.759 |
| Error | 541 | | |

Tests of Between-Subjects Effect

Table 4.46. Influence of U.S. Dept. of Ed. *NCLB*, 2-year -Tests of Within-Subjects Effect and Between-Subjects Effect

| **INFLUENCE_ USDoE_*NCLB*** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| No | 76.974 | 0.743 | 75.513 | 78.434 |
| Yes | 77.315 | 0.832 | 75.680 | 78.950 |

Factor of Time Estimates

| **INFLUENCE _USDoE_ *NCLB*** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 74.907 | 0.856 | 73.227 | 76.588 |
| | 2 | 79.040 | 0.757 | 77.552 | 80.527 |
| Yes | 1 | 75.710 | 0.958 | 73.828 | 77.591 |
| | 2 | 78.921 | 0.848 | 77.256 | 80.586 |

Factor of INFLUENCE_USDoE_*NCLB* * time

Table 4.47. Influence of U.S. Dept. of Ed. *NCLB*, 2-year - Estimated Marginal Means

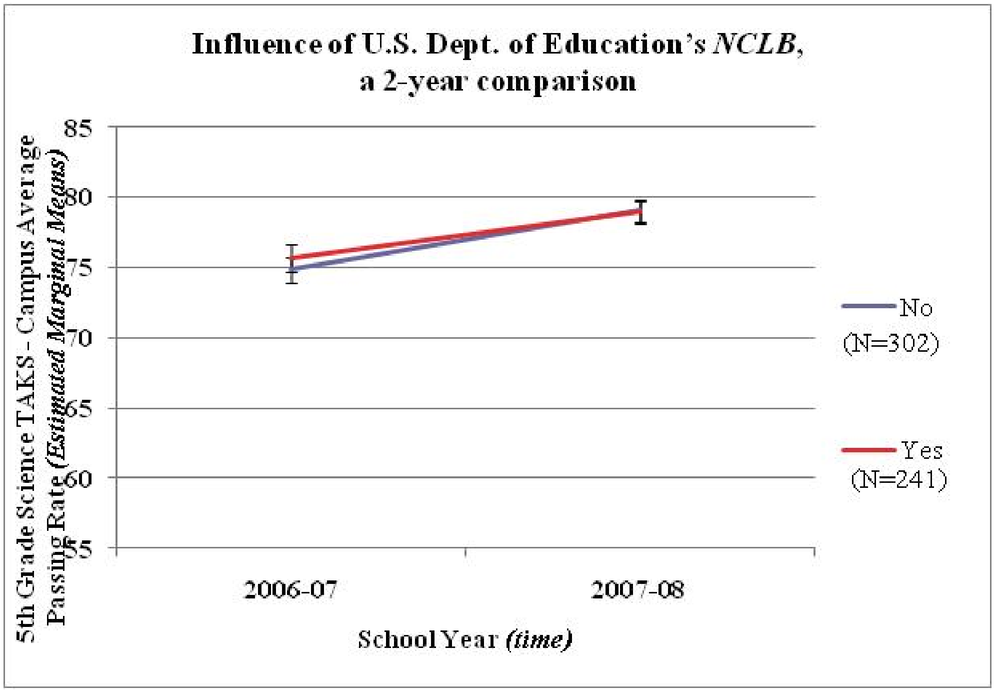



Figure 4.19. Influence of U.S. DoE's NCLB regarding CILs selection of pre-eminent teacher staff in regards to improving student learning, a 2-year comparison

*Summary of the influence of* USDoE's *NCLB regarding CILs selection of preeminent teacher staffing, 2-year comparison:*

Time is significant, but the interaction of time and how elementary campus administrators and teachers view the influence of USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing for improving student learning, in a 2-year comparison, was not significant ($p = 0.332$).

The change over time noticed for TAKS scores does not depend on how elementary campus administrators and teachers view the influence of USDoE's *NCLB* regarding CILs selection of preeminent teacher staffing for improving student learning for a 2-year comparison. The only event observed was that something happened to 5$^{th}$ grade science TAKS scores over time.

5) The influence of School Boards on CILs' decisions regarding the selection of preeminent teacher staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning, the Tests of Within-Subjects Effect's factor of Time, $F(2.632, 1423.963) = 427.327$, $p < 0.05$, time is significant. The Tests of Between-Subjects Effect's factor regarding the influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning demonstrates no significance: $F(1, 541) = 0.350$, $p = 0.555$. The Tests of Within-Subjects Effect's relationship between the factor of Time*Influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning, $F(2.632, 1423.963) = 0.014$, $p = 0.995$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.632 | 427.327 | 0.000 |
| time*INFLUENCE_Sch_Bd | Huynh-Feldt | 2.632 | 0.014 | 0.995 |
| Error(time) | Huynh-Feldt | 1423.963 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| INFLUENCE_Sch_Bd | 1 | 0.350 | 0.555 |
| Error | 541 | | |

Tests of Between-Subjects Effect

Table 4.48. Influence of School Boards - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|
| 1 | 59.919 | 0.768 | 58.410 | 61.427 |
| 2 | 72.856 | 0.684 | 71.513 | 74.200 |
| 3 | 75.251 | 0.638 | 73.997 | 76.505 |
| 4 | 78.978 | 0.565 | 77.868 | 80.087 |

Factor of Time Estimates

| INFLUENCE_Sch_Bd | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| No | 1 | 60.282 | 1.069 | 58.182 | 62.382 |
| | 2 | 73.146 | 0.952 | 71.277 | 75.016 |
| | 3 | 75.643 | 0.889 | 73.897 | 77.388 |
| | 4 | 79.282 | 0.786 | 77.738 | 80.826 |
| Yes | 1 | 59.555 | 1.103 | 57.388 | 61.722 |
| | 2 | 72.567 | 0.982 | 70.638 | 74.495 |
| | 3 | 74.859 | 0.917 | 73.058 | 76.660 |
| | 4 | 78.673 | 0.811 | 77.080 | 80.266 |

Factor of Time*INFLUENCE_Sch_Brds

Table 4.49. Influence of School Boards - Estimated Marginal Means

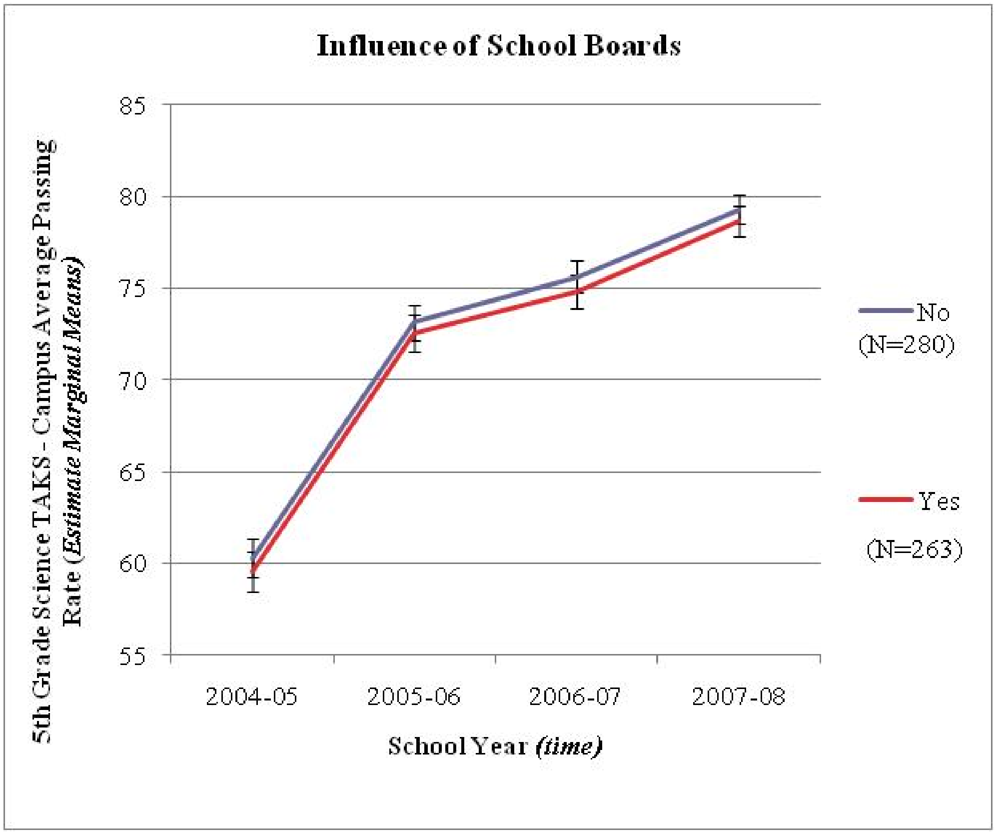



Figure 4.20. Influence of school boards on CIL decisions regarding the selection of preeminent teacher staff

*Summary of the influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning:*

Time is significant, but the interaction of Time and how elementary campus administrators and teachers view the influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning was <u>not</u> significant (p= 0.995).

The change over time noticed for TAKS scores <u>does not</u> depend on how elementary campus administrators and teachers viewed the influence of School Boards on CIL decisions regarding the selection of preeminent teacher staff to improve student learning.

The only event that occurred was that something happened to 5th grade science TAKS scores over time.

6) The influence of Teachers' Input on CILs' decisions for selecting pre-eminent teacher staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of Teachers' Input on CIL decisions for selecting pre-eminent teacher staff to improve student learning, the Tests Within-Subjects Effect's factor of Time, $F(2.630, 1412.413) = 414.483$, $p<0.05$, time is significant. The Test of Between-Subjects Effect's factor of Teachers' Input on CIL decisions for selecting pre-eminent teacher staff to improve student learning is significant: $F(1, 537) = 5.648$, **$p=0.018$**. The Test of Within-Subjects Effect's relationship between the factor of Time*Teachers' Input on CIL decisions for selecting pre-eminent teacher staff to improve student learning, $F(2.630, 1412.413) = 1.070$, $p= 0.356$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.630 | 414.483 | 0.000 |
| time* INFLUENCE_ Tchrs_input | Huynh-Feldt | 2.630 | 1.070 | 0.356 |
| Error(time) | Huynh-Feldt | 1412.413 | | |

Test of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| INFLUENCE_Tchrs _input | 1 | 5.648 | **0.018** |
| Error | 537 | | |

Test of Between-Subjects Effect

Table 4.50. Influence of Teachers' Input - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|
| 1 | 59.793 | 0.778 | 58.265 | 61.320 |
| 2 | 72.573 | 0.689 | 71.219 | 73.927 |
| 3 | 75.085 | 0.646 | 73.817 | 76.354 |
| 4 | 78.846 | 0.571 | 77.724 | 79.968 |

Factor of Time Estimates

| INFLUENCE_Tchrs_input | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| No | 1 | 61.055 | 1.020 | 59.051 | 63.060 |
| | 2 | 74.547 | 0.904 | 72.771 | 76.324 |
| | 3 | 76.326 | 0.847 | 74.661 | 77.990 |
| | 4 | 79.847 | 0.749 | 78.375 | 81.319 |
| Yes | 1 | 58.530 | 1.174 | 56.224 | 60.836 |
| | 2 | 70.599 | 1.040 | 68.556 | 72.643 |
| | 3 | 73.845 | 0.975 | 71.930 | 75.760 |
| | 4 | 77.845 | 0.862 | 76.152 | 79.538 |

Factor of INFLUENCE_Tchrs_input * time

Table 4.51. Influence of Teachers input - Estimated Marginal Means

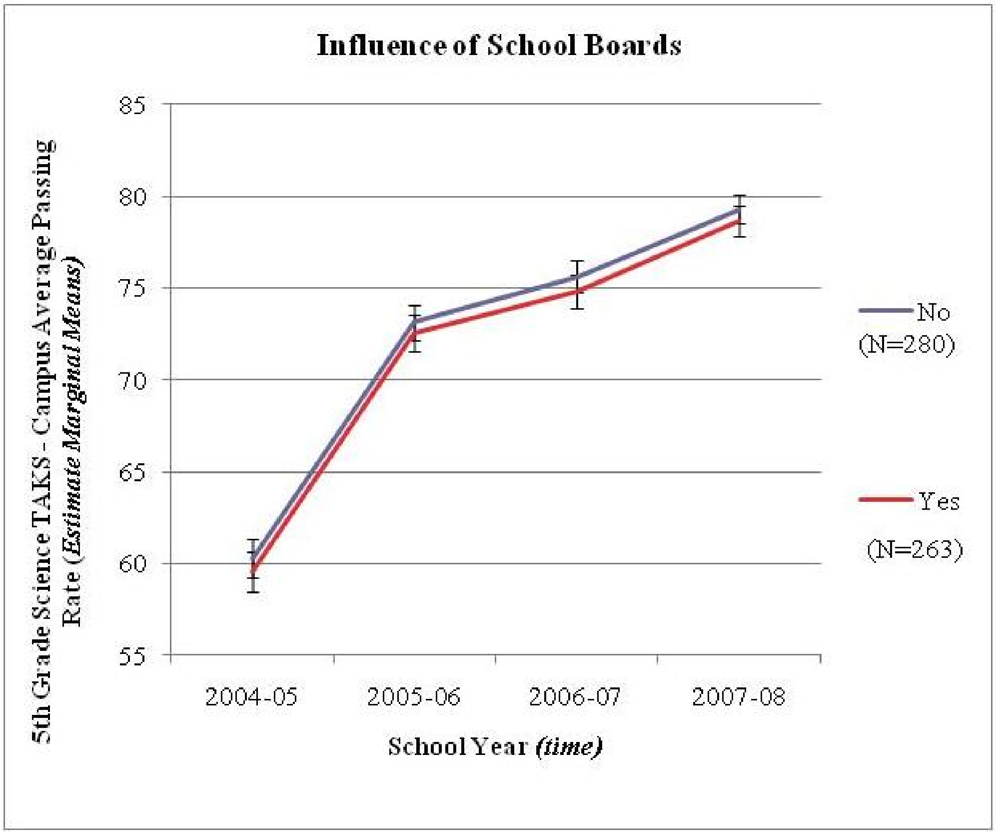



Figure 4.21. Influence of Teachers' input on CILs decisions for selecting pre-eminent teacher staff

*Summary of the influence of Teachers' Input on CILs' decisions for selecting preeminent teacher staff to improve student learning:*

Time is significant, and the Test of Between-Subjects Effect regarding how elementary campus administrators and teachers view the influence of Teachers' Input on CIL decisions for selecting pre-eminent teacher staff to improve student learning <u>is significant</u> (**p= 0.018**). However, the interaction between Time and Teachers' Input on CIL decisions for selecting preeminent teacher staff to improve student learning <u>was not</u> significant. The change over time noticed for TAKS scores <u>does not depend</u> on how elementary campus administrators and teachers view the influence of Teachers' Input on CIL decisions for selecting pre-eminent teacher staff to improve student learning. The only event observed was that something happened to 5th grade science TAKS scores over time.

7) The influence of Teacher Tenure on CILs' decisions regarding the selection of pre-eminent staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of Teacher Tenure on CIL decisions regarding the selection of pre-eminent staff to improve student learning, the Tests Within-Subjects Effect's factor of Time, $F(2.635, 1428.388)= 93.783$, $p< 0.05$, is significant. The Tests of Between-Subjects Effect's on the factor of influence of Teacher Tenure on CIL decisions regarding the selection of pre-eminent staff to improve student learning demonstrates no significance: $F(1, 542) = 0.008$, $p = 0.930$. The Tests of Within-Subjects Effect's relationship between the factor of Time*Influence of Teacher Tenure on CIL decisions regarding the selection of preeminent staff to improve student learning, $F(2.635, 1428.388) = 1.435$, $p = 0.234$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| Time | Huynh-Feldt | 2.635 | 93.783 | 0.000 |
| time * Influence_Tenure | Huynh-Feldt | 2.635 | 1.435 | 0.234 |
| Error(time) | Huynh-Feldt | 1428.388 | | |

Test of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Influence_Tenure | 1 | 0.008 | 0.930 |
| Error | 542 | | |

Test of Between-Subjects Effect

Table 4.52. Influence of Teachers' Tenure - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 58.684 | 1.830 | 55.089 | 62.279 |
| 2 | 72.862 | 1.630 | 69.660 | 76.065 |
| 3 | 75.114 | 1.522 | 72.124 | 78.104 |
| 4 | 80.217 | 1.344 | 77.576 | 82.858 |

Factor of Time – Estimate

| Influence_ Tenure | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 57.200 | 3.575 | 50.177 | 64.223 |
| | 2 | 72.800 | 3.184 | 66.545 | 79.055 |
| | 3 | 74.880 | 2.974 | 69.039 | 80.721 |
| | 4 | 81.520 | 2.626 | 76.361 | 86.679 |
| Yes | 1 | 60.168 | .785 | 58.626 | 61.709 |
| | 2 | 72.925 | .699 | 71.552 | 74.298 |
| | 3 | 75.349 | .653 | 74.067 | 76.631 |
| | 4 | 78.913 | .576 | 77.781 | 80.046 |

Factor of the Influence_Tenure * time

Table 4.53. Influence of Teachers' Tenure - Estimated Marginal Means

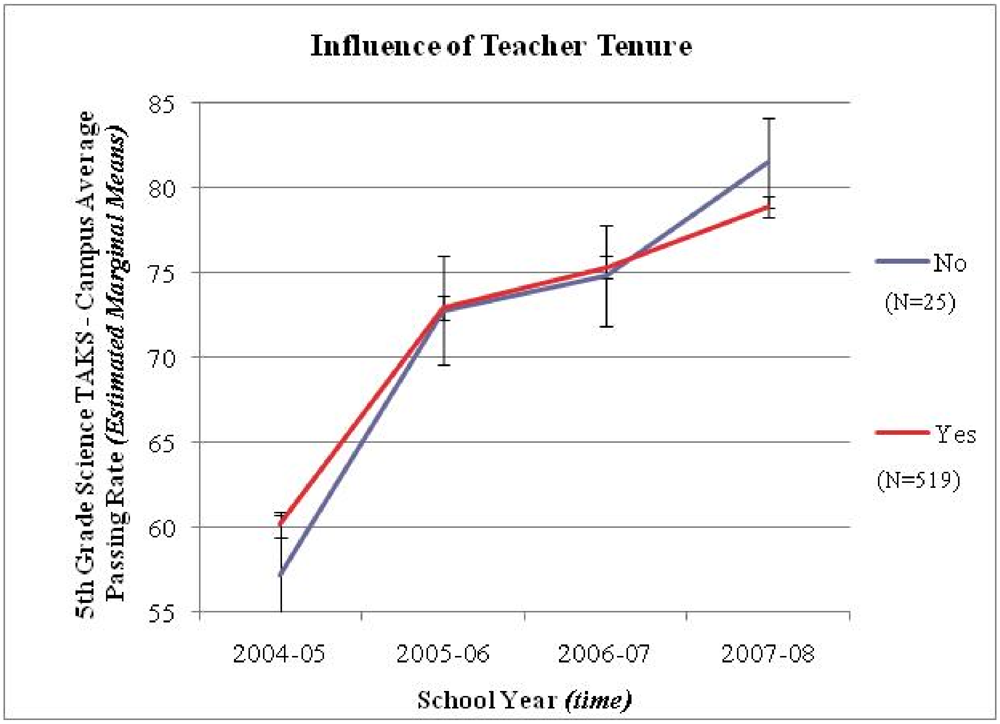



Figure 4.22. Influence of Teacher Tenure on CIL decisions regarding the selection of pre-eminent staff

*Summary of the influence of Teacher Tenure on CILs' decisions regarding the selection of pre-eminent staff to improve student learning:*

Time is significant, although how elementary campus administrators and teachers viewed the influence of Teachers' Tenure on CIL decisions for selecting pre-eminent teacher staff to improve student learning was not significant (p=0.930). The interaction between Time*Teachers' Tenure on CIL decisions for selecting pre-eminent teacher staff to improve student learning was not significant (p=0.234).

The change over time noticed for TAKS scores does not depend on how elementary campus administrators and teachers view the influence of Teachers' Tenure on CIL decisions for selecting pre-eminent teacher staff to improve student learning. The only event observed was that something happened to 5$^{th}$ grade science TAKS scores over time.

8) The influence of Teachers' Classroom Teaching Experience on CIL decisions regarding the selection of pre-eminent staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of teachers' classroom teaching experience on CIL decisions regarding the selection of pre-eminent staff in order to improve student learning, the Tests of Within-Subjects Effect's factor of Time, $F(2.631, 1425.793) = 110.899$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor of the influence of teachers' classroom teaching experience on CIL decisions regarding the selection of pre-eminent staff in order to improve student learning was not significant: $F(1, 542) = 1.699$, $p = 0.193$. The Tests of Within-Subjects Effect's relationship between the Factor of Time*Influence of Teachers' classroom teaching experience on CIL decisions regarding the selection of pre-eminent staff to improve student learning, $F(2.631, 1425.793) = 0.982$, $p= 0.393$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.631 | 110.899 | 0.000 |
| time * Influence_tchg_exp | Huynh-Feldt | 2.631 | 0.982 | 0.393 |
| Error(time) | Huynh-Feldt | 1425.793 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Influence_tchg_exp | 1 | 1.699 | 0.193 |
| Error | 542 | | |

Tests of Between-Subjects Effect

Table 4.54. Influence of Teaching Experiences - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 60.682 | 1.563 | 57.613 | 63.751 |
| 2 | 75.218 | 1.387 | 72.495 | 77.942 |
| 3 | 76.585 | 1.298 | 74.036 | 79.134 |
| 4 | 80.095 | 1.147 | 77.842 | 82.349 |

Factor of Time – Estimate

| Influence_ tchg_exp | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 61.429 | 3.023 | 55.491 | 67.366 |
| | 2 | 77.857 | 2.682 | 72.588 | 83.126 |
| | 3 | 78.029 | 2.510 | 73.097 | 82.960 |
| | 4 | 81.314 | 2.219 | 76.955 | 85.674 |
| Yes | 1 | 59.935 | 0.793 | 58.378 | 61.492 |
| | 2 | 72.580 | 0.703 | 71.198 | 73.961 |
| | 3 | 75.141 | 0.658 | 73.848 | 76.435 |
| | 4 | 78.876 | 0.582 | 77.733 | 80.019 |

Factor of Influence_tchg_exp * time

Table 4.55. Influence of Teaching Experience - Estimated Marginal Means

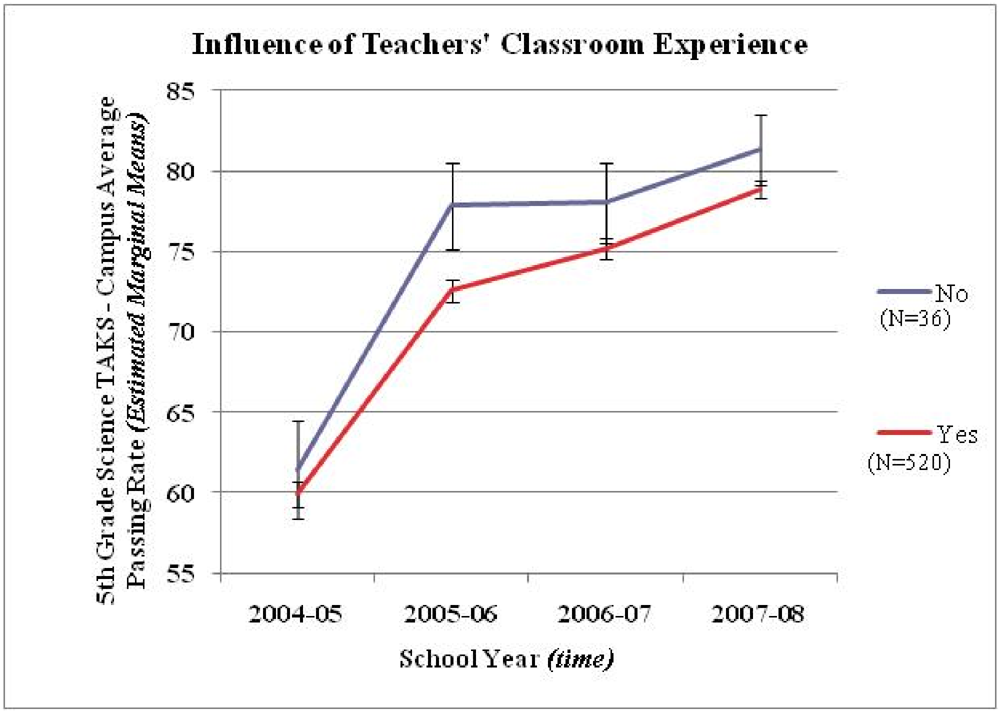



Figure 4.23. Influence of Teachers' classroom teaching experience on CILs' decisions regarding the selection of pre-eminent staff

*Summary of the influence of Teachers' Classroom Teaching Experience on CIL decisions regarding the selection of pre-eminent staff to improve student learning:*

Time is significant, although how elementary campus administrators and teachers view the influence of Teachers' classroom teaching experience on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning was not significant (p=0.193). The interaction between Time and Teachers' classroom teaching experience on CILs' decisions for selecting preeminent teacher staff in order to improve student learning was not significant (p=0.393).

The change over time noticed for TAKS scores does not depend on how elementary campus administrators and teachers view the influence of teachers' classroom teaching experience on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning. The only event observed was that something happened to 5th grade science TAKS scores over time.

9) The influence of Teachers' Certifications on CILs' decisions for selecting pre-eminent teacher staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of teachers' certifications on CIL decisions for selecting pre-eminent teacher staff to improve student learning with the Tests of Within-Subjects Effect's the factor of Time, $F(2.633, 1426.959) = 427.310$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor of the influence of teachers' certifications on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning was not significant: $F(1, 542) = 0.469$, $p = 0.494$. The Tests of Within-Subjects Effect's relationship between the factor of Time*the influence of teachers' certifications on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning, $F(2.633, 1426.959) = 0.160$, $p = 0.903$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| Time | Huynh-Feldt | 2.633 | 427.310 | 0.000 |
| time* Influence_cert_yesno | Huynh-Feldt | 2.633 | 0.160 | 0.903 |
| Error(time) | Huynh-Feldt | 1426.959 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Influence_cert_yesno | 1 | 0.469 | 0.494 |
| Error | 542 | | |

Tests of Between-Subjects Effect

Table 4.56. Influence of Teaching Certificates - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|
| 1 | 60.026 | 0.767 | 58.519 | 61.533 |
| 2 | 72.906 | 0.683 | 71.565 | 74.247 |
| 3 | 75.319 | 0.638 | 74.067 | 76.571 |
| 4 | 79.020 | 0.563 | 77.913 | 80.126 |

Factor of Time – Estimates

| Influence _cert_ yesno | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| No | 1 | 60.222 | 1.071 | 58.119 | 62.326 |
| | 2 | 73.423 | 0.953 | 71.551 | 75.294 |
| | 3 | 75.642 | 0.890 | 73.893 | 77.390 |
| | 4 | 79.545 | 0.786 | 78.000 | 81.089 |
| Yes | 1 | 59.830 | 1.099 | 57.672 | 61.988 |
| | 2 | 72.389 | 0.978 | 70.468 | 74.309 |
| | 3 | 74.996 | 0.913 | 73.203 | 76.790 |
| | 4 | 78.494 | 0.807 | 76.910 | 80.079 |

Factor of Influence_cert_yesno * time

Table 4.57. Influence of Teaching Certificates - Estimated Marginal Means

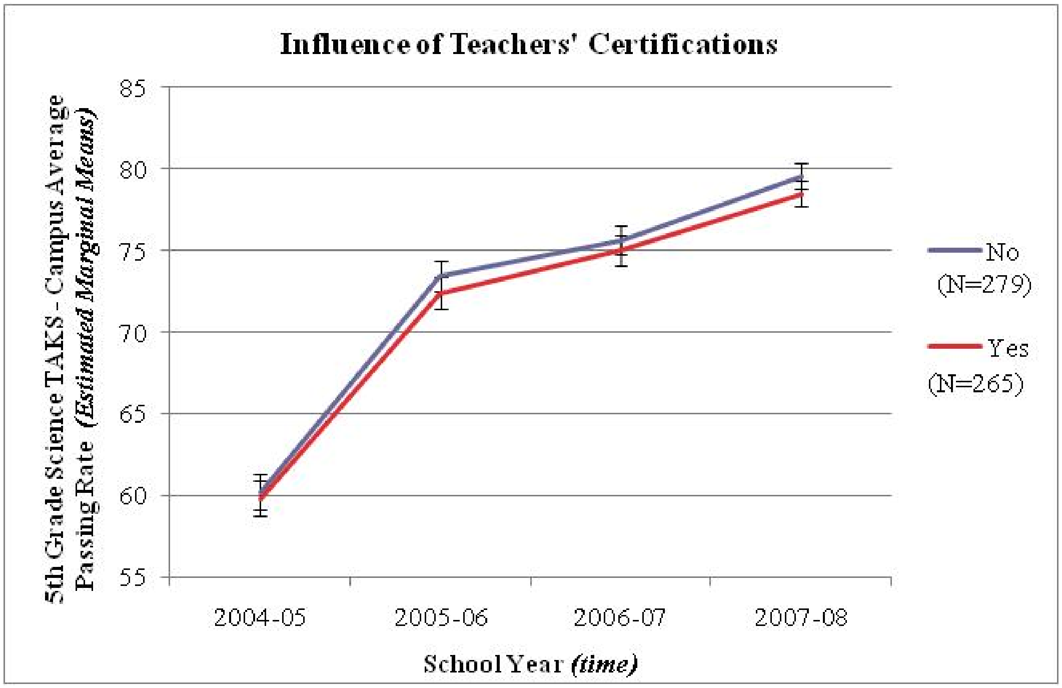



Figure 4.24. Influence of Teachers' Certification on CIL decisions regarding the selection of pre-eminent staff

*Summary of the influence of teachers' certification on CIL decisions regarding the selection of pre-eminent staff to improve student learning:*

Time is significant, although how elementary campus administrators and teachers view the influence of teachers' certification on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning was not significant (p=0.494). The relationship between Time*Teachers' certification on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning was not significant (p= 0.903).

The change over time noticed for TAKS scores does not depend on how elementary campus administrators and teachers viewed the influence of teachers' certification on CIL decisions for selecting preeminent teacher staff in order to improve student learning. The only event observed was that something happened to 5th grade science TAKS scores over time.

10) Influence of the science professional development on CILs' decisions regarding the selection of pre-eminent teacher staff to improve student learning

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of the science professional development on CIL decisions regarding the selection of pre-eminent teacher staff in order to improve student learning, the Factor of Time, $F(2.629, 1401.505) = 394.959$, $p < 0.05$, is significant. The Tests of Between-Subjects Effects as the influence of the science professional development on CIL decisions regarding the selection of pre-eminent teacher staff in order to improve student learning demonstrated no significance $F(1, 553) = 2.249$, $p = 0.134$. The Tests of Between-Subjects Effect's interaction between the factor of Time*influence of the science professional development on CIL decisions regarding the selection of preeminent teacher staff in order to improve student learning, $F(2.629, 1401.505) = 0.377$, $p = 0.743$, interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.629 | 394.959 | 0.000 |
| time * Influence_PD | Huynh-Feldt | 2.629 | 0.377 | 0.743 |
| Error | | 1401.505 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Influence_PD | 1 | 2.249 | 0.134 |
| Error | 533 | | |

Tests of Between-Subjects Effect

Table 4.58. Influence of PD - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|
| 1 | 60.210 | 0.793 | 58.652 | 61.768 |
| 2 | 73.169 | 0.703 | 71.788 | 74.549 |
| 3 | 75.490 | 0.658 | 74.197 | 76.782 |
| 4 | 79.093 | 0.583 | 77.947 | 80.239 |

Factor of Time – Estimates

| Influence_PD | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| No | 1 | 61.071 | 1.234 | 58.647 | 63.496 |
| | 2 | 74.322 | 1.094 | 72.173 | 76.471 |
| | 3 | 76.455 | 1.024 | 74.443 | 78.467 |
| | 4 | 79.640 | 0.908 | 77.856 | 81.423 |
| Yes | 1 | 59.349 | 0.996 | 57.392 | 61.305 |
| | 2 | 72.015 | 0.883 | 70.281 | 73.750 |
| | 3 | 74.525 | 0.826 | 72.901 | 76.148 |
| | 4 | 78.546 | 0.733 | 77.107 | 79.986 |

Factor of Influence_PD*time

Table 4.59. Influence of PD - Estimated Marginal Means

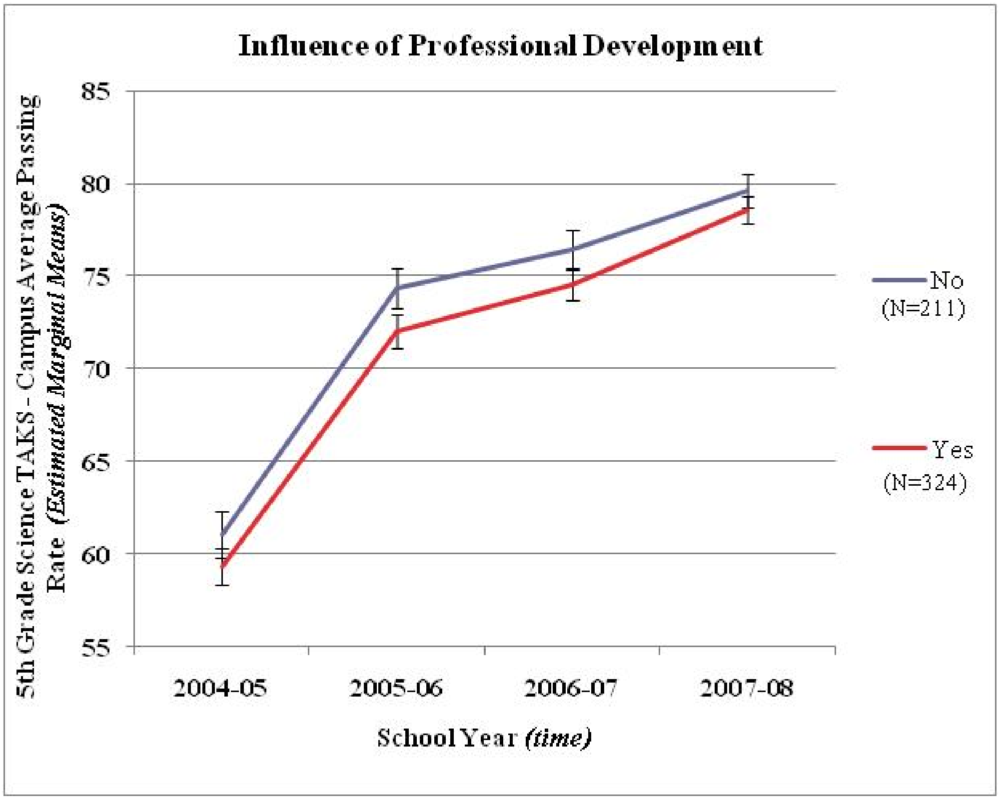



Figure 4.25. Influence of the science professional development on CILs' decisions regarding the selection of pre-eminent teacher staff

*Summary of the influence of science professional development on CILs' decisions regarding the selection of pre-eminent staff in order to improve student learning:*

Time is significant, although how elementary campus administrators and teachers viewed the influence of science PD on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning demonstrated no significance (**p= 0.134**). The interaction between time and science PD on CIL decisions for selecting pre-eminent teacher staff in order to improve student learning was not significant (p= 0.743). The change over time noticed for TAKS scores may not depend on how elementary campus administrators and teachers view the influence of science PD on CIL decisions for selecting preeminent teacher staff in order to improve student learning. The only event observed was that something happened to 5th grade science TAKS scores over time.

The impact of how elementary campus administrators and teachers viewed the influence of science PD on CIL decisions for selecting preeminent teacher staff in order to improve student learning is inconclusive in regard to effect on 5th grade science TAKS scores over time.

## Impact of Science Professional Development on 5th Grade Science TAKS

*Research Question #4* specifically examines the influence science education professional development had on 5th grade science TAKS scores directly: *How does the science education professional development opportunity for teachers' impact 5th grade science TAKS scores?* Section III of the *Texas Elementary, Middle or Intermediate Teacher Survey*™ and the *Texas Campus Administrator Survey*™ contains questions that purposely addressed this subject. Due to the complexity of this issue, and in recognition that not every teacher participant continued attending the local regional collaborative for science PD, data for this question were collected for the impact of either any science education PD (e.g., district-created PD) or the Texas Regional Collaboratives networked system PD. In the *Texas Elementary, Middle or Intermediate Teacher Survey*™, 276 participating teachers indicate that they attended a TRC – PD program for one year, while an additional 209 participating teachers indicate that they attended a TRC – PD program for two or more years. It was anticipated that the 5th grade science TAKS test scores would exhibit differences over the 4-year period used for this research (2005-2008).

### 1) Influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of any science professional development opportunity for teachers' impact on 5$^{th}$ grade science TAKS scores, the Tests of Within-Subjects Effect's factor of Time, $F(2.629, 1401.505) = 394.959$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect as influencing any science professional development opportunity for teachers' impact on 5$^{th}$ grade science TAKS scores <u>was not</u> significant: $F(1, 553) = 2.249$, $p = 0.134$. The Tests of Within-Subjects Effect's interaction between the factor of Time*Influence of science professional development opportunity for teachers' impact on 5$^{th}$ grade science TAKS scores, $F(2.629, 1401.505) = 0.377$, $p = 0.743$, interaction <u>was not</u> significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.629 | 394.959 | 0.000 |
| time * Influence_PD | Huynh-Feldt | 2.629 | 0.377 | 0.743 |
| Error | Huynh-Feldt | 1401.505 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| Influence_PD | 1 | 2.249 | 0.134 |
| Error | 533 | | |

Tests of Between-Subjects Effect

Table 4.60. Influence of science PD - Tests of Within-Subjects Effect and Between-Subjects Effect

| | | | **95% Confidence Interval** | |
|---|---|---|---|---|
| **time** | **Mean** | **Std. Error** | Lower Bound | Upper Bound |
| 1 | 60.210 | 0.793 | 58.652 | 61.768 |
| 2 | 73.169 | 0.703 | 71.788 | 74.549 |
| 3 | 75.490 | 0.658 | 74.197 | 76.782 |
| 4 | 79.093 | 0.583 | 77.947 | 80.239 |

Factor of Time - Estimates

| **Influence_ PD** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 1 | 61.071 | 1.234 | 58.647 | 63.496 |
| | 2 | 74.322 | 1.094 | 72.173 | 76.471 |
| | 3 | 76.455 | 1.024 | 74.443 | 78.467 |
| | 4 | 79.640 | 0.908 | 77.856 | 81.423 |
| Yes | 1 | 59.349 | 0.996 | 57.392 | 61.305 |
| | 2 | 72.015 | 0.883 | 70.281 | 73.750 |
| | 3 | 74.525 | 0.826 | 72.901 | 76.148 |
| | 4 | 78.546 | 0.733 | 77.107 | 79.986 |

Factor of Influence_PD*time

Table 4.61. Influence of science PD - Estimated Marginal Means

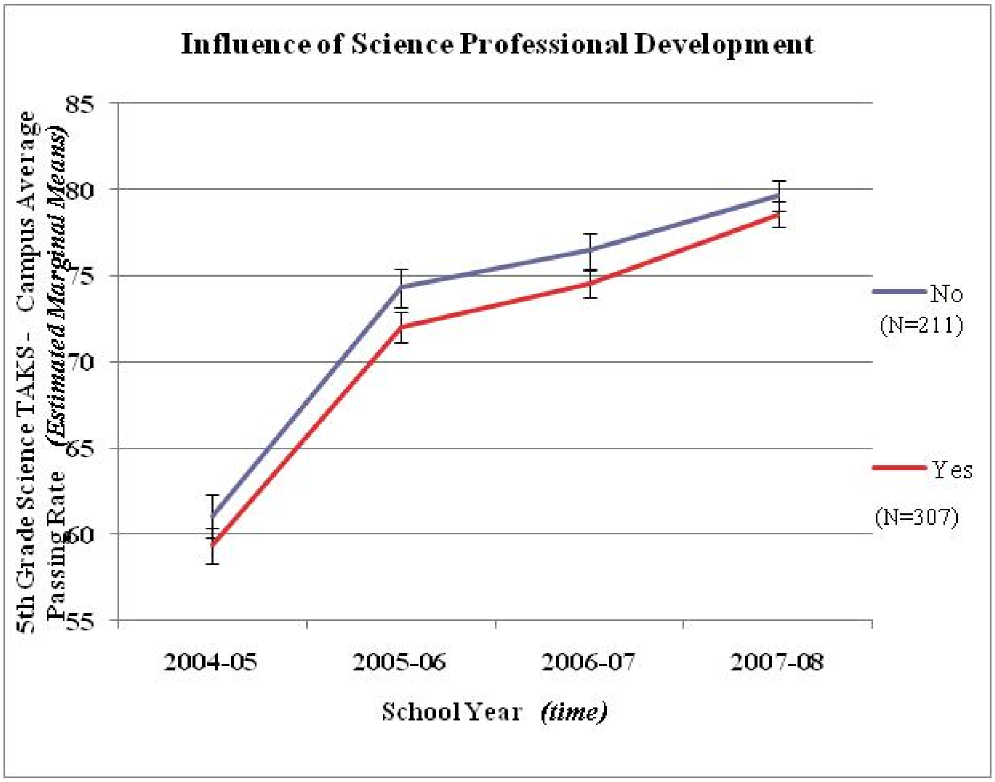



Figure 4.26. Influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores

*Summary of the influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores:*

Time is significant, although how elementary campus administrators and teachers viewed the influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores was not significant ($p = 0.134$). The interaction between Time and the influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores was not significant ($p = 0.743$).

The change over time noticed for TAKS scores may not depend on how elementary campus administrators and teachers viewed the influence of any science professional development opportunity for teachers' impact on 5th grade science TAKS scores. The only event observed was that something happened to 5th grade science TAKS scores over time.

### 2) Impact of Teachers' Attendance of a TRC local regional professional development program

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the impact of Teachers' attendance at a Texas Regional Collaborative local regional science PD program, the Tests of Within-Subjects Effect's factor of Time, $F(2.649, 1279.697) = 361.954$, $p < 0.05$, time is significant. The Tests of Between-Subjects Effect's impact of Teachers' attendance of a local regional Texas Regional Collaborative science PD program is significant: $F(1, 483) = 5.795$, **p= 0.016**. The Tests of Within-Subjects Effect's interaction between the factor of Time*Impact of Teachers' attendance of a Texas Regional Collaborative local regional science PD program, $F(2.649, 1279.697) = 0.535$, $p=0.636$, the interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.649 | 361.954 | 0.000 |
| time * timesTRC | Huynh-Feldt | 2.649 | 0.535 | 0.636 |
| Error(time) | Huynh-Feldt | 1279.697 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| timesTRC | 1 | 5.795 | **0.016** |
| Error | 483 | | |

Tests of Between-Subjects Effect

Table 4.62. Frequency of Teachers' attendance at TRC PD - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 59.950 | 0.833 | 58.314 | 61.586 |
| 2 | 72.663 | 0.737 | 71.214 | 74.111 |
| 3 | 75.131 | 0.691 | 73.774 | 76.488 |
| 4 | 78.838 | 0.617 | 77.626 | 80.050 |

Factor of Time - Estimates

| timesTRC | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| One Year | 1 | 58.373 | 1.093 | 56.225 | 60.521 |
| | 2 | 71.431 | 0.968 | 69.529 | 73.333 |
| | 3 | 73.228 | 0.907 | 71.447 | 75.010 |
| | 4 | 77.580 | 0.810 | 75.988 | 79.171 |
| Two or More | 1 | 61.526 | 1.256 | 59.058 | 63.995 |
| | 2 | 73.895 | 1.112 | 71.709 | 76.080 |
| | 3 | 77.033 | 1.042 | 74.986 | 79.081 |
| | 4 | 80.096 | 0.931 | 78.267 | 81.924 |

Factor of Time*TRCtime

Table 4.63. Frequency of Teachers' attendance at TRC PD - Estimated Marginal Means

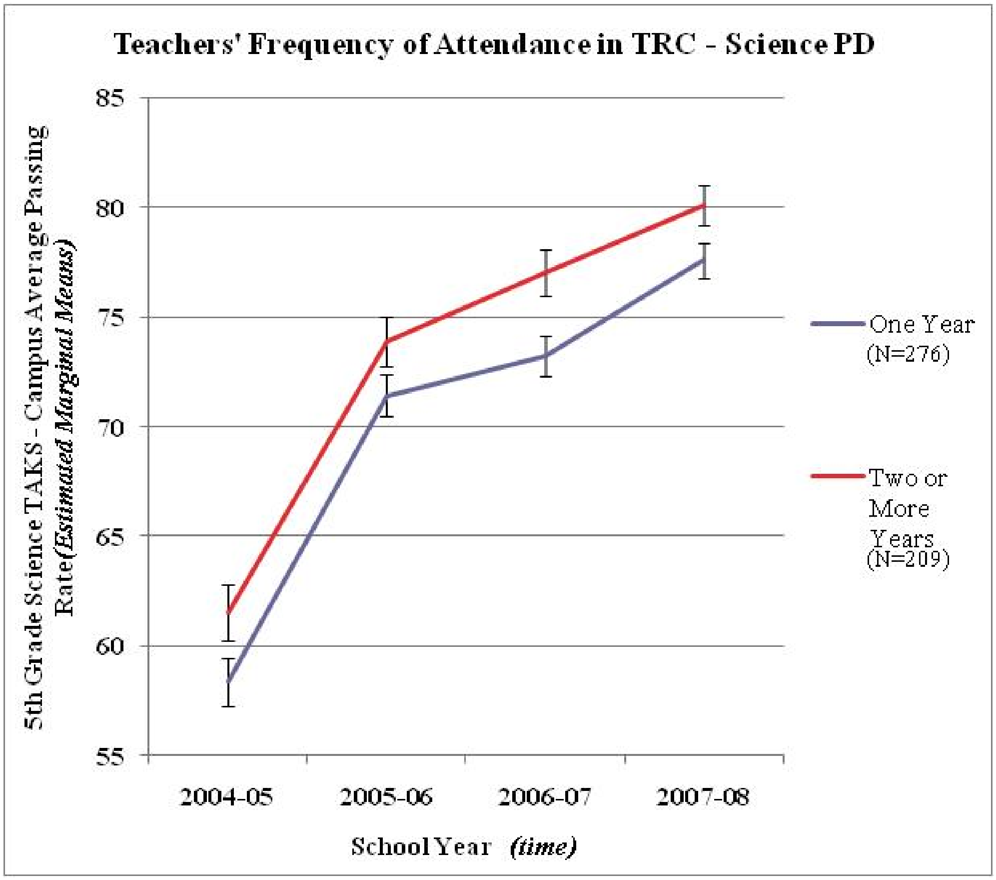



Figure 4.27. Impact of Teachers' attendance at a Texas Regional Collaboratives local regional science professional development program

*Summary of the impact of Teachers' attendance in a Texas Regional Collaboratives local regional science professional development opportunity on 5th grade science TAKS scores:*

Time is significant, and how elementary campus administrators and teachers viewed the impact of teachers' attendance at a Texas Regional Collaboratives local regional science PD program on 5th grade science TAKS scores for the Tests of Between-Subjects Effect is significant (**p= 0.016**). The Tests of Within-Subjects Effect's interaction between Time*Influence of teachers' attendance at a Texas Regional Collaboratives local regional science PD program impact on 5th grade science TAKS scores was not significant (p= 0.636).

The change over time noticed for TAKS scores may depend on how elementary campus administrators and teachers view the importance of teachers' attendance in a Texas Regional Collaboratives science PD program for impact on 5th grade science TAKS scores. The only event observed was that something happened to 5th grade science TAKS scores over time.

**3) Influence of Texas Regional Collaborative local regional science professional development program for teachers' impact on 5th grade science TAKS scores**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of Texas Regional Collaborative local regional science PD program for teachers' impact on 5th grade science TAKS scores, the Tests of Within-Subjects Effect's factor of Time, $F(2.628, 1434.708) = 431.563$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor of the influence of Texas Regional Collaborative science PD program for teachers' impact on 5th grade science TAKS scores was not significant: $F(1, 546) = 0.812$, $p = 0.812$. The Tests of Within-Subjects Effect's interaction between the factor of Time*Influence of Texas Regional Collaborative science PD program for teachers' impact on 5th grade science TAKS scores, $F(2.628, 1434.708) = 1.197$, $p = 0.308$, interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.628 | 431.563 | 0.000 |
| time* TRC_PD_sci_edu | Huynh-Feldt | 2.628 | 1.197 | 0.308 |
| Error (time) | Huynh-Feldt | 1434.708 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| TRC_PD_sci_edu | 1 | 0.812 | 0.812 |
| Error | 546 | | |

Tests of Between-Subjects Effect

Table 4.64. Influence of TRC Science PD programs on 5th grade science TAKS - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 60.042 | 0.763 | 58.542 | 61.542 |
| 2 | 72.995 | 0.679 | 71.661 | 74.330 |
| 3 | 75.390 | 0.635 | 74.142 | 76.638 |
| 4 | 79.089 | 0.562 | 77.985 | 80.194 |

Factor of Time - Estimates

| TRC_PD_sci_edu | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| 0 | 1 | 59.108 | 1.033 | 57.078 | 61.138 |
| | 2 | 72.158 | 0.919 | 70.352 | 73.964 |
| | 3 | 75.202 | 0.860 | 73.513 | 76.891 |
| | 4 | 79.003 | 0.761 | 77.508 | 80.499 |
| 1 | 1 | 60.976 | 1.124 | 58.768 | 63.184 |
| | 2 | 73.833 | 1.000 | 71.868 | 75.797 |
| | 3 | 75.578 | 0.936 | 73.740 | 77.415 |
| | 4 | 79.175 | 0.828 | 77.549 | 80.802 |

Factor of Time*TRC_PD_sci_edu

Table 4.65. Influence of TRC Science PD programs on 5th grade science TAKS - Estimated Marginal Means

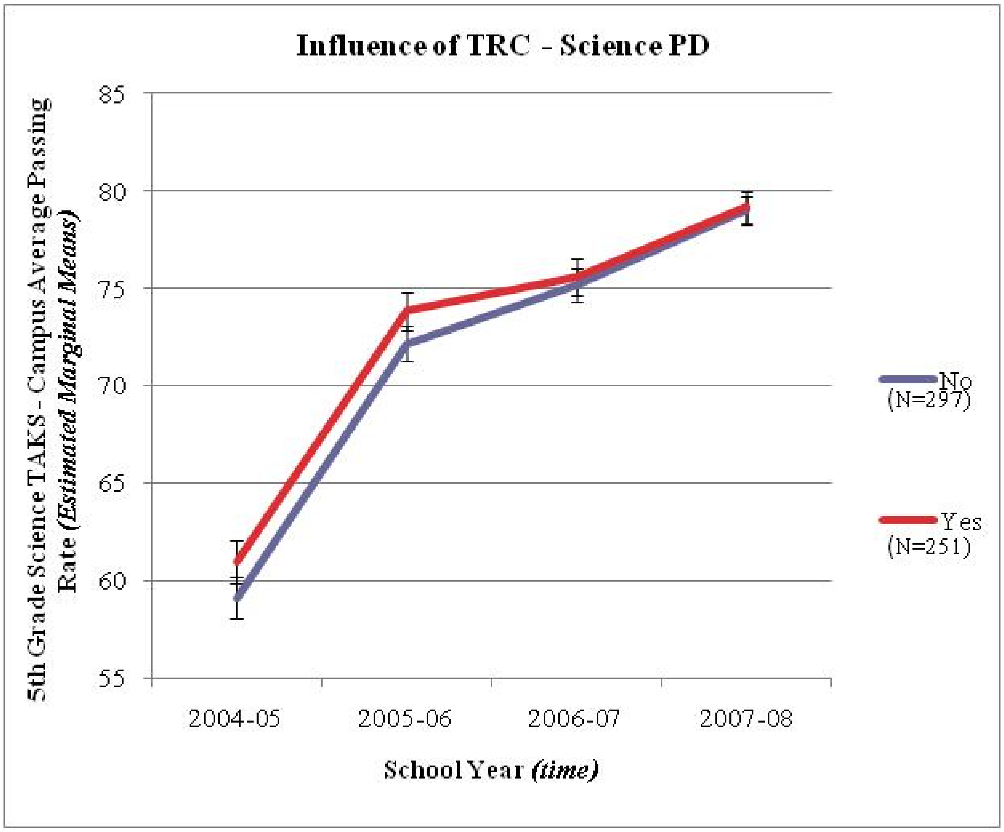



Figure 4.28. Influence of TRC Science PD programs on 5th grade science TAKS

*Summary of the influence of Texas Regional Collaborative local regional science PD programs for teachers' impact on 5th grade science TAKS scores:*

Time is significant. How elementary campus administrators and teachers viewed the influence of Texas Regional Collaborative science professional development opportunity for teachers' impact on 5th grade science TAKS scores from the Tests of Between-Subjects Effect was not significant ($p = 0.812$). The Tests of Within-Subjects Effect's interaction between Time*Influence of Texas Regional Collaborative local regional science PD programs for teachers' impact on 5th grade science TAKS scores was not significant ($p = 0.308$).

The change noticed for the 4-year time period of TAKS scores may not depend on how elementary campus administrators and teachers viewed the influence of Texas Regional Collaborative local, regional science PD programs for teachers' impact on 5th grade science TAKS scores. The only event observed was that something happened to 5th grade science TAKS scores over time. A closer evaluation of a 2-year comparison was deemed necessary.

**4) Influence of Texas Regional Collaborative local regional science professional development programs for teachers' impact on 5th grade science TAKS scores, 2-year comparison**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the influence of Texas Regional Collaborative local regional science PD programs for teachers' impact on 5th grade science TAKS scores in a 2-year comparison, the factor of Time, $F(1.000, 558.000) = 63.255$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor for the influence of Texas Regional Collaborative science PD program for teachers' impact on 5th grade science TAKS scores was not significant: $F(1, 558) = 0.063$, $p = 0.801$. The Tests of Within-Subjects Effect's interaction between the factors of Time*Influence of Texas Regional Collaborative science PD program for teachers' impact on 5th grade science TAKS scores, $F(1.000, 558.000) = 0.041$, $p = 0.840$, interaction was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 63.255 | 0.000 |
| time * TRC_PD_sci_edu | Huynh-Feldt | 1.000 | 0.041 | 0.840 |
| Error(time) | Huynh-Feldt | 558.000 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| TRC_PD_sci_edu | 1 | 0.063 | 0.801 |
| Error | 558 | | |

Tests of Between-Subjects Effect

Table 4.66. Influence of TRC Science PD programs on 5th grade science TAKS, 2-year - Tests of Within-Subjects Effect and Between-Subjects Effect

| TRC_PD_ sci_edu | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| No | 77.200 | 0.737 | 75.752 | 78.648 |
| Yes | 77.476 | 0.812 | 75.881 | 79.071 |

Factor of Time - Estimates

| time | TRC_ PD_sci_ edu | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| No | 0 | 75.322 | 0.847 | 73.659 | 76.986 |
| | 1 | 75.692 | 0.933 | 73.860 | 77.524 |
| Yes | 0 | 79.078 | 0.749 | 77.606 | 80.550 |
| | 1 | 79.261 | 0.826 | 77.639 | 80.882 |

Factor of Time*TRC_PD_sci_edu

Table 4.67. Influence of TRC Science PD programs on 5th grade science TAKS, 2-year Estimated Marginal Means

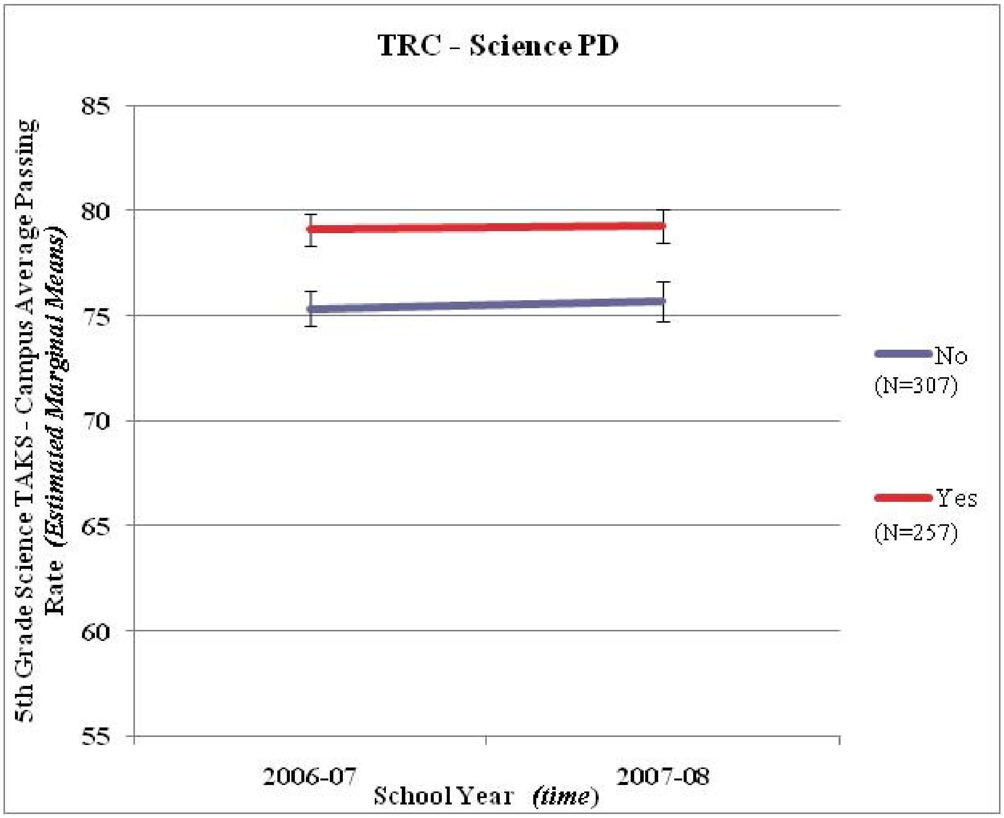



Figure 4.29. Influence of local regional Collaboratives science PD program for Teachers' impact on 5th grade science TAKS scores

*Summary of the influence of Texas Regional Collaborative local regional science PD program for teachers' impact on 5th grade science TAKS scores:*

Time -is significant; however, the elementary campus administrators' and teachers' view of the influence of Texas Regional Collaborative local regional science PD program for teachers' impact on 5th grade science TAKS scores for the Tests of Between-Subjects Effect was not significant (p= 0.840). The Tests of Within-Subjects Effect's interaction between Time*Influence of Texas Regional Collaborative local regional science PD program for teachers' impact on 5th grade science TAKS scores was not significant (p=0.801). The change over time noticed for TAKS scores appeared to have no impact on how elementary campus administrators and teachers viewed the influence of Texas Regional Collaborative local regional science PD program for teachers' impact on 5th grade science TAKS scores. The only event observed was that something happened to 5th grade science TAKS scores over time.

**Impact of 'Highly Qualified Classroom Teacher' designation from *NCLB* on 5th Grade Science TAKS**

The final question focused on how *NCLB*'s policy designation of a highly qualified classroom teacher may influence how a CIL views preeminent teaching staff for improving student success on 5th grade science TAKS scores. *Research Question #5: Is education policy's designation of a highly qualified classroom teacher, as currently defined by the No Child Left Behind Act of 2001, necessary for elementary science education?*

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining whether the *NCLB* designation of a HQCT policy influenced CIL selection of preeminent teachers in order to impact students' 5th grade science TAKS scores, the first question sub-set concerned how campus administrators viewed their current staff during 2007-2008.

**1) Percentage of HQCT on a Texas elementary campus**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the percentage of HQCT professional teaching staff at a Texas elementary campus, the Tests of Within-Subjects Effect's factor of Time, $F(2.738, 796.801) = 184.821$, $p < 0.05$, is significant. The factor of the Tests of Between-Subjects Effect regarding the percentage of HQCT on a Texas elementary campus was not significant: $F(2, 291) = 2.188$, $p = 0.114$. The Tests of Within-Subjects Effect's interaction between the factor of Time*the percentage of HQCT teacher staff at a Texas elementary campus, $F(5.476, 796.801) = 2.022$, **$p = 0.067$**, demonstrates an upward sloping trend.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.738 | 184.821 | 0.000 |
| time * tri_percent | Huynh-Feldt | 5.476 | 2.022 | **0.067** |
| Error(time) | Huynh-Feldt | 796.801 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| tri_percent | 2 | 2.188 | 0.114 |
| Error | 291 | | |

Tests of Between-Subjects Effect

Table 4.68. Percentage of HQCT - Tests of Within-Subjects Effect and Between-Subjects Effect

| **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 60.362 | 1.107 | 58.184 | 62.541 |
| 2 | 72.495 | 1.040 | 70.449 | 74.542 |
| 3 | 75.067 | 0.990 | 73.119 | 77.016 |
| 4 | 79.547 | 0.848 | 77.878 | 81.216 |

Factor of Time – Estimates

| **tri_percent** | **time** | **Mean** | **Std. Error** | **95% Confidence Interval** | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Lower third (0% to 30%) | 1 | 64.529 | 1.855 | 60.879 | 68.180 |
| | 2 | 74.882 | 1.743 | 71.453 | 78.312 |
| | 3 | 77.671 | 1.659 | 74.405 | 80.936 |
| | 4 | 80.282 | 1.421 | 77.486 | 83.079 |
| Middle third (31% to 60%) | 1 | 56.627 | 2.395 | 51.914 | 61.341 |
| | 2 | 70.275 | 2.250 | 65.847 | 74.702 |
| | 3 | 72.196 | 2.142 | 67.980 | 76.412 |
| | 4 | 79.941 | 1.834 | 76.331 | 83.552 |
| Upper third (61% to 100%) | 1 | 59.930 | 1.361 | 57.253 | 62.608 |
| | 2 | 72.329 | 1.278 | 69.814 | 74.845 |
| | 3 | 75.335 | 1.217 | 72.940 | 77.731 |
| | 4 | 78.418 | 1.042 | 76.366 | 80.469 |

Factor of Time*tri_percent

Table 4.69. Percentage of HQCT - Estimated Marginal Means

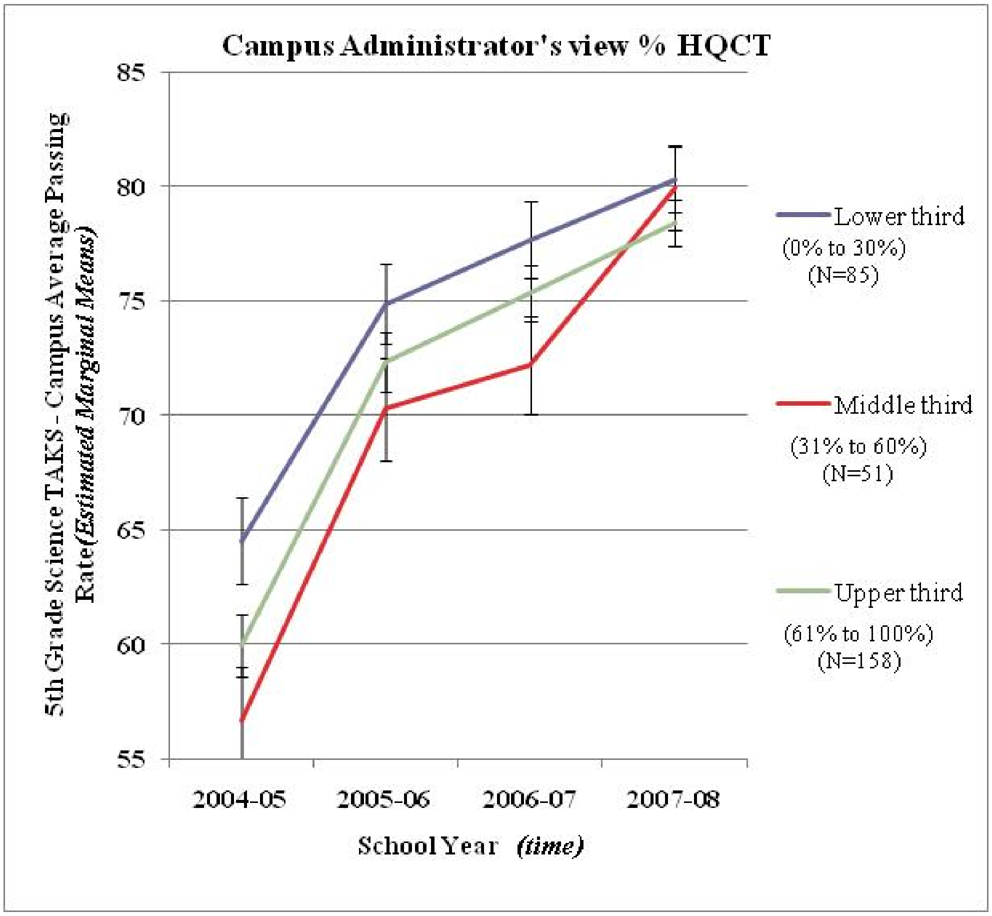



Figure 4.30. Campus administrators' view of the percentage of HQCT teacher staff at a Texas elementary campus

*Summary of campus administrators' view of the percentage of HQCT teacher staff at a Texas elementary campus:*

Time is significant, and how elementary campus administrators viewed the percentage of HQCT teacher staff at a Texas elementary campus for teachers' impact on 5th grade science TAKS scores from the Tests of Between-Subjects Effect demonstrated <u>no significance</u> (p= 0.114). Additionally, the interaction between Time*Percentage of HQCT teaching professional staff at a Texas elementary campus in order to improve student achievement on 5th grade science TAKS scores demonstrates an upward sloping trend (**p= 0.067**).

The change noticed over time for TAKS scores appears to have an impact on how elementary campus administrators viewed the influence of the percentage of HQCT teacher staff at a Texas elementary campus for teachers' impact on 5th grade science TAKS scores. These results support the observation event that something happened to 5th grade science TAKS scores over time. The impact of how elementary campus administrators viewed the influence of the percentage of HQCT teacher staff at a Texas elementary campus does show an upward sloping trend toward influencing an effect on 5th grade science TAKS scores over time. When examining this trend more closely on a 2-year comparison, the results support this trend as a potentially significant effect.

**2) Percentage of HQCT teaching professional staff at a Texas elementary campus, 2-year comparison**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining the percentage of HQCT teaching professional staff at a Texas elementary campus, the Tests of Within-Subjects Effect's factor of Time, $F(1.000, 299.000) = 41.017$, $p < 0.05$, remains significant. The Tests of Between-Subjects Effect's factor to examine the percentage of HQCT teaching professional staff at a Texas elementary campus was not significant: $F(2, 299) = 01.043$, $p = 0.354$. The Tests of Within-Subjects Effect's interaction between the factor of Time*Percentage of HQCT teaching professional staff at a Texas elementary campus, $F(2.000, 299.000) = 04.184$, **$p = 0.016$**, interaction is significant.

| Source | | df | F | Sig. |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 41.017 | .000 |
| time* tri_percent | Huynh-Feldt | 2.000 | 4.184 | **.016** |
| Error(time) | Huynh-Feldt | 299.000 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| tri_percent | 2 | 1.043 | 0.354 |
| Error | 299 | | |

Tests of Between-Subjects Effect

Table 4.70. Percentage of HQCT, 2-year - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|
| 1 | 75.275 | 0.971 | 73.363 | 77.186 |
| 2 | 79.672 | 0.831 | 78.036 | 81.308 |

Factor of Time – Estimates

| tri_percent | time | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| Lower third | 1 | 77.884 | 1.642 | 74.653 | 81.114 |
| | 2 | 80.430 | 1.405 | 77.665 | 83.196 |
| Middle third | 1 | 72.302 | 2.091 | 68.187 | 76.417 |
| | 2 | 79.868 | 1.790 | 76.345 | 83.390 |
| Upper third | 1 | 75.638 | 1.192 | 73.291 | 77.985 |
| | 2 | 78.718 | 1.021 | 76.709 | 80.726 |

Factor of tri_percent*time

Table 4.71. Percentage of HQCT, 2-year - Estimated Marginal Means

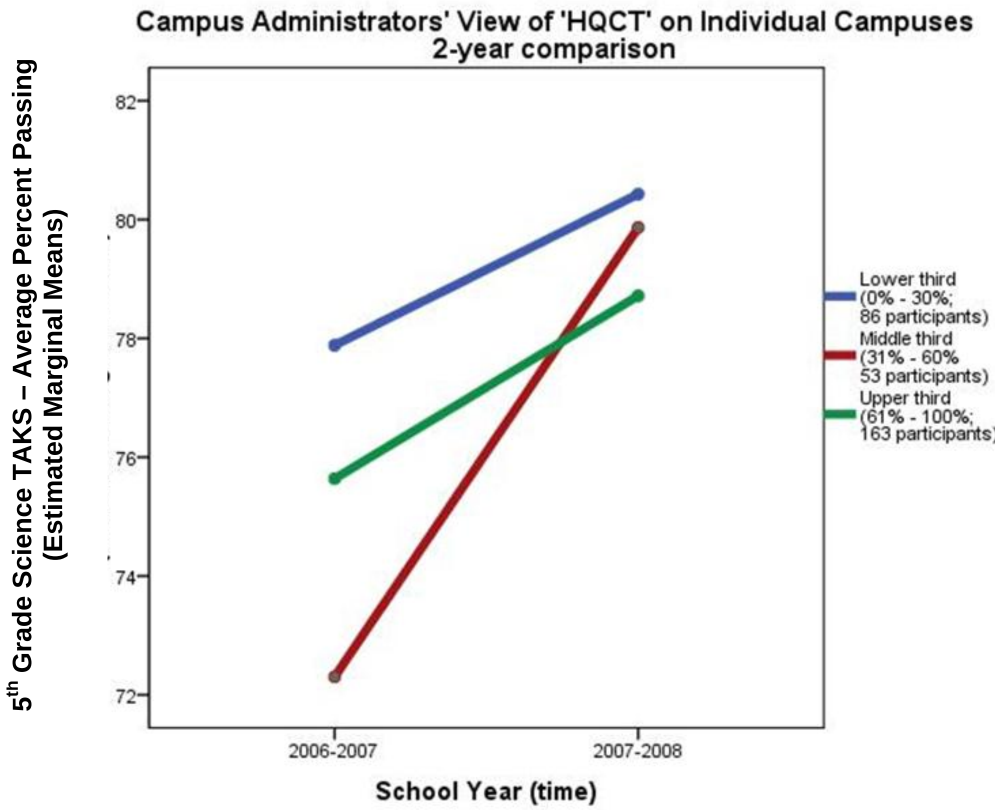



Figure 4.31. Campus Administrators' view of the percentage of HQ Teacher staff at a Texas elementary campus, a 2-year comparison

*Summary of the influence of the percentage of HQCT teacher staff at a Texas elementary campus:*

Time is significant. How the elementary campus administrators viewed the influence the percentage of HQCT teaching professional staff at a Texas elementary campus had on 5th grade science TAKS scores <u>was not</u> significant (p= 0.354). The interaction between Time*Influence of the percentage of HQCT teacher staff at a Texas elementary campus on 5th grade science TAKS scores <u>is</u> significant (**p=0.016**). The change noticed for TAKS scores over time shows an <u>upward sloping trend</u> for how elementary campus administrators viewed the influence of the percentage of HQCT teaching professional staff at a Texas elementary campus on 5$^{th}$ grade science TAKS scores. These results support the observation event that something happened to 5$^{th}$ grade science TAKS scores over time.

The impact of how elementary campus administrators viewed the influence of percentage of HQCT teaching professional staff at a Texas elementary campus shows an upward trend influencing 5$^{th}$ grade science TAKS scores.

**3) Highly Qualified Classroom Teachers assessment by *NCLB***

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining how campus administrators and teachers viewed the definition of the HQCT assessment by *NCLB*, the Tests of Within-Subjects Effect's factor of Time, $F(2.617, 1441.898) = 184.821$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor of how campus administrators and teachers viewed the definition of the HQCT assessment by *NCLB* demonstrated no significance: $F(2, 291) = 435.225$, $\mathbf{p = 0.095}$. The Tests of Within-Subjects Effect's interaction between the factor of Time*How campus administrators and teachers viewed the HQCT assessment by *NCLB*, $(2.617, 1441.898) = 0.054$, $p = 0.816$, was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.617 | 435.225 | 0.000 |
| time * tri_percent | Huynh-Feldt | 2.617 | 2.199 | 0.095 |
| Error(time) | Huynh-Feldt | 1441.898 | | |

Tests of Within-Subjects Effect

| Source | df | F | Sig. |
|---|---|---|---|
| tri_percent | 1 | .054 | 0.816 |
| Error | 547 | | |

Tests of Between-Subjects Effect

Table 4.72. HQCT assessment by *NCLB* - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|
| 1 | 59.954 | 0.761 | 58.458 | 61.449 |
| 2 | 72.946 | 0.679 | 71.612 | 74.280 |
| 3 | 75.404 | 0.636 | 74.155 | 76.653 |
| 4 | 78.977 | 0.560 | 77.877 | 80.078 |

Factor of Time – Estimates

| time | HQCT_ assess_by _*NCLB* | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 1 | | | | | |
| | No | 59.817 | 1.036 | 57.782 | 61.851 |
| 2 | No | 72.864 | 0.924 | 71.049 | 74.680 |
| 3 | No | 75.142 | 0.865 | 73.444 | 76.841 |
| 4 | No | 79.986 | 0.762 | 78.489 | 81.484 |
| 1 | Yes | 60.091 | 1.116 | 57.898 | 62.283 |
| 2 | Yes | 73.028 | 0.996 | 71.071 | 74.984 |
| 3 | Yes | 75.665 | 0.932 | 73.835 | 77.496 |
| 4 | Yes | 77.969 | 0.821 | 76.355 | 79.582 |

Factor of Time*HQCT_assess_by_*NCLB*

Table 4.73. HQCT assessment by *NCLB* - Estimated Marginal Means

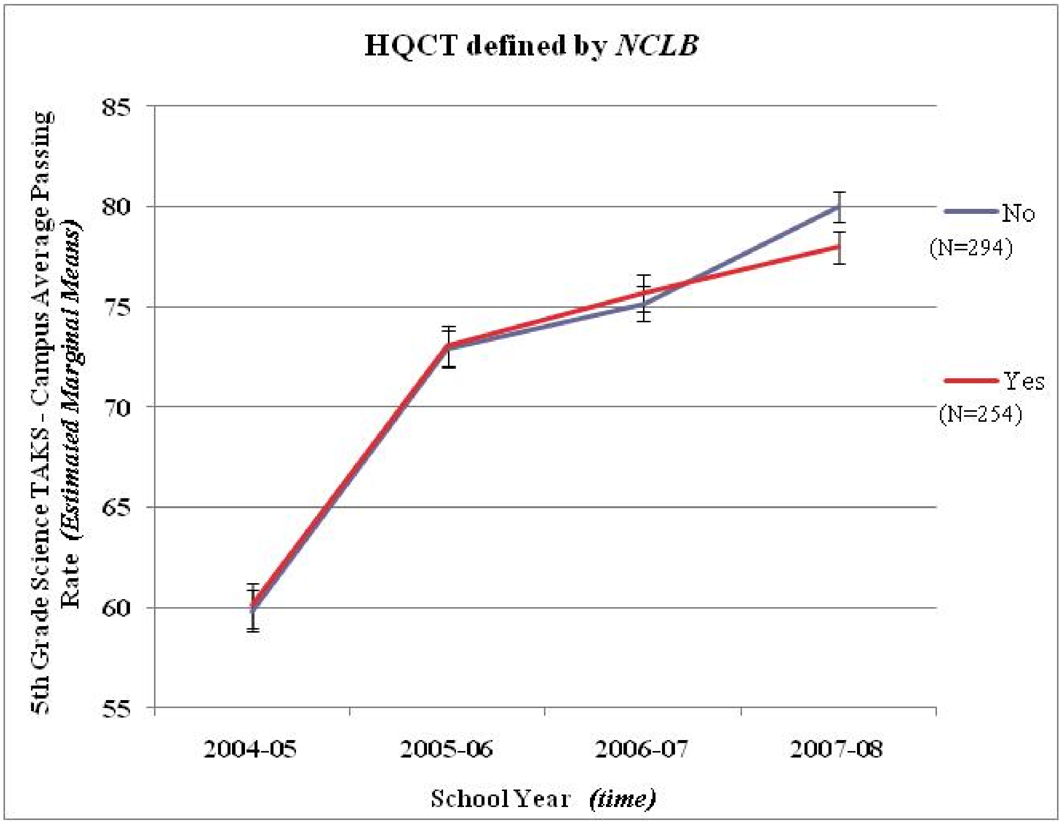



Figure 4.32. Influence of how Campus Administrators' and Teachers' view HQCT assessments by *NCLB*

*Summary of the influence of how campus administrators and teachers view HQCT assessments by NCLB:*

Time is significant. How campus administrators and teachers viewed the HQCT assessment by *NCLB* impact on 5th grade science TAKS scores for the Tests of Between-Subjects Effects demonstrated <u>no significance</u> (p=0.095). Also, the Tests of Within-Subjects Effect's interaction between the factor of Time*How campus administrators and teachers viewed HQCT assessments by *NCLB* impact on 5th grade science TAKS scores (p = 0.816) <u>was not</u> significant.

The change over time noticed for TAKS scores appeared to have no impact on how campus administrators and teachers viewed HQCT assessments by *NCLB* impact on 5th grade science TAKS scores. These results support earlier observations of an event that something happened to 5th grade science TAKS scores over time. A closer examination of the 2-year interaction was necessary.

**4) Highly Qualified Classroom Teachers as assessed by *NCLB*, 2-year comparison**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining how campus administrators and teachers viewed the definition of HQCT assessments by *NCLB*, the Tests of Within-Subjects Effect's factor of Time, F(1.000, 559.000) = 58.777, $p < 0.05$, was significant. The Tests of Between-Subjects Effect when examining how campus administrators and teachers viewed the definition of HQCT assessment by *NCLB*, F(1, 559) = 0.541, p = 0.462, was not significant. The Tests of Within-Subjects Effect's interaction between the factor of Time*How campus administrators and teachers viewed the definition of HQCT assessment by *NCLB*, F(1.000, 559.000)= 07.182, **p = 0.008**, is significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 1.000 | 58.777 | 0.000 |
| time*HQCT_assess_by_ *NCLB* | Huynh-Feldt | 1.000 | 7.182 | **0.008** |
| Error(time) | Huynh-Feldt | 559.000 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| HQCT_assess_by_ *NCLB* | 1 | 0.541 | 0.462 |
| Error | 559 | | |

Tests of Between-Subjects Effect

Table 4.74. HQCT assessment by *NCLB*, 2-year - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 75.517 | 0.630 | 74.280 | 76.754 |
| 2 | 79.047 | 0.555 | 77.956 | 80.137 |

Factor of Time - Estimated

| time | HQCT_assess_by_*NCLB* | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| 1 | No | 75.303 | 0.853 | 73.628 | 76.978 |
| | Yes | 75.732 | 0.927 | 73.910 | 77.553 |
| 2 | No | 80.066 | 0.751 | 78.590 | 81.542 |
| | Yes | 78.027 | 0.817 | 76.422 | 79.633 |

Factor of Time*HQCT_assess_by_*NCLB*

Table 4.75. HQCT assessment by *NCLB*, 2-year - Estimated Marginal Means

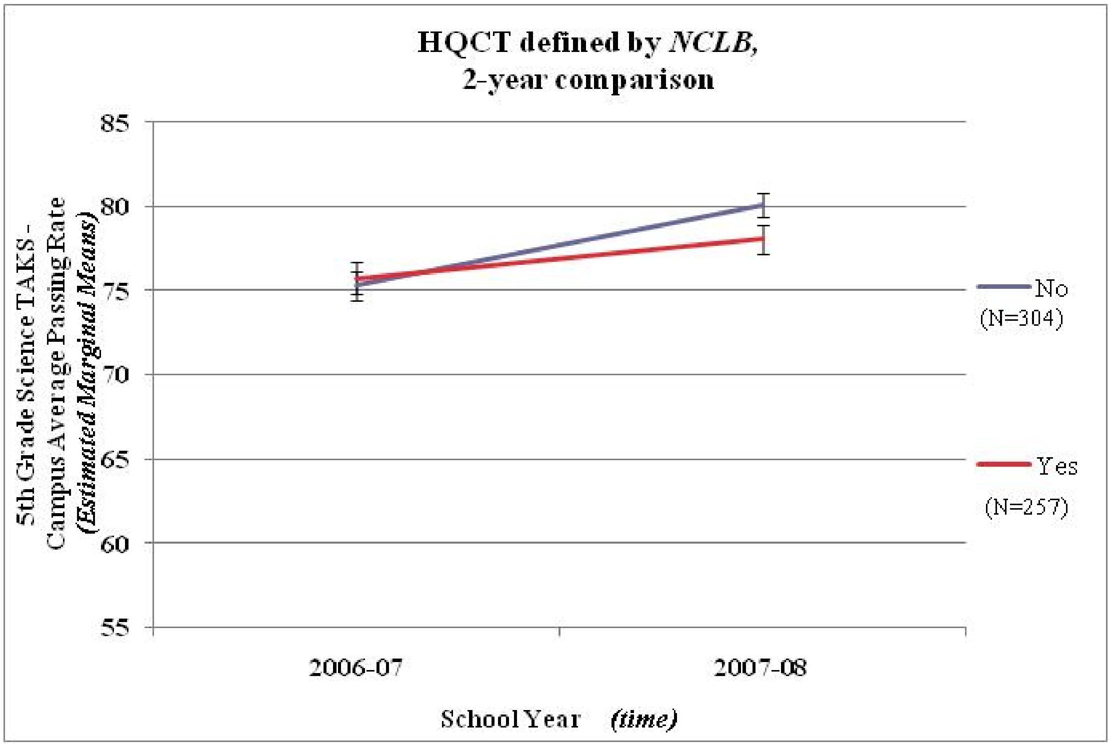



Figure 4.33. Influence of how Campus Administrators' and Teachers' viewed HQCT assessments by NCLB, a 2-year comparison

*Summary of the influence of how campus administrators and teachers viewed HQCT assessments by NCLB, 2-year comparison:*

Time is significant. How campus administrators and teachers viewed HQCT assessments by *NCLB* impact on 5$^{th}$ grade science TAKS scores from the Tests of Between-Subjects Effect <u>was not</u> significant (p= 0.462**)** in the 2-year comparison. However, the Tests of Within-Subjects Effect's interaction between the factor of Time*How campus administrators and teachers viewed HQCT assessments by *NCLB* impact on 5$^{th}$ grade science TAKS scores (**p= 0.008**) <u>is</u> significant.

The change over time noticed for TAKS scores <u>is inconclusive</u> on how campus administrators and teachers viewed HQCT assessment by *NCLB* impact on 5$^{th}$ grade science TAKS scores. These results support earlier observations of an event that something happened to 5th grade science TAKS scores over time.

**5) How campus administrators view *NCLB*'s definition of a Highly Qualified Classroom Teacher**

As with all of the study-related analyses, Sphericity was corrected with Huynh-Feldt. When examining how campus administrators viewed *NCLB*'s definition of a HQCT, the Tests of Within-Subjects Effects factor of Time, $F(2.704, 789.693) = 216.883$, $p < 0.05$, is significant. The Tests of Between-Subjects Effect's factor for examining how campus administrators viewed *NCLB*'s definition of a HQCT was not significant: $F(1, 292) = 1.513$, $p = 0.220$. The Tests of Within-Subjects Effect's interaction between the factor of Time*How campus administrators viewed *NCLB*'s definition of a HQCT, $F(2.704, 789.693) = 1.238$, $p = 0.294$, was not significant.

| **Source** | | **df** | **F** | **Sig.** |
|---|---|---|---|---|
| time | Huynh-Feldt | 2.704 | 216.883 | 0.000 |
| time**NCLB*_define_HQCT | Huynh-Feldt | 2.704 | 1.238 | 0.294 |
| Error(time) | Huynh-Feldt | 789.693 | | |

Tests of Within-Subjects Effect

| **Source** | **df** | **F** | **Sig.** |
|---|---|---|---|
| *NCLB*_define_HQCT | 1 | 1.513 | 0.220 |
| Error | 292 | | |

Tests of Between-Subjects Effect

Table 4.76. *NCLB* definition of HQCT - Tests of Within-Subjects Effect and Between-Subjects Effect

| time | Mean | Std. Error | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|
| 1 | 60.616 | 1.008 | 58.632 | 62.600 |
| 2 | 72.657 | 0.939 | 70.809 | 74.505 |
| 3 | 75.426 | 0.892 | 73.669 | 77.182 |
| 4 | 79.249 | 0.763 | 77.748 | 80.750 |

Factor of Time - Estimates

| **time** | ***NCLB*_ define_ HQCT** | **Mean** | **Std. Error** | **95% Confidence Interval** Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 1 | No | 58.848 | 1.468 | 55.958 | 61.738 |
| | Yes | 62.385 | 1.381 | 59.666 | 65.103 |
| 2 | No | 72.217 | 1.368 | 69.525 | 74.910 |
| | Yes | 73.096 | 1.287 | 70.564 | 75.628 |
| 3 | No | 74.377 | 1.300 | 71.818 | 76.936 |
| | Yes | 76.474 | 1.223 | 74.068 | 78.881 |
| 4 | No | 78.710 | 1.111 | 76.523 | 80.897 |
| | Yes | 79.788 | 1.045 | 77.732 | 81.845 |

Factor of time**NCLB*_define_HQCT

Table 4.77. *NCLB* definition of HQCT - Estimated Marginal Means

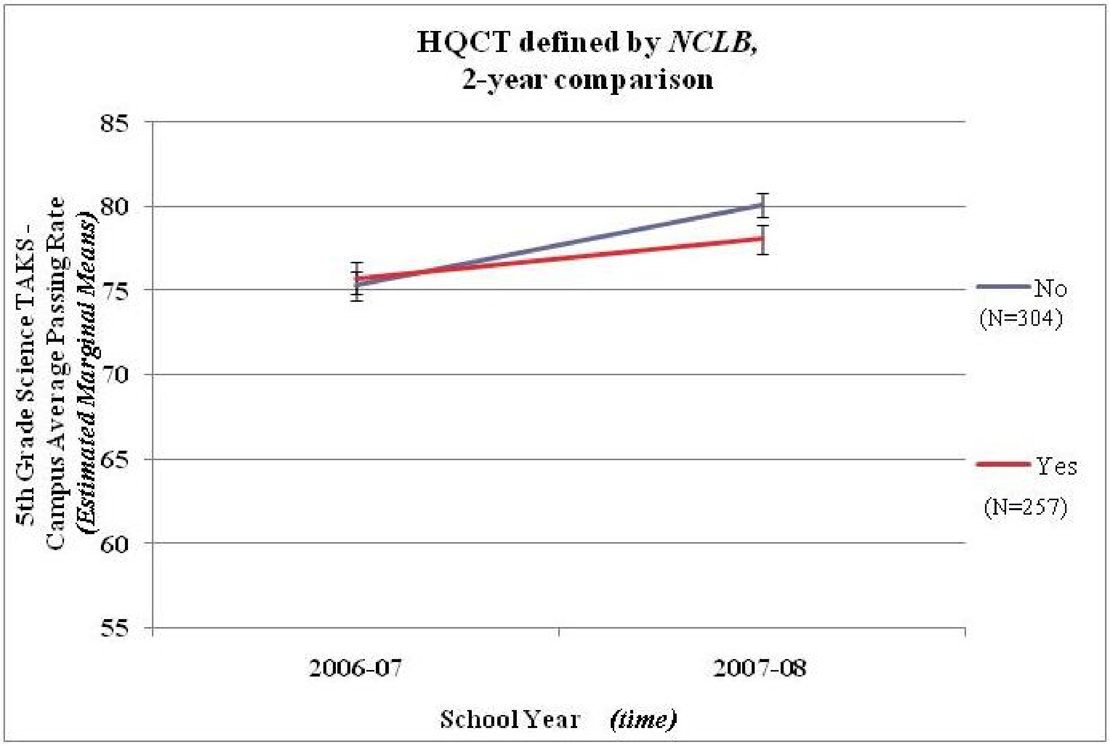



Figure 4.34. Campus Administrators' view of NCLB policy of HQCT

*Summary of how campus administrators viewed NCLB's policy of HQCT:*

Time is significant. How campus administrators viewed *NCLB*'s policy of HQCT impact on 5th grade science TAKS scores was not significant (p=0.220). The interaction between the factor of Time*How campus administrators viewed *NCLB*'s policy of HQCT impact on 5th grade science TAKS scores (p=0.220) was not significant. The change over time noticed for TAKS scores showed no impact on how campus administrators viewed *NCLB*'s definition of HQCT impact on 5th grade science TAKS scores.

## REVIEW OF QUANTITATIVE RESEARCH QUESTIONS

| | | F-values | | |
|---|---|---|---|---|
| | **Between Factor** | **Time** | **Between** | **Interaction** |
| **RQ #1** | *What formats of data analysis are used to support science education instructional decisions determined by Texas elementary campus administrators?* | | | |
| 1 | Data Warehouse Systems | **382.257*** | 2.340 | 0.393 |
| 2 | District-created Data Warehouse System | **361.337*** | 0.183 | 0.560 |
| 3 | Student Information System | **262.891*** | **3.419 Ω** | 0.825 |

| | | F-values | | |
|---|---|---|---|---|
| | **Between Factor Effect** | **Time** | **Between** | **Interaction** |
| **RQ #2** | *How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?* | | | |
| **Sub-section 1** | | | | |
| 1 | State mandated test assessments (i.e. TAKS) | **20.80*** | 2.569 | 0.202 |
| 2 | Criterion-referenced tests | **160.875*** | 0 | 0.062 |
| 3 | Formative assessments, 4-year | **98.11*** | 1.627 | 1.045 |
| 4 | Formative assessments, 2-year | **5.824*** | 0.450 | 2.735 |
| 5 | Curriculum-embedded assessment | **23.755*** | 0.968 | 1.378 |
| 6 | Nationally-normed Tests (i.e. ITBS) | **382.478*** | 2.74 | 2.116 |
| **Sub-section 2** | | | | |
| 1 | CA - view faculty use of DIDM, 4-year | **203.052*** | 0.555 | 0.798 |
| 2 | CA - view faculty use of DIDM, 2-year | **34.994*** | 0.183 | 0.097 |
| 3 | Teacher - view using DIDM | **176.563*** | 0.447 | **2.624Ω** |
| 4 | Teachers' view using DIDM teaching TEKS | **42.166*** | **3.862*** | 0.632 |
| 5 | Teachers' view using DIDM to modify teaching practices, 4-year | **176.563*** | 0.447 | **2.624Ω** |
| 6 | Teachers' view using DIDM to modify teaching practices, 2-year | **31.809*** | 0.098 | **4.856*** |

| | | F-values | | |
|---|---|---|---|---|
| | **Between Factor Effect** | **Time** | **Between** | **Interaction** |
| **RQ #3** | *Do the Campus Instructional Leaders (CIL) decisions support the selection of preeminent teacher staffing arrangements to enhance student learning through teacher instruction?* | | | |
| 1 | Influence TEA 5th grade science TAKS 4-year | **260.521*** | 2.588 | 1.183 |
| 2 | Influence TEA 5th grade science TAKS 2-year | **41.322*** | 2.185 | 0.409 |
| 3 | Influence *NCLB*, 4-year | **420.816*** | 0.255 | 0.337 |
| 4 | Influence *NCLB*, 2-year | **59.893*** | 0.094 | 0.942 |
| 5 | Influence School Boards | **427.327*** | 0.35 | 0.014 |
| 6 | Influence Teachers' Input | **414.483*** | **5.648*** | 1.07 |
| 7 | Influence Teacher Tenure | **93.783*** | 0.008 | 1.435 |
| 8 | Influence Teachers' Classroom Teaching Experience | **110.899*** | 1.699 | 0.982 |
| 9 | Influence Teachers' Certifications | **427.31*** | 0.469 | 0.16 |
| 10 | Influence science professional development | **394.959*** | 2.249 | 0.377 |

| | | F-values | | |
|---|---|---|---|---|
| | **Between Factor Effect** | **Time** | **Between** | **Interaction** |
| **RQ #4** | *How does science education professional development opportunity for teachers' impact 5th grade science TAKS scores?* | | | |
| 1 | Influence any science professional development | **394.959*** | 2.249 | 0.377 |
| 2 | Impact Teachers' Attendance TRC science PD | **361.954*** | **5.795*** | 0.535 |
| 3 | Influence TRC science PD, 4-year | **431.563*** | 0.812 | 1.197 |
| 4 | Influence TRC science PD, 2-year | **63.255*** | 0.063 | 0.041 |

| | | F-values | | |
|---|---|---|---|---|
| | **Between Factor Effect** | **Time** | **Between** | **Interaction** |
| **RQ #5** | *Is education policy's designation of a highly qualified classroom teacher, as currently defined by the 'No Child Left Behind Act of 2001', necessary for elementary science education?* | | | |
| 1 | CA assessment % HQCT, 4-year | **184.821*** | 2.188 | **2.022Ω** |
| 2 | CA assessment % HQCT, 2-year | **41.017*** | 1.043 | **4.184*** |
| 3 | HQCT assessment *NCLB*, 4-year | **435.225*** | 0.054 | 2.199Ω |
| 4 | HQCT assessment *NCLB*, 2-year | **58.777*** | 0.541 | **7.182*** |
| 5 | CA view *NCLB* definition HQCT | **216.883*** | 1.513 | 1.238 |

| **KEY** |
|---|
| *** = stastically significant** |
| Ω = upward sloping trend |

| |
|---|
| **Time** = longitudinal from 2005 to 2008 |
| **Between** = the grouping on the factor tested (Yes and No) |
| **Interaction** = Time*Between = Determining patterns of change between groups over time. |

Table 4.78. F-Value results of all sub-set questions

## PART 2 - VOICES FROM THE CLASSROOM AND CAMPUSES REGARDING ELEMENTARY SCIENCE EDUCATION

### Research Questions Comments - Qualitative Analysis

The second part of data analysis involves qualitative processes application of comments from the *Texas Elementary, Intermediate and Middle School Teachers Survey*™ and the *Texas Elementary Campus Administrator Survey*™. Both surveys were issued twice electronically. The first time the *Texas Elementary Campus Administrator Survey*™ was issued, there were numerous comments. The second time the *Texas Elementary, Intermediate and Middle School Teachers Survey*™ was issued, the teachers wrote detailed and extensive comments

The logic of preparing dual surveys was to determine whether there would be a difference between the viewpoints of the teachers who participated in a TRC science PD program and their corresponding campus administrators regarding *NCLB* policy application and 5$^{th}$ grade students' level of achievement as measured by Texas Education Agency's 5$^{th}$ grade science TAKS. Through using both quantitative and qualitative analytical processes, it was apparent that there were varying applications of federal policy. The surveys provided opportunities for campus administrators and teachers to write explanations of how the TRC science PD programs were, or were not, supported and utilized on Texas elementary campuses. The comment sections enabled participants to explain in their own words their thoughts about how, why, or what results were measured by the state-mandated, standardized 5$^{th}$ grade science TAKS test.

Part 2 in this document represents the qualitative analysis of the survey comments as they appeared on each survey and analyzed by the researcher. The comments from both surveys were analyzed according to the qualitative data analysis processes of Lincoln and Guba.[265]

Campus administrators and teachers throughout Texas school districts and elementary campuses provided rich, informative, and descriptive information. The comments from both surveys illuminate the TRC impact on science PD experiences the local regional sites and Collaborative sites in order to improve teachers' science pedagogy, knowledge, and content. Nevertheless, rigor and accountability of student learning along with teacher certification and continual professional development to enhance teachers' content knowledge of science instruction were basic requirements of a HQCT according to *NCLB.*

**Descriptive process – use of the survey**

The ultimate part of this study was to link how Texas elementary campus administrators were using the teachers' TRC science PD training for determining elementary teachers' ability to teach science to 5th grade students as an application of *NCLB*'s HQCT. From the four comment areas on the *Texas Elementary Campus Administrator Survey*™, information relayed describes how the campus administrators view these interactions. Similarly, the three comments areas on the *Texas Elementary, Intermediate and Middle School Teachers Survey*™ relayed teachers' viewpoints on the same interactions. In most situations, the campus administrators' comments were not in alignment with teacher comments.

The results overall from both survey comments are presented individually. Any names, campuses and districts used in this document are primarily pseudonyms from either American car manufactures and car names from 1895 to 2007 or from international car manufactures and car names from 1900 to 2007. Additionally, if there were multiple teachers' on the same campus, individuals are identified by the original assigned unique identification number, position, school and district; *Brenda, Teacher #1 (Sioux South Elementary, Wagenhals ISD); Thomas, Teacher #4 (Sioux South Elementary, Wagenhals*

*ISD)*, etc. For campuses that had one teacher sample selected, no numbers are used; *Nathan, Teacher (Rainier Elementary, Welch-Detroit ISD).* Campus administrators are identified by first name, position help, school and district; *Jóse, Assistant Principal (Duesenberg Elementary, Dragon ISD).*

**Data-Informed Decision Making: Surveys Comment Results**

*Research Question #1: What formats of data analysis are used to support science education instructional decisions determined by Texas elementary campus administrators?*

*Research Question #2*: *How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?*

The first two research questions were reported together since a mixture of comments from the campus administrators and teachers' describe DIDM uses and how elementary science is taught across Texas schools. This was not a *required comment* area on either survey since comment boxes were included at the end of each section and labeled as a place that a participant could express their ideas or thoughts to the researcher. As such, a wide variety of personal commentary was documented. The surveys' comments reflect participants' descriptions of the how DIDM applications occur within their campus environments, yet any specific references regarding how DIDM improved student learning and achievement on the $5^{th}$ grade science TAKS remains inconclusive.

On the subject of DIDM applications within Texas elementary campuses, twenty-four campus administrators and seventy-nine teachers wrote comments that addressed ten topics: (1) use of DIDM for curricular decisions, (2) DIDM uses for personal growth in the teaching profession, (3) use of data for increasing teacher content knowledge, (4) DIDM use, training provided by district, or use within district and/or campus, (5) positive support of science, (6) lack of science content knowledge by teachers, (7) district and campus pressures for reading and mathematics accountability under *NCLB*'s Annual Yearly Progress (AYP) reporting structure, (8) use of data for TAKS, (9) use of data for TEKS, and (10) the lack of science education programs, (11)district and campus pressures for reading and mathematics accountability under *NCLB*'s Annual Yearly Progress (AYP) reporting structure.

| **Uses of Data - Topics** | **% TS Survey Comments * (N=79)** | **% CA Survey Comments * (N=24)** |
|---|---|---|
| 1. Data use for personal growth in the teaching profession | **54%** | 3% |
| 2. Use of data for curricular decisions | **53%** | 17% |
| 3. Use of data for increasing teacher content knowledge | **41%** | 10% |
| 4. Data warehouse training / use within district and / or campus | 24% | 10% |
| 5. Campus Adm. & District positive support of science | 18% | 17% |
| 6. Lack of science content knowledge by teachers and Lack of resources | 11% | 10% |
| 7. Reading and mathematics primary focus | 9% | **21%** |
| 8. Use of data for TAKS | 13% | 17% |
| 9. Use of data for TEKS | 10% | **28%** |
| 10. Limited or no science education programs | 8% | **55%** |

* **Bold** indicates top 5 comments per survey

Table 4.72. Comments from Campus Administrator and Teacher Survey regarding uses of data

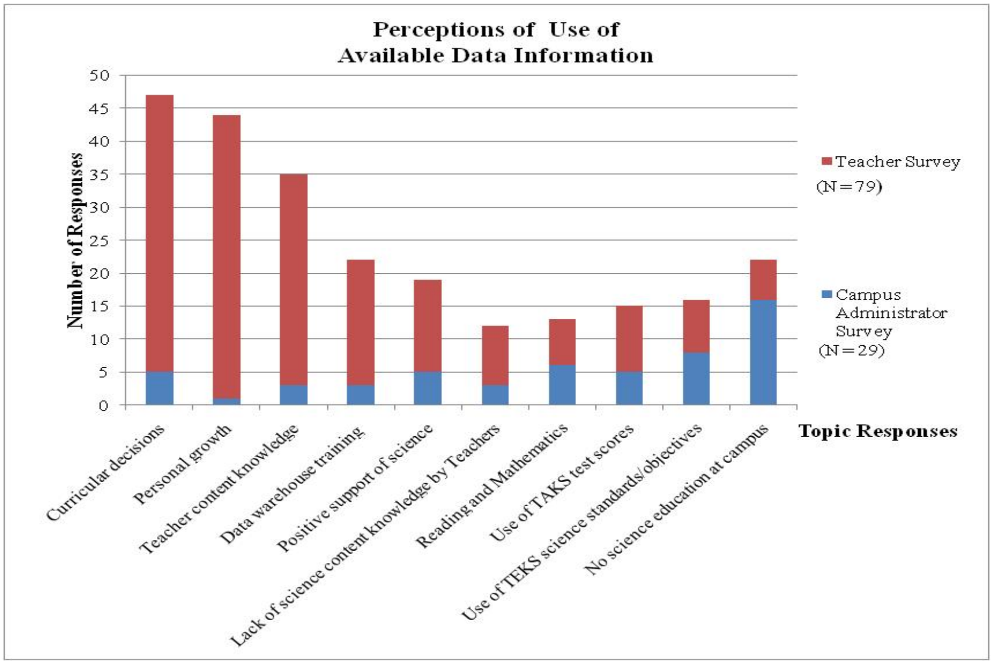



Figure 4.35. All topics regarding data use at Texas elementary campuses

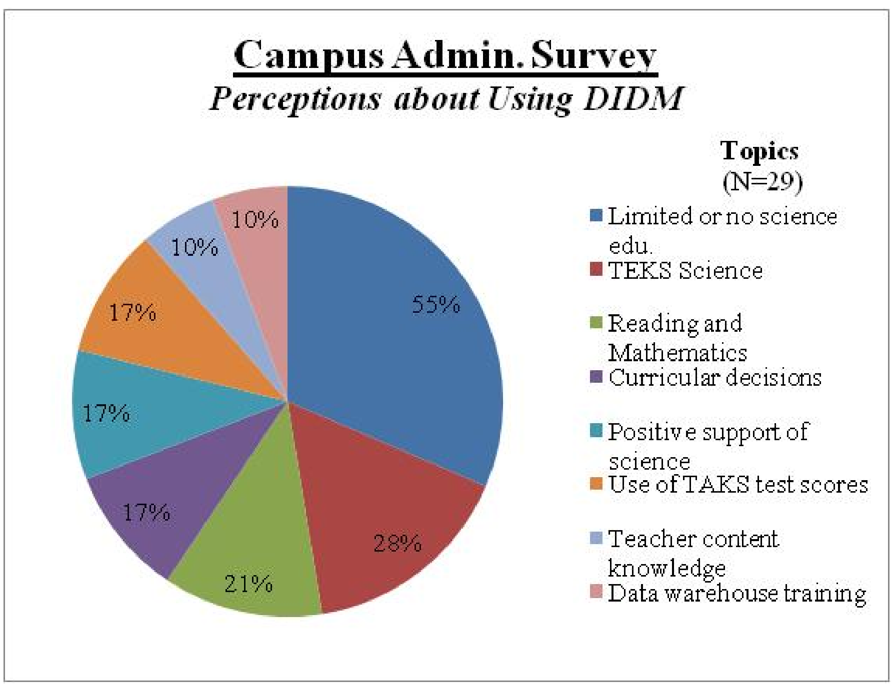



Figure 4.36. Campus Administrator Survey, Perceptions about using data-informed decision making, top 5 comments

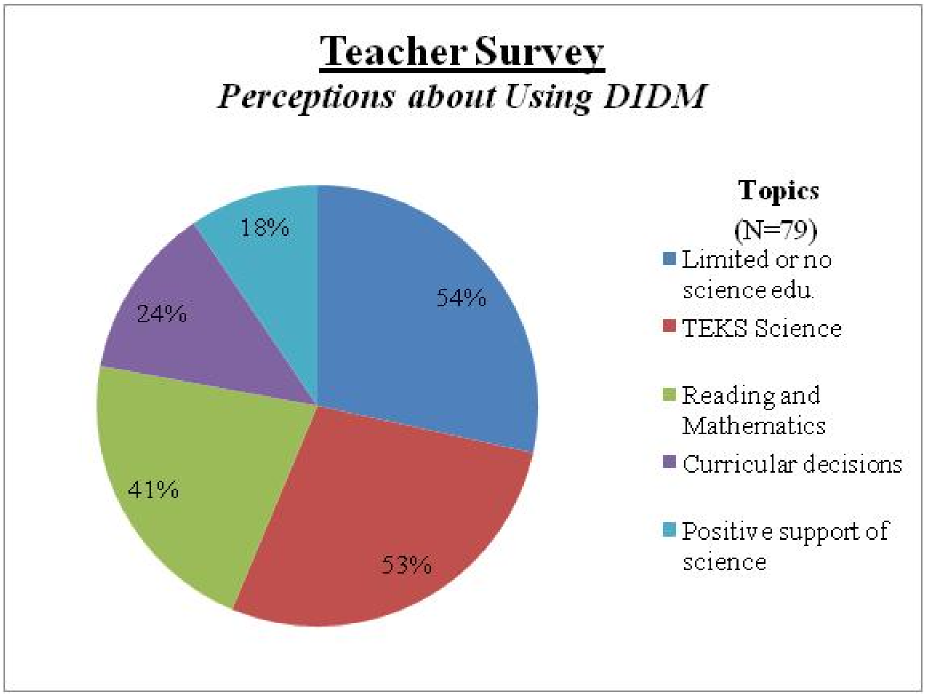



Figure 4.37. Teacher Survey, Perceptions about using data-informed decision making, top 5 comments

**Data use for personal growth in the teaching profession**

This topic was the highest (54%) from comments made by teachers on the *Texas Elementary, Intermediate or Middle School Teacher Survey™* while 3% of campus administrators wrote parts alluding to teachers' *personal growth* in this section of the *Texas Elementary Campus Administrator Survey™*. Most notable was that the teachers wrote about personal experiences and their confidence as science teachers, how teaching science has changed their views of their careers, and the impact science has on students in their classes. Written comments was not a requirement for the DIDM portions of either survey.

*Donna, Teacher (Mercedes Elementary, Niagara Falls, ISD): "I feel well prepared compared to most because of my new knowledge. I have also gained more confidence in my science teaching although sometimes I still have to research or ask about some concepts or am not able to answer some of the students' questions.*

*I feel good about my science teaching as I see the students TAKS improving each year. I will try to continue trying to improve my science knowledge through any workshop or professional development I can attend. One of those will be this summer as I have been accepted to be a counselor at Texas A&M University at Galveston's* Sea Camp *in July.*

> *(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Sally, Teacher #1 (Ivory Coast Elementary, Ramses ISD): "I never feel confident with myself. I feel I need to keep learning!"*

> *(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Tanya, Teacher #2 (Ivory Coast Elementary, Ramses ISD): "I wish all the teachers on our campus could attend one of these trainings, especially our new teachers(less than 5 years experience). I know it is very time consuming and you are out of your classroom a lot, I feel the knowledge you gain from it is worth it."*

> *(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Pamela, Teacher #1 (Texas University Elementary Academy, Texas College University): "I feel that my work with the TRC has had the largest impact on my success as a teacher over any other factors. I wish every teacher had the time and opportunity to be involved in such a valuable and rewarding program. I feel very competent in my teaching and my students have greatly benefited from my continued learning."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Dena, Teacher (Scarab Elementary, Stout-Scarab ISD): "I am a fifth Grade Science Teacher and proud of it!"*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Anthony, Teacher #3 (Standard Elementary, Standards CISD): "This was my third year in my regional Collaborative. My first year with the TRC was my first year back into teaching after a short career in the private sector. The TRC gave me the experiences that I needed to make my classroom a GREAT learning environment for my students. Most if not all of my successes in the classroom come from my time interacting with other collaborative members and in the workshops. I am still learning and changing with each new experience and look forward to our meeting, to see what great new ideas I can use in my classroom each year. We have an outstanding group of educational instructors at* [my regional Collaborative] *and I cannot thank them enough for their support."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Jesus, Teacher #1 (Anchor Lane Elementary, Anchor Buggy ISD): "The TRC gave me the confidence I need to implement a hands-on science program."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Use of data for curricular decisions**

This topic was the second highest (53%) from comments from teachers on the *Texas Elementary, Intermediate or Middle School Teacher Survey™* while 17% of campus administrators responded on the *Texas Elementary Campus Administrator Survey™*. Among the teachers', DIDM is used extensively for improving student learning and achievement in a variety of methods. Although the TRC database indicated the teachers who were selected through a random and stratified process as 5th grade teachers, the actual teacher participants were teaching in elementary, intermediate or middle school grade levels as well as many in pullout programs such as gifted and talented teachers, those who self-identified as *English-as-Second-Language* teachers (ESOL), or bilingual classroom teachers.

> *James, Principal (O.L. Stanley Elementary, Staver ISD): "At the elementary level, it would be teachers who use the district science pacing guides as teacher leaders to share information about curriculum and work to ensure the science lab is stocked and ready to receive classes throughout the school day. We have several teachers who attend the* [local regional Collaborative] *science workshops and are a part of that consortium. During the 2005-2006 school year, teachers participated in road mapping each 9 weeks for science lesson planning with the entire district by grade level. ™"*
>
> *(Comment from Texas Elementary Campus Administrator Survey™)*

> *Brenda, Teacher #1 (Souix South Elementary, Wagenhals ISD): "I teach gifted/talented Kindergarten through 5th grade students in a pull-out program. I use science as the foundation for all interdisciplinary thematic units.*
>
> *(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Donald, Teacher (Electrical Elementary, Amalgamated ISD): "Test data is available from the school counselor. Assessment information is available from the school curriculum coordinator who tells what testing will be done and then gives the resulting information to you."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Cynthia, Teacher (River Elementary, Engler River ISD): "I am now writing curriculum, teaching workshops, and helping teachers in my building."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Guadalupe, Teacher (Moline Elementary, Island Cove ISD): "As a teacher of English to speakers of other languages, I teach all subjects. Primarily, I am required to teach language arts. However, I understand that hands-on science in the ESL classroom is the best way to teach academic vocabulary and concepts needed across the curriculum. I constantly have to coordinate language arts and the science, math, and technology areas or I would not be allowed to have the science center in my room. I would like to increase the amount of ESL connections that the TRC trainings document. Many are there, but training descriptions don't include it. Better curriculum inclusion descriptions would help us, ESL teachers, to justify attending the TRC Collaborative workshops to our principals so we can help our students prepare for TAKS."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Reginald, Assistant Principal (Moline Elementary, Island Cove ISD): "We have a Science facilitator on our campus that drives the instruction for our Kindergarten - 3rd grade students. Due to the valuable resource teacher that we have on our campus, our classroom teachers feel more comfortable with the Science curriculum."*

*(Comment from the Texas Campus Administrator Survey™)*

**Use of data for increasing teachers' science content knowledge**

This topic was the third highest (41%) of comments made by teachers on the *Texas Elementary, Intermediate or Middle School Teacher Survey*™ while 10% of campus administrators wrote supportive comments regarding teachers' science content knowledge of the *Texas Elementary Campus Administrator Survey*™. Most notable was that the campus administrators wrote much about their opinion of the lack of science content knowledge by teachers' on their campus with many indicating that was one reason science was not taught often. From the teachers' view, longevity with regional local Collaboratives and sustained PD science experiences permeated their feelings. Written comments were not a requirement for the DIDM portions of either survey.

*Anton, Teacher (Nasr Road Elementary, Laraki County ISD): "I have been with* [my regional Collaborative] *since 2003. I recently completed the Master Science Teacher Certification Course and just received my scores informing me that I have now obtained the state-level of a Certified Master Science Teacher."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Georgiana, Teacher #2 (Hayden Intermediate School, Badsey ISD): "TRC helped me prepare to teach science. I came from out of state with a degree in elementary education with a minor in math. I never liked science until I started teaching it and going to* [my regional Collaborative] *meetings and trainings. I now work on district science curriculum, do district trainings, and am completing my MST testing (hopefully) this month. I cannot say enough positive things about* [my regional collaborative TRC] ... *They do an awesome job!"*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Billie, Teacher #2 (Xenia Elementary, Xenia ISD): "I have been a member of* [my local Collaborative] *for over 12 years and believe that it has brought about a change of direction for science and science-related classrooms in the state of Texas. As an STM, I was aware of the need for individual classroom teachers in elementary level schools to receive supportive training and materials to build a stronger foundation for the upper level educators to count on with their students."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*David, Teacher (O.L. Stanley Elementary, Staver ISD): "I know this says I attended a regional collaborative workshop but it has been long ago. I do not remember exact details of the TRC, but wish I did. I ask every year to attend the state conferences and workshops to improve science teaching in our district but the answer is always* ***NO****. I think this is very unfortunate for the students of our district, as well as the teachers."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Jesus, Teacher #1 (Anchor Lane Elementary, Anchor Buggy ISD): "The* [local regional Collaborative] *has help connect me with an endless network of people that can answer any question that my students or I may have."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Data warehouse systems training / use within district and / or campus**

The actual use of data warehouse systems revealed minimal information within the comments on either survey. Very few campus administrators (10%) indicated how data warehouse information is used while teachers' (24%) indicated DIDM had valuable and variable uses.

*Nathan, Teacher (Rainier Elementary, Welch-Detroit ISD): "Our district uses Edusoft. I have tried to compile longitudinal data but the information cannot be retrieved nor is it reliable. The data is patchy and of little use other than for a one-year period."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Jordan, Teacher (Electro Elementary, Dragon ISD): "At our campus, we use the Baldridge method for backwards designing to plan and implement instruction. We start with the desired result and work backwards using the TEKS. Is this what you mean about 'data warehouse systems'?"*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Jóse, Assistant Principal (Duesenberg Elementary, Dragon ISD): "The C-Scope[266] collaboratives have made a huge difference in rigor and instruction."*

*(Comment from the Texas Campus Administrator Survey™)*

*Kathleen, Teacher #1 (Arrow Creek Intermediate School, Argo Hills ISD): "All data that I use I create with spreadsheets. No district data is furnished."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Barbanne, Teacher (Saturn Elementary, Universe ISD): "As the Science Specialist for our school, I have more access to data than the regular classroom teacher does. Unfortunately, we do not have many parent surveys to gather information from."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Donna, Teacher (Mercedes Elementary, Niagara Falls, ISD): "I believe my school makes available any data I need to enhance my teaching and help students achieve."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

However, the majority of participants expressed their frustration at the lack of data resources. The lack of DIDM appears to influence how well the teachers felt they are able to teach science to their students.

*Janie, Teacher (Blast Elementary, Berrien Buggy ISD): "I teach at a small low socio-economic school, therefore, we do not have some of the opportunities that larger schools may have. We are limited to computers and activities such as field trips because of a lack of funds. In addition, many of our students do not have access to computers at home, and they do not travel far from home limiting their worldly perspectives. However, we are striving to correct as much of this as possible through grants and creative teaching techniques. I am sure you understand these situations. We obviously are not the only school district in this situation. I do feel that sometimes outsiders, such as parents, non-teachers, do not look at the whole picture when it comes to rankings and test scores. Thank you for including me in your research."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Campus Administration and District positive support of science**

Comments from both campus administrators (17%) and teachers (18%) was nearly equal in the type of information provided on either survey. This topic as part of the DIDM section was somewhat a surprise since DIDM would not be directly related to positive supportive efforts on the part of campus administrators or how teachers' felt their activities were endorsed.

*Wallace, Teacher (Stewart Elementary, East Stewart Island CISD): "After my first year in* [my local Collaborative], *I felt like I had made years of progress in my* *science knowledge not only in my grade level but in grade levels below me and above. Because of this, I now understand where my students are coming from and where they are going. I now better understand my role in their science learning process. I would recommend that every science teacher needs to experience at least one year* [a regional] *TRC."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Rosalia, Principal (DeSoto Elementary, Chrysler CISD): "Science is stressed from Pre-Kinder to 5th grade. In Pre-Kinder, however, shapes, letters, sounds, numbers, animals, and colors are targeted so that picks up simple introductory science concepts. Also in 5th grade, we are departmentalized and a few teachers teach only Math or Reading or English Language Arts or Social Studies or some form of Elective. It's exciting to see how science is incorporated throughout all grades and disciplines."*

*(Comment from Texas Elementary Campus Administrator Survey™)*

**Lack of Science Content Knowledge by Teachers and Lack of Science Resources**

For many campuses, the lack of resources and lack of science content knowledge by the teachers has impeded science education programs. Both campus administrators (10%) and teachers' (11%) commented that not having the training or resources greatly reduces opportunities to teach science.

*Maria, Principal (Maxwell Elementary, Chrysler Rio ISD): "Teachers in elementary schools may not have sufficient content knowledge in specific core* *content. Science is a good example of this and our 5th grade science TAKS scores show it."*

*(Comment from Texas Elementary Campus Administrator Survey™)*

*Mark, Assistant Principal (Sheridan Elementary, Scripps Booth ISD):"Science is not taught much here because not many teachers are able to teach it."*

*(Comment from the Texas Campus Administrator Survey™)*

*Patricia, Assistant Principal (Anteros Elementary, Advanced Technologies ISD): "Without a science lab and other resources, teachers do not teach the science TEKS to the standards as defined by TEA and NCLB."*

*(Comment from the Texas Campus Administrator Survey™)*

*Margarita, Teacher, (LaSalle Elementary, General Motors ISD): "You have to understand that for me to comment that I am somewhat prepared is not an insult. I was not at all prepared in college or prior to my certification, and I was completely terrified of teaching science. So for me to feel somewhat prepared in an area where I had no training ... it is like learning to walk. I pray that over the next few years I will be able to run. Science was something that I had no previous experience in and tons of anxiety. I am learning science now and overcoming my inadequacies for teaching."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Sister Mary Katherine, Teacher #6 (Holy Family Academy, Holy Family Charter Schools): "I really did not attend enough sessions to be able to provide a great deal of information."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Esac, Teacher #4 (Stewart Elementary, East Stewart Island CISD): "Before TRC, I received training here and there about different topics. I felt like I was barely keeping my head above water. While attending* [my local Collaborative] *I received some of the best training that I have ever received in science. During this time, I also learned what to look for in a science workshop so I could pick the workshops that I needed and were worthwhile."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Reading and Mathematics primary focus on elementary campuses**

Approximately one-fifth of the campus administrators (21%) indicated how reading and mathematics usurp science teaching while teachers' (9%) indicated district-level demands for reading and mathematics were the cause for limitations to teach science.

*Eric, Assistant Principal #1 (Tomanek Elementary, Santa Cruz ISD): "Our district is focusing as a whole in reading and math in alignments with the TEKS and TAKS objectives only. It is more important to have children read and be able to do math. So I don't allow my teachers to teach Science on my campus."*

*(Comment from the Texas Campus Administrator Survey™)*

*Ken, Assistant Principal (Studebaker Elementary, West Terra ISD): "Science education is crucial at the elementary, I wish we would have more time throughout the day in order to allocate more time for this core area. But math & reading are emphasized in this district much more than science because our students need to know how to read and do math computations. So science just doesn't get taught here very often."*

*(Comment from the Texas Campus Administrator Survey™)*

*John, Teacher #2 (South Stutz Road Elementary, West Terra ISD): "At our campus, we are allowed to access any type of data from our PEIMS clerk. However, in second grade we primarily have benchmarks from our district for reading and math and that is what our principal insists on. We really do not have a formal assessment for science like the one we do for reading and math. Our district requires us to formally benchmark our students in the area of reading and math."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Use of data for TAKS test scores for improving student achievement**

The actual use of TAKS for improving student achievement on 5$^{th}$ grade science TAKS reveals minimal information within the comments on either survey. Slightly more campus administrators (17%) indicated the utilization of TAKS information use while teachers' (13%) discussed TAKS as part of the district requirements for formal assessments and as a method for gaining DIDM information.

*David, Teacher (O.L. Stanley Elementary, Staver ISD): "Our TAKS coordinator makes  all data available to us. She is wonderful!"*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Carol, Teacher #2 (Western America Elementary, Amalgamated ISD): "Test data is available from the school counselor. Assessment information is available from the school curriculum coordinator who tells what testing will be done and then gives the resulting information to you."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Lynne, Teacher (Earl Elementary, DuPont ISD): "My students have reaped the benefits of my TRC experiences. I believe our love of science, our knowledge of science and our TAKS scores reflect that the TRC has been a distinct advantage for me and my students."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Mary Lee, Teacher (Windsor Elementary, Winston ISD): "I have continuously informed my colleagues about the TRC and the fact that it reinforced my beliefs that <u>I was on the right track</u> even though TAKS test scores do not agree. Hands on inquiry-based science will have a positive effect on students in the end."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Use of data for TEKS science standards / objectives for improving student achievement**

The use of the TEKS science standards/objectives appeared to be a higher requirement of accountability for teachers' according to comments made by campus administrators (28%) while teachers' (10%) made few references to using TEKS to guide teaching practices.

> *Aaron, Assistant Principal (Mercury Middle School, Ford ISD): "I believe most of the training we have received has been beneficial to organizing our curriculum and having a greater focus on the TEKS".*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Kerry, Assistant Principal (South Stutz Road Elementary, West Terra ISD): "All teachers should be teaching to the standards only because it is mandated. However, more attention needs to be applied to how we teach to those standards."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Patricia, Assistant Principal (Anteros Elementary, Advanced Technologies ISD): "Many teachers feel they are covering science TEKS and doing an adequate job of administering the curriculum."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Reginald, Assistant Principal (Moline Elementary, Island Cove ISD): "[Our] Science facilitator drives the instruction for our students and teachers .... This teacher directly provides instruction to some grade levels and is a critical resource at other grade levels as she plans the Science lessons for our self-contained teachers which are based on the TEKS."*

*(Comment from the Texas Campus Administrator Survey™)*

*Adrianna Elise, Assistant Principal (Steammobile Elementary, Stearns-Knight ISD): "Our district is focusing as a whole in science and math in alignment with the TEKS and TAKS objectives. They are using thematic units called bundles. This is the first year that the teachers are responsible for utilizing this form of curriculum focus … I personally think that the bundles are a wonderful idea except that the approach to getting the teachers to use them and expanding on them are not the way I would address it. I believe that teachers need to have an ownership of collaborating in their campuses first prior to collaborating as a district. Our TAKS science scores are slowly improving, I just think that if the teachers felt any sense of ownership about science teaching, then the students would gain so much more. It really depends on how the teacher brings out the learning experiences for their students."*

*(Comment from the Texas Campus Administrator Survey™)*

*Ivy, Teacher #1 (Morris Elementary, Eisenhuth ISD): "Our school has 6 Week tests assessing student performance on TEKS taught during the 6 weeks period. We also give a practice TAKS test during the first week or two of school to assess where we are in terms of meeting standards for the end of the year. We again give a practice test in January and then again in early April. This enables us to chart student progress for the year and see who needs tutorial time and extra help in order to meet end of year standards. We are having great results!"*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*William, Teacher #2 (Eastman Elementary, Emerson ISD): "I have been working on a Saturday Science Fifth Grade at one of the other elementary* [schools] *within my school district where we are focusing on TEKS. I have been using a lot of the material I have gotten from the collaborative to work with those students and teachers."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Limited or No Science Education Programs at Texas Elementary Campuses**

As the highest level of comments from the campus administrators (55%), many indicated that their elementary campuses do not have science education programs while few teachers' (8%) commented about this situation. Many campus administrators indicated the situation was due to accountability concerns required by districts in Language Arts and Mathematics for AYP reports mandated by *NCLB*. From the *Texas Elementary Campus Administrator Survey*™, 55% indicate there was <u>no science or limited science</u> taught at their campuses and 10% felt that the teachers lacked requisite science content knowledge preparation. Furthermore, 11% of the teachers agreed that the lack of science content knowledge preparation has held them back as well.

*George, Principal (Marquette Elementary, General Motors ISD): "Our district has focused our data uses as a whole in reading and math in alignments with the TEKS and TAKS objectives only. Science is not included on my campus, I have the grades PreK-5 and our focus entirely is on our reading and math scores."*

*(Comment from the Texas Campus Administrator Survey™)*

*Mary, Principal (Edsel Elementary, Lincoln-Ford CISD): "I feel the overall quality of science instruction (Kinder - 5th grade) has improved over the last 5 years at my school. But I still feel we have a lot of room to improve since, overall science still is not featured often in the curriculum here."*

*(Comment from the Texas Campus Administrator Survey™)*

*Carolina, Assistant Principal (Chalmers Elementary, Chalmers-Detroit CISD): "Reading & math are the main concern for students on my campus. As a former reading coach, I believe it is more important to have a solid foundation in reading in elementary schools. Science should be taught in middle schools only."*

*(Comment from the Texas Campus Administrator Survey™)*

*Shirley, Teacher (Ewing Elementary, GMC ISD) "It is unfortunate that my district doesn't understand my need to have quality science materials, equipment, books, etc. for teaching my ESL students so they would have access to hands-on learning. But in this district, I haven't been able to encourage my principal to participate in TRC's programs. As such, my students aren't learning science well at all."*

*(Comment from Texas Elementary, Intermediate or Middle School Teacher Survey™)*

## COMMENTS FROM THE SURVEYS REGARDING DATA-INFORMED DECISION MAKING USE FOR MONITORING ELEMENTARY SCIENCE

The focus of the third research question examined external factors influencing a CIL's decision to hire professional elementary science educators. *Research Question #3 Do* *the Campus Instructional Leaders' decisions support the selection of pre-eminent teacher staffing arrangements to enhance student learning through teacher instruction?* Although comment space was provided on both surveys none of the participating teachers included comments on the *Texas Elementary, Intermediate or Middle School Teacher Survey™*. It is assumed that teachers' chose not to provide additional information for this section since it was not a *required* comment area.

From the CA survey, sixteen topics were identified that dealt with a TAKS, a campus' performance rating, and monitoring science education programs. However, none of the comments in this portion of the *Texas Elementary Campus Administrators Survey™* directly addressed the research question, multiple aspects of staffing and pre-eminent teachers were discussed. These topics included: (1) School performance rating overall due to TAKS, (2) Lack of or limitations of science education programs at campus, (3) Reports of past performance at the campus by the 5$^{th}$ grade science TAKS, (4) Knowledge of increasing science programs caused an increase in 5$^{th}$ grade science TAKS, (5) blaming low TAKS scores on < 5 students, (6) cross-discipline uses of science in reading, mathematics and art, (7) Lack of knowledge by the CA regarding TRC science program PD for teacher training, (8) blame of poor advertising of TRC science PD programs, (9) overall low science TAKS scores with no specific reason, (10) CA knowledge of STMs and CMs on their campus, (11) CA moved frequently to campus assignments, (12) Science TAKS not being important for federal AYP assessment or for the state-level accountability system, (13) CA multiple assigned elementary campus duties during the same school year, (14) CA blame of lack of science content knowledge by teachers cause for low 5$^{th}$ grade science TAKS scores, (15) prohibited by excessive costs of TRC science PD programs and not sending teachers, and (16) positive support of science from the district-level supporting DIDM.

The maximum number of comments dealt with campus administrators (52.5%) reporting general information regarding their campus TAKS performance. Since the majority of comments dealt with campuses past performance on TAKS, this single topic became individual items. Some campus administrators indicated the lowest TAKS scores (10%) are usually in science while indicating science is not included within their campuses academic subjects (37.5%).

| **Uses of Data - Topics** | **% Campus Administrator Survey Comments * (N = 40)** |
|---|---|
| 1. School performance rating overall due to TAKS | **52.5%** |
| 2. Lack of or limited science education at campus | **37.5%** |
| 3. Reports past performance for campus science TAKS | **20.0%** |
| 4. Increased science program, Increased science TAKS | **17.5%** |
| 5. Blaming <5 students on low TAKS | **12.5%** |
| 6. Cross-discipline use of science | **12.5%** |
| 7. CM lack of knowledge @ TRC program trained teachers | **12.5%** |
| 8. CM blame on poor advertising of TRC science PD | **12.5%** |
| 9. Low science TAKS | 10.0% |
| 10. CA knowledge of STMs & CMs | 10.0% |
| 11. CA moved frequently to campus assignments | 7.5% |
| 12. TAKS not important on federal AYP or state accountability system | 7.5% |
| 13. CA multiple campus assignment duties at same time | 5.0% |
| 14. CA believes there is a lack of science content knowledge by teachers | 5.0% |
| 15. Prohibited by excessive costs of TRC PD | 5.0% |
| 16. Positive support from district-level for science education | 5.0% |

* **Bold** indicates top 5 comments

Table 4.73. Campus Administrator Survey only comments regarding use of data for TAKS, performance ratings and monitoring science education

Many campus administrators noted that participation in the TRC science PD, the campus performance on TAKS increased over time from low performing to recognized or exemplary (17.5%). Furthermore, 20% of CAs wrote about their campuses general trends of past performance on the 5th grade science TAKS. The same number of responses (12.5%) occurs for five topic categories; blame <5 students for low TAKS scores, cross-discipline uses of science, CA lack of knowledge regarding TRC science PD program trained teachers, and CA blame of poor advertising of TRC science PD programs. Fewer CAs (10%) report that their campus had a lower science TAKS with no further discussion.

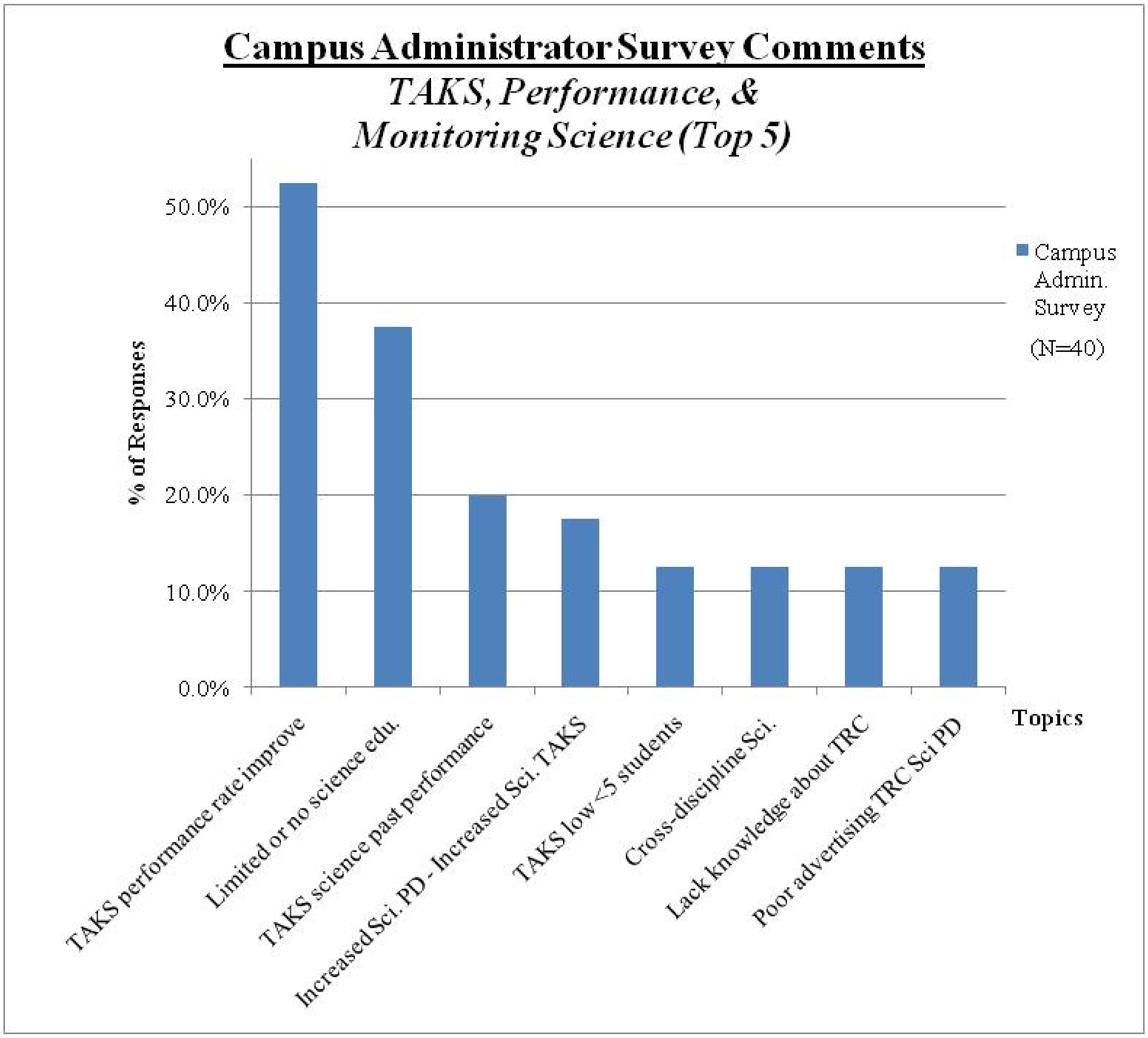



Figure 4.38. Campus administrator survey comments regarding TAKS, campus performance ratings on TAKS, and monitoring science education

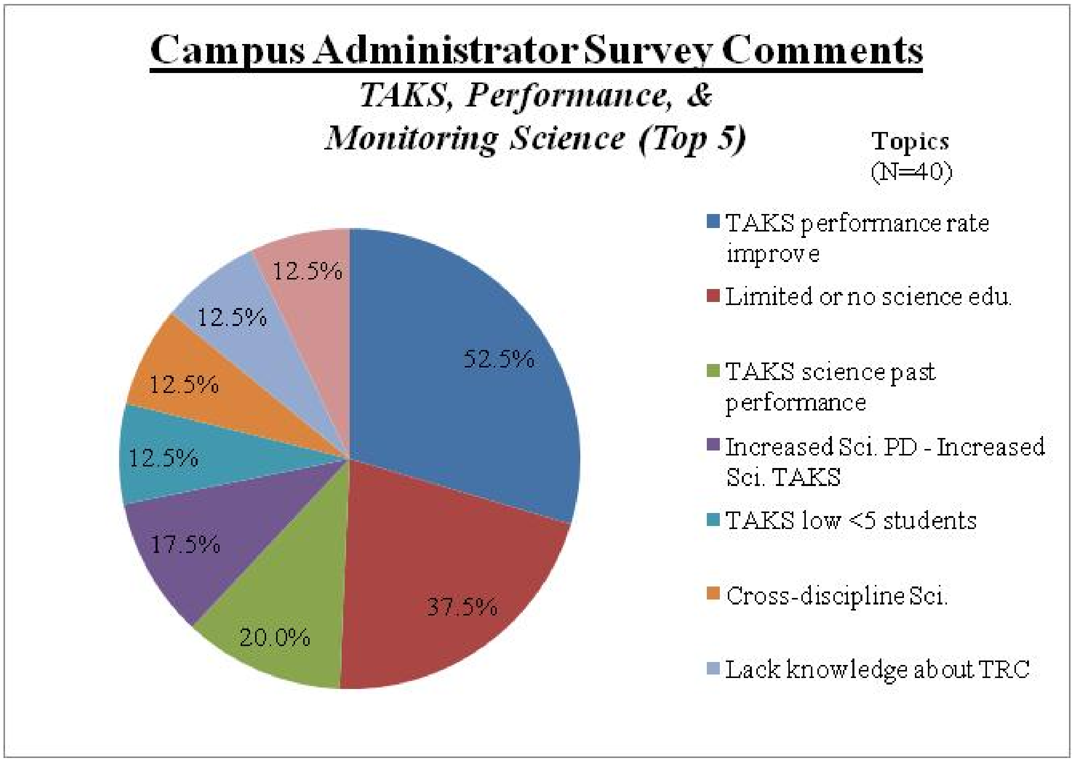



Figure 4.39. Campus Administrator Survey only, comments about TAKS, Performance ratings and monitoring science education, top 5 comments

the TRC science PD program through discussion of the number of STMs and CMs on their campuses. Similarly, few CA's (7.5%) indicate that their knowledge of TRC, STMs or CMS was missing due to being frequently moved to various assigned campuses within the past two or three years while the same number of responses (7.5%) wrote that the "*[science] TAKS is not important on the federal AYP.*"[267]

Last, there are CA (5%) responses for four topic categories discussed such as CA assignment to multiple campuses during the same school year. CA's believe that low science TAKS scores are a direct result of the lack of science content knowledge of teachers, and the cost of the TRC science PD was prohibitive for smaller districts. Two CAs (5%) indicate that they received directives from the Assistant Superintendent to use DIDM applications for science education.

All comments from the *Texas Elementary Campus Administrator*™ were analyzed and selected comments are presented individually. Any names, campuses and districts used in this document are primarily pseudonyms from either American car manufactures and car names from 1895 to 2007 or from international car manufactures and car names from 1900 to 2007. Campus administrators are identified by first name, position help, school and district; *Jóse, Assistant Principal (Duesenberg Elementary, Dragon ISD).*

**School performance rating overall due to TAKS Comments:**

This topic was most frequently discussed within the CA (52.5%) comments. The majority of comments talk about the campus' school performance improvement. A few comments are made about school performance ratings diminishing due to the 5th grade science TAKS scores. The comments that are specific to a topic are reported within the discussions that follow in this section.

> *Greg, Assistant Principal (River Elementary, Engler River ISD): "River Elementary school received the recognized status from TEA for the first time in the four (now five) years the school has been open. We went from almost low performing in the area of 5th grade science to recognized in three years."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

**Lack of or limitations of science education programs at campus**

As the second topic from the CA survey, 37.5% expressed their viewpoint about the lack of or limitations regarding science education programs at their campuses. The majority of comments reflect beliefs that science is not appropriate for elementary schools because of the severity of accountability linked to TAKS reading and mathematics test scores.

*William, Principal (Aurora Drive Elementary, Santa Cruz ISD): "Grades K - 5 primarily should be on teaching children about reading & language arts, how to write and do math. I just do not think science is important to elementary children."*

*(Comment from the Texas Campus Administrator Survey™)*

**Reports of past performance at the campus by the 5th grade science TAKS**

The third topic deals specifically with CA (17.5%) expression about the impact on their campus' from the 5th grade science TAKS test scores. Most of the CA provide details about how the campus TAKS improved once the district determined that science teaching is important for the students.

*Olga, Principal (Orlo River Elementary, Niagara Falls ISD): "In 2007 we had 89% of our students pass Science TAKS and 46% were commended in Science. Our district has an assistant superintendent for student success and with his help we concentrated on fifth grade science and the results speak for themselves. We have taken the Science TEKS and unpacked them, we study the data analysis provided by the state, and take diagnostic tests throughout the year. We are a data driven campus!"*

*(Comment from the Texas Campus Administrator Survey™)*

*Carlos, Principal (Melendez Elementary, Flint ISD): "We had 90% passing in science."*

*(Comment from the Texas Campus Administrator Survey™)*

*Melanie, Principal ( Terra Elementary, West Terra ISD): "Our campus had a recognized status the year before but we fell to acceptable due to our Science scores. All other scores were 90s except for a 71% in Science. We did qualify for the TEEG Grant for the 2005-06 scores. We are working our way up to exemplary."*

*(Comment from the Texas Campus Administrator Survey™)*

**Knowledge of increasing science programs caused an increase in 5th grade science TAKS**

Many CA (17.5%) discuss their observations of how the local regional Collaboratives science PD has contributed to improvements of student achievement on the 5th grade science TAKS scores.

*DonAnne, Principal (Macaw Elementary, Niagara Falls ISD): "The TRC program helped our school improve science instruction and raise our passing rate on TAKS)."*

*(Comment from the Texas Campus Administrator Survey™)*

*Michal, Assistant Principal (Red Bug Middle School, Santa Cruz ISD): "The collaborative has helped our science teachers immensely."*

*(Comment from the Texas Campus Administrator Survey™)*

**Blaming > 5 students for low TAKS scores**

There are four topics that shared the 5th level of importance on the CA survey. The first topic discussion revolves around the CA awareness (12.5%) that the local regional

Collaboratives has played an important part in the increase over time of individual campus' 5th grade science TAKS scores. The main issue was that CAs were indicating their overall campus performance rating was not achieved due to <5 students ability to succeed on the 5th grade science TAKS exam. Very few indicated any possible cause of this failure while most did indicate that the students who failed TAKS usually were from an identified sub-group of students. Based on statewide assessments of TAKS, these sub-groups have been identified by TEA[268] as "special education".

*Olga, Principal (Orlo River Elementary, Niagara Falls ISD): "In 2006 our campus missed being a recognized campus by a couple of students in a sub group in science. In 2006 only 71% of our students passed Science TAKS."*

*(Comment from the Texas Campus Administrator Survey™)*

*Roberta, Principal (Velie Elementary, Van Wagonner ISD): "We were one student away from exemplary. 5th grade science was our downfall."*

*(Comment from the Texas Campus Administrator Survey™)*

*Laraine, Principal (Ortiz Elementary, Santiago CISD): "Ortiz missed being recognized in one subgroup by 3 students."*

*(Comment from the Texas Campus Administrator Survey™)*

*Louis, Principal (Red Rock Elementary, Franklin ISD): "We missed being recognized by 1 student for the 2nd straight year."*

*(Comment from the Texas Campus Administrator Survey™)*

*Laura, Assistant Principal (Smith Elementary, Smith Flyer ISD): "For the past three years, the campus has failed to reach Recognized status due to the low student performance on TAKS Science 5th grade test."*

*(Comment from the Texas Campus Administrator Survey™)*

*Martha, Assistant Principal (Delgado Elementary, Rockwell ISD): "We missed an Exemplary rating by one student in the area of low socio economic math. Our fifth grade* Math *score was 97% with over 50% commended."*

*(Comment from the Texas Campus Administrator Survey™)*

*Cathy, Principal (Wolverine Elementary, West Terra ISD): "Wolverine Elementary missed being recognized by one student in Science. We were awarded the NCLB-Blue Ribbon School Award in 2003. We were recognized in 2002 and 2006."*

*(Comment from the Texas Campus Administrator Survey™)*

**Cross-discipline uses of science in reading, mathematics and art**

The second factor sharing the level of fifth place in a four-way tie includes discussions by CAs (12.5%) of their observations of teachers using science in cross-discipline teaching in other academic subjects along with fine arts. Many of the CA written voices include very specific examples of how other teachers on their campuses are using science concepts within different disciplines.

*Joy, Principal (Dort Elementary, Doble ISD): "Many teachers in the* fine arts *have gone to the TRC conference and have brought back ideas to use cross-curricular wise in their subject. For instance, our art teacher incorporates life science by having the students' plant and maintain a butterfly garden. She also has the* *students dip paint on dead fish and then press the fish on paper to make an imprint of the fish. Our art teacher also sponsors* Feather Fest *and creates activities around environmental issues and the effect it has on birds."*

*(Comment from the Texas Campus Administrator Survey™)*

**Lack of knowledge by the CA regarding TRC science program PD for teacher training**

The third factor sharing the level of fifth place in a four-way tie includes discussions by the CAs (12.5%) where the local regional Collaboratives are not recognized as where the teachers are attending PD. This is noticeable mostly when CA discuss training programs through ESCs as a separate entity or their viewpoint that science is not appropriate at an elementary campus.

*Stephen, Principal (Barley Elementary, Santa Cruz ISD): "I send my science teachers to training at [the local ESC] Region, Steve Spangler, Loose in the Lab, and the national convention. What is a TRC?"*

*(Comment from the Texas Campus Administrator Survey™)*

*George, Principal (DeSoto Elementary, Chrysler ISD): "We do have a Science Facilitator on our campus, which services several grade levels. However, I don't think he went through the Texas Regional Collaboratives professional development program.*

*(Comment from the Texas Campus Administrator Survey™)*

*Tom, Assistant Principal (Rayfield Lane Elementary, Dragon ISD): "Grades K - 5 should focus primarily on reading /language arts /writing and math."*

*(Comment from the Texas Campus Administrator Survey™)*

*Kerry, Assistant Principal (South Stutz Road Elementary, West Terra ISD): "My science teachers attend many [of our local ESC] Region workshop opportunities. This is the first time I have ever heard of the Texas Regional Collaborative program."*

*(Comment from the Texas Campus Administrator Survey™)*

**Blame of poor advertising of TRC science PD programs**

The fourth and last factor sharing the level of fifth place in a four-way tie includes discussions by CAs (12.5%) who express strongly that the TRC programs are not advertised appropriately. Some comment on the specific requirement demands for teachers enrolled in the local regional Collaboratives PD.

*Allison, Assistant Principal (Melendez Elementary, Flint ISD): "The TRC program is not advertised properly. Too much pressure is placed on the designated teacher. Too many things to do to become a teacher mentor in addition to teaching the regular required curriculum."*

*(Comment from the Texas Campus Administrator Survey™)*

*MaryKate, Assistant Principal (Pullman Elementary, Dragon ISD): "Don't remember hearing anything about the Texas Regional Collaboratives mentor teachers or the TRC professional development program for science teachers."*

*(Comment from the Texas Campus Administrator Survey™)*

*Isaac, Assistant Principal #2 (Tomanek Elementary, Santa Cruz ISD): "Information about the program needs to be presented or given to administrators in a clear,* *specific manner regarding cost, location, time commitment, registration, etc. in order for campuses to access the program."*

*(Comment from the Texas Campus Administrator Survey™)*

*Caleb, Assistant Principal #2 (Terra Elementary, West Terra ISD): "I would love more information about the Texas Regional Collaboration programs to share with my science teachers."*

*(Comment from the Texas Campus Administrator Survey™)*

**Overall low science TAKS scores with no specific reason**

A few CAs (10%) mention that the overall performance reviews for their campuses have been influenced by low levels of student achievement on the 5th grade science TAKS. However, no other information is provided regarding circumstances that may have contributed to the lack of students' ability for learning science.

*Terri, Assistant Principal #2 (Apperson Elementary, General Motors ISD): "Science is the lowest score we usually have."*

*(Comment from the Texas Campus Administrator Survey™)*

*Mary Lee, Assistant Principal (Little Creek Intermediate School, Falcon-Knight CISD): "We were very close to recognized; however our science scores prevented us from reaching the recognized status."*

*(Comment from the Texas Campus Administrator Survey™)*

**CA knowledge of STMs and CMs on their campus**

The same number of CAs (10%) discuss their knowledge of teachers' achieving the level as an STMs and/ or CMs.

*Paula, Principal (Asardos Elementary, Santa Cruz ISD): "There are about 3 teachers who have been TRC Science Mentor teachers in the past. At the present time, none are serving in that capacity."*

*(Comment from the Texas Campus Administrator Survey™)*

*Chuck, Assistant Principal (Apollo Elementary, General Motors ISD): "I have 3 SMTs on my campus and 15 additional cadre members under each of them."*

*(Comment from the Texas Campus Administrator Survey™)*

*Sandy, Assistant Principal (Western Night Sky Elementary School): "I don't have a mentor because the teacher trained at the academy has resigned. since the last training there has not been any more staff development. I have 2 excellent teachers who could become mentors but were hired after the initial training."*

*(Comment from the Texas Campus Administrator Survey™)*

*Jóse, Assistant Principal (Duesenberg Elementary, Dragon ISD): "One of my science teachers has been involved in the TRC but I do not believe she has attained the level of mentor teacher."*

*(Comment from the Texas Campus Administrator Survey™)*

**CA moved frequently or new on assigned campuses**

Another recurring concern is many CAs (7.5%) are moved frequently to a new campus assignment or are newly assigned to a campus. The CA comments also indicate that they were unaware of which teachers' on their respective campuses were participants of the local regional Collaborative. This is the same issue supported in the statistical analysis earlier in this chapter.

*Franklin, Principal (Tucker Road Elementary, Trihawk ISD): "This is my second year at this campus. I am not aware if I have teachers who have participated in the TRC Science program."*

*(Comment from the Texas Campus Administrator Survey™)*

*Louisa, Principal (Excalibur Charter Academy, Dragon ISD): "I am a first year assistant principal; therefore I do not have knowledge of any teachers on my current campus who have attended the Texas Regional Collaborative programs."*

*(Comment from the Texas Campus Administrator Survey™)*

*Lewis, Principal (Pungs Finch Elementary, Dragon ISD): "I have been assigned to this campus as Principal temporarily. The school is split into two campuses due to the construction of a new wing. My campus houses only sixth graders and is located across town from the original campus."*

*(Comment from the Texas Campus Administrator Survey™)*

*Suzanne, Principal (Fisker Elem, Avanti ISD): "I am the principal at two schools, one was Recognized and the other was Academically Acceptable."*

*(Comment from the Texas Campus Administrator Survey™)*

*Frank, Assistant Principal (Indian Paintbrush Elementary, Tincher ISD): "I have been the A.P. at this campus for 1 complete year and 2 years as a half-timer share with another campus, and at a previous one for 3 years. I do not have a clue which teacher may have attended training in your program, nor from which school."*

*(Comment from the Texas Campus Administrator Survey™)*

**Science TAKS not being important for federal AYP assessment**

Although science is a portion of a Texas elementary campus' annual accountability system monitoring, success or failure of the 5th grade science TAKS test does not possess any of the negative consequences or punishments associated with failure to pass reading or mathematics for the federal AYP report. Therefore, some CAs (7.5%) express how science is not important for either state or federal assessment qualifications.

*Olga, Principal (Orlo River Elementary, Niagara Falls ISD): "Texas schools are judged on TAKS for reading and mathematics."*

*(Comment from the Texas Campus Administrator Survey™)*

*Anna-Marie, Principal (Rayfield Lane Elementary, Dragon ISD): "Campuses do not receive performance ratings due to the number of students tested."*

*(Comment from the Texas Campus Administrator Survey™)*

**CA blame of lack of science content knowledge by teachers cause for low 5th grade science TAKS scores**

A concern in a few CA (5%) comments indicate that the lack of student achievement on the 5th grade science TAKS may be caused by the teachers' having insufficient science content knowledge.

*Laura, Assistant Principal (Smith Elementary, Smith Flyer ISD): "[Due to our low TAKS Science 5th grade test scores] we have determined that many of our teachers are not as effective with teaching Science due to lack of knowledge of the content."*

*(Comment from the Texas Campus Administrator Survey™)*

*Raul, Assistant Principal (Mercedes Elementary, Niagara Falls, ISD): "Science was where our campus was Unacceptable rated. We clearly need more science training for our teachers, but our small district can't afford send many people out for it. We would like to have things done via distance learning if there are any things that are out there for that."*

*(Comment from the Texas Campus Administrator Survey™)*

**Positive support of science from the district-level supporting DIDM**

The last topic of discussion from CAs (5%) demonstrate positive support for attending local regional Collaboratives PDs in order to improve teachers' science content and knowledge.

*Laraine, Principal (Ortiz Elementary, Santiago CISD): "Science performance increased 30 points from the previous school year due to having a teacher who had completed over 100 CPE hours of science development the previous year. TRC helped our school tremendously."*

*(Comment from the Texas Campus Administrator Survey™)*

*Rosalie, Assistant Principal (Auburn College Academy Elementary, Santa Cruz ISD): "The science coordinator in the district asked that each campus in the district send a representative to the Regional Collaborative, so I sent one and she came* *back with some great ideas to share with the campus. She continues to meet with the other science teachers in our district and attends any additional Regional Collaboratives."*

*(Comment from the Texas Campus Administrator Survey™)*

## IMPACT OF SCIENCE PROFESSIONAL DEVELOPMENT ON 5$^{TH}$ GRADE SCIENCE TAKS

The focus of the fourth research question examines the impact of science PD for teachers and how a specific teacher-training program offered by regional Collaboratives could influence student achievement on the 5$^{th}$ grade science TAKS test. *Research Question #4: How does the science education professional development opportunity for teachers impact 5$^{th}$ grade science TAKS scores?*

Through analyzing comments from both surveys, 28 topics are identified that dealt with how science PD could influence student achievement on the 5$^{th}$ grade science TAKS test. Among the CAs the comments focus on the *big picture* aspect of managing an entire elementary school campus facility while the Teachers' comments are personally focused and directly applicable to student learning and achievement.

Due to the larger number of comments made by CAs (N=63) and Teachers (N=80), the top three concerns are described in the introduction of this section. The percentage of responses for each identified topic have been added to selected comments that follow Figure 4.75.

The top three areas of concern for CA demonstrate management qualities that any campus administrator faces under the scrutiny of *NCLB* and state accountability requirements. First, the ability of local regional Collaboratives science PD to match Curriculum & Instruction strategies (17%) for the teachers to learn how to apply pedagogy to TEKS standards and 5th grade science TAKS. This is closely followed by the second highest response (15.8%) regarding the use of DIDM and applications of research-based pedagogy for Curriculum & Instruction to reach the highest impact on student learning and achievement. The next two are tied as the third highest responses (9.5%) for (1) Increase number of science benchmarks & formative assessments to monitor student learning and achievement and (2) that the demands and requirements of TRC science PD are considered as too excessive on teachers' time and that the participating teachers were out-of-the-classroom too often.

From the teachers' comments, two of the top three concerns are not addressed in the CA comments. In a three-way tie, the top concern of the teachers (1) regard teaching outside of their teaching certification credentials (15.2%), (2) their perceptions of no district support science (15.2%), and (3) quite a few Special Education teachers who are directed to focus teaching efforts on reading and mathematics yet expected to include science (15.2%). The second highest concern is teachers' perception that their CA did not support teacher attendance to the TRC PD (13.6%). The third concern is a two-way tie that (1) a teacher was unable to continue TRC sessions due to personal conflicts (10.5%) such as family or medical reasons, and that (2) the overall demands of TRC science PD were excessive (10.5%) requirements of time, travel and other expenses.

In both surveys, many CAs and Teachers express high praise and positive reactions about the science PD experience. Some teachers note the support, resources, and materials provided by the local regional collaboratives and the comments express their gratitude. Some of the more experienced CAs express high regards for the overall training programs provided through the local regional Collaboratives and discuss noticeable, positive behavioral changes observed as teachers participate in the PD programs. Overall there are a very high number of negative reactions to the local regional Collaboratives regarding issues such as time requirements when the teachers were not in their classrooms, the lack of or repetition of programs offered, the lack of technology for distance-learning.

Sixty-three campus administrators wrote thoughtful responses as well as eighty teachers. Pseudonyms are used for first names, campus name and district name. Job titles are the only accurate documentation. There are 23 topic categories identified through the analytical process: (1) TRC science PD programs work to help teachers learn to match curriculum and instruction strategies to TEKS and science TAKS, (2) DIDM and research-based curriculum and instruction strategies high impact on student learning and achievement, (3) Increase number of science measurement of student learning through benchmarks and formative assessments, (4) Demands of TRC science PD programs excessive, (5) Teachers reluctance to teach science or attend TRC science PD, (6) CA observation of little to no impact from TRC science PD and teachers uncertain about attending TRC science PD, (7) CA observation of noticeable HQCT strategies and increased teacher science content and knowledge, (8) CA observation and teacher self-reporting of needing help to teach science, (9) CA desire to attend TRC training to support teachers in program, (10) CA observation of teachers high TRC science PD attendance improve student achievement, (11) CA observation of noticeable teachers' struggle and their lack or ability of applying TRC science PD experience, (12) Lack of advertising TRC PD, (13) High turnover science teachers after participating in TRC science PD, (14) Strong science education program on campus or within district, (15) Lack of teacher college preparation or teaching out-of-certification, (16) Campus no longer involved with TRC programs, (17) Lack of technology access, (18) TRC limitations on number of teachers and districts participation, (19) CA noticeable change in teacher behavior through leadership, mentoring, and other roles after attending TRC science PD, (20) Limited science programs on campus, (21) Teaching assignments changed, (22) Limited or no district support of science programs, (23) Special education and other teachers’ primary focus teaching

Reading and Mathematics for *NCLB* accountability, (24) Limited or no CA support of Teachers' attending TRC science PD, (25) Teacher is no longer teaching science, (26) Joy teaching science prior now lost to TAKS and *NCLB* required accountability structure, (27) None or lack TRC programs / grade, and (29) Teacher was unable to continue TRC sessions.

All of the teacher participants were invited as participants for this study due to their former enrollment through a local regional Collaborative science PD program between 2003 and 2008. Teacher names were selected through a stratified random process and the campus administrators at the schools where the teachers were employed in 2007-2008 were invited as participants as well. Written comments were not a requirement for the PD portions of either survey. However, there was more participation in written comments in this section when compared to earlier research questions.

| **Uses of Data - Topics** | **% Teacher Survey Comments (N = 80)** | **% Campus Administrator Survey Comments (N = 63)** |
|---|---|---|
| 1. TRC match C&I to TEKS & Sci. TAKS | 8.0% | **17.0%** |
| 2. DIDM & Research-based C&I high impact | 9.6% | **15.8%** |
| 3. Increase # sci. benchmarks & formative assess | **12.0%** | **9.5%** |
| 4. Demands of TRC PD excessive | 10.5% | **9.5%** |
| 5. No impact PD / teachers uncertain | 4.0% | **9.5%** |
| 6. Teachers reluctant teach sci. | *No comments* | **7.0%** |
| 7. Noticeable HQCT science knowledge | 2.4% | **6.0%** |
| 8. Teachers need help for science teaching | 1.6% | 5.0% |
| 9. CA attend TRC training | 0.8% | 4.4% |
| 10. High PD attendance, improve student achievement | 0.8% | 3.2% |
| 11. Noticeable teachers' struggle & lack ability application | 0.8% | 3.0% |
| 12. Lack of advertising TRC PD | 5.0% | 3.0% |
| 13. High turnover science teachers | *No comments* | 2.0% |
| 14. Strong science education program | *No comments* | 1.3% |
| 15. Teacher Prep. Lack Out-of-cert. | **15.2%** | 1.3% |

| | | |
|---|---|---|
| 16. Campus not involved with TRC programs | 6.4% | 1.3% |
| 17. Lack of technology access | 2.4% | 1.3% |
| 18. TRC limits participation | 2.4% | 1% |
| 19. Noticeable teacher leadership development | 4.0% | 1% |
| 20. Limited science programs on campus | *No comments* | 1% |
| 21. Teaching assignment changed, | **16.0%** | *No comments* |
| 22. Limited or no district support of science programs | **15.2%** | *No comments* |
| 23. Special education and other teachers' focus Reading and Math for *NCLB* accountability | **15.2%** | *No comments* |
| 24. No CA support Teacher attend TRC PD | **13.6%** | *No comments* |
| 25. Teacher no longer teaching sci | 7.0% | *No comments* |
| 26. Joy teaching sci. prior to TAKS / *NCLB* | 3.0% | *No comments* |
| 27. None or lack of TRC science PD programs for specific grade levels | 2.4% | *No comments* |
| 29. Teacher unable to continue TRC science PD sessions | 10.5% | *No comments* |

* **Bold** indicates top 5 comments

Table 4.74. Teacher and Campus administrator survey comments regarding science professional development through local, regional Collaboratives

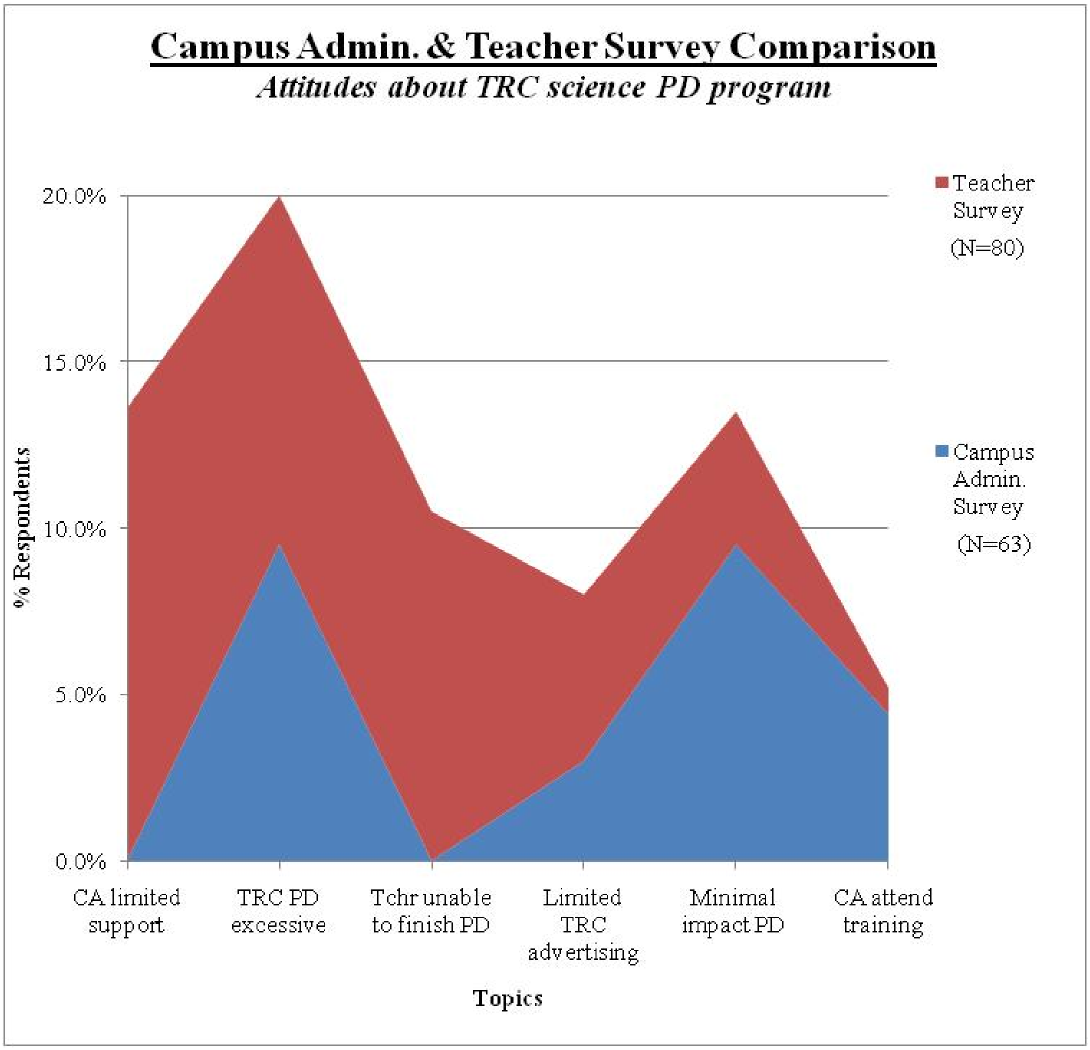

Campus Admin. & Teacher Survey Comparison
Attitudes about TRC science PD program
20.0%
15.0%
10.0%
5.0%
0.0%
% Respondents
Teacher Survey (N=80)
Campus Admin. Survey (N=63)
CA limited support
TRC PD excessive
Tchr unable to finish PD
Limited TRC advertising
Minimal impact PD
CA attend training
Topics

Figure 4.40. Campus Administrators and Teachers Survey comparison of comment attitudes regarding science education Professional Development, top 5 comments

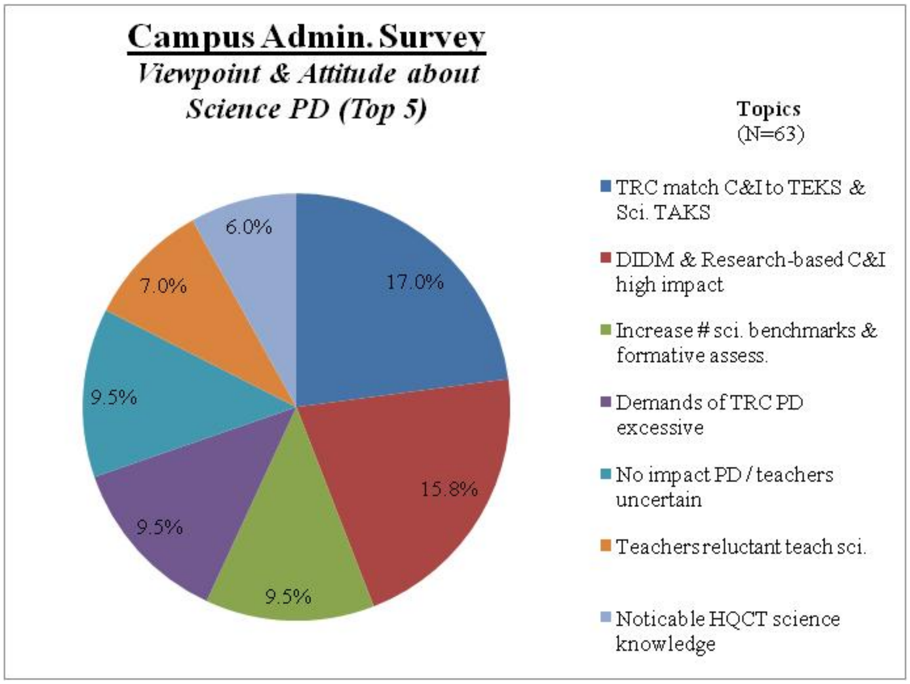



Figure 4.41. Campus Administrators survey viewpoint and attitudes regarding science education Professional Development, top 5 comments

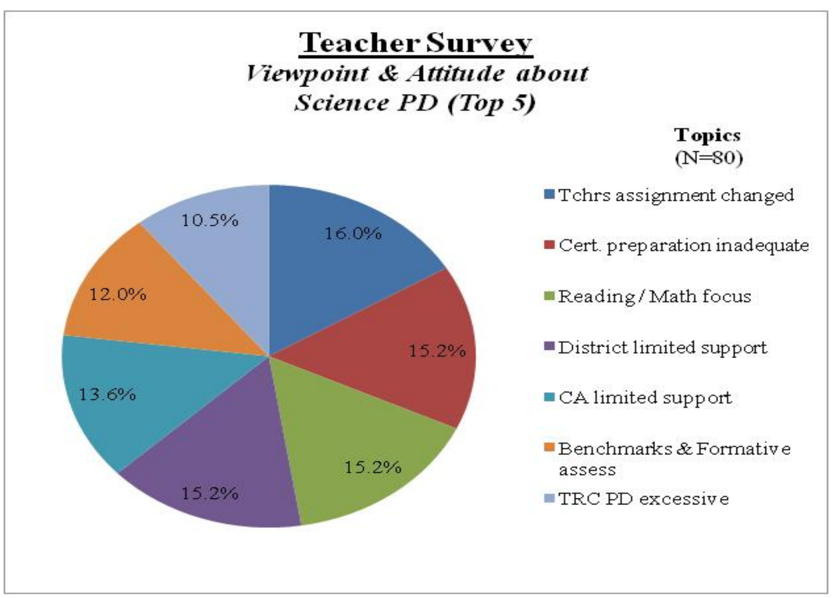


Figure 4.42. Teacher Survey viewpoint and attitudes regarding science education Professional Development, top 5 comments

**TRC match of Curriculum & Instruction strategies to TEKS standards & 5$^{th}$ grade science TAKS**

This section has the highest number of comments from campus administrator (17%), yet is mid-range from the teachers' comments (8%). From the CA viewpoint, the local regional Collaboratives science PD was very helpful and useful for assisting teachers to learn to match instructional strategies to TEKS standards and identify how the standards are used in the 5$^{th}$ grade science TAKS tests.

*Jane, Principal (Lincoln Elementary, Imperial ISD): "Our science teachers are extremely prepared for every lesson. I attribute that to the local Collaborative training that they have received. Our 3 science teachers have been presenters at the conventions and are professionals in every way."*

*(Comment from the Texas Campus Administrator Survey™)*

*Pamela, Assistant Principal (Eldredge Elementary, Eisenhuth ISD): "I believe the science teachers have learned to match curriculum to the TEKS and access student learning."*

*(Comment from the Texas Campus Administrator Survey™)*

*Jordan, Teacher (Texas University Academy, Texas University): "In my old school district, we spent a lot of time testing and benchmarking. Unfortunately, the benchmarks were not always well aligned to the TEKS and followed a specific timeline that did not take into account the need to go back and re-teach various concepts."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Darla, Teacher #2 (Belize Elementary, Washington CISD): "We currently use journaling, rubrics for projects, benchmarks, TAKS scores, and unit tests for data. We will be using what are called checkpoints next year. This will consist of a short quiz after a specific section. The questions will be like TAKS questions but made by curriculum writers. Teachers are encouraged to use multiple types of assessments."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Naomi, Teacher (Southern Star Academy, Southern Star Religious Academy): "While the answers* [on this section of the survey] *above are yes, the researcher must keep in mind that this data is for a private school. Student data is easily accessible and school curriculum follows the TEKS, however we do not necessarily use the same formats or computer programs/file-sharing that public schools use. In addition, our school uses Standard Achievement Tests (SAT's) to assess national performance rather than TAKS."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**DIDM & application of Research-based pedagogy for Curriculum & Instruction with highest impact on student learning and achievement**

This comment is the second highest from the CA survey (15.8%) while it is ranked #7 from the teachers' survey comments (9.6%). The CA comments primarily focus on the use of data for monitoring student learning and achievement. Some CA mention specific data systems and that the TRC science PD programs have had a noticeable improvement in regards to teachers' attitudes and behaviors regarding their own science content learning as well as applying new strategies to support student learning and achievement. The teacher surveys are not as positive about the use of data systems for monitoring student achievement. Many of the teacher respondents indicate that they designed or created their own data collection mechanisms to monitor individual student learning. Most of the individualized systems are due to campus or district computer inadequacies of keeping up with technology.

*Michael, Principal (Munson Elementary, Mitchell ISD): "We do our own data collection on benchmark testing and formative testing. We do use INNOVA which tracks TAKS and ITBS results."*

*(Comment from the Texas Campus Administrator Survey™)*

*Gary, Principal (Totem Elementary, Tincher ISD): "TISD has improved in making data more accessible to campuses and you can customize the data based on student academic needs."*

*(Comment from the Texas Campus Administrator Survey™)*

*Kathleen, Principal (Russell Elementary, General Motors ISD): "Testing and Data are a huge part of my job. The data drives our instruction and affects lesson planning as the needs of the students change."*

*(Comment from the Texas Campus Administrator Survey™)*

*Maria, Principal (Dragon Elementary, Astra ISD): "I was a 3rd grade Reading Academy trainer and understand the importance and effort it takes to gather a* *research-based proven curriculum and the impact it can make on teachers and students if it is closely implemented. I fully support the [local regional Collaborative] and truly wish all teachers will have the opportunity to attend and learn from the training."*

*(Comment from the Texas Campus Administrator Survey™)*

*Christopher, Assistant Principal (Fischer Middle School, Fostoria ISD): "Data driven teachers are more apt to focus on areas of needs for individual students, thus making data a major influence on the directions teachers take in preparing for student success."*

*(Comment from the Texas Campus Administrator Survey™)*

*Larry, Assistant Principal #2 (Beaver Pond Elementary, Erskine ISD): "The teachers who have been involved with TRC have improved their science knowledge base and skills. They have also become more confident in their science instruction. Student assessment has shown that the students' science achievements have also improved."*

*(Comment from the Texas Campus Administrator Survey™)*

*Jordan, Teacher (Texas University Academy, Texas University): "At my new school have much more freedom in regards to assessment and have moved away from constant benchmarking and TAKS type assessments. Now, I use a variety of assessments to evaluate my students' learning and performance. I do 2 benchmarks a year. We also take the SAT 10. I do use the benchmark data to plan my lessons and reviews. I also use testing data to work with my campus teachers on vertical alignment."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Grace Ellen, Teacher (Quinby Wood Elementary, Dragon ISD): "The depth and quality of the data available to us is variable but seems to be improving."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Ryan, Teacher #2 (Princess Diana Elementary, Dragon ISD): "We use any assessments that are available but the best assessment for the teacher is the informal classroom assessments that are taken almost daily."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Alex, Teacher #2 (Binghamton Central Elementary, Binney-Burnham ISD): "This is my third year at B-BISD and this district has no real curriculum (they have a scope and sequence) in place and only give one district benchmark (a released TAKS test) throughout the year."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Kenneth, Teacher (Asardo Elementary, Chrysler ISD): "We use any information we can obtain to help students do their best."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Destiny, Teacher #2 (Moline Elementary, Island Cove ISD): "As you may be aware, in Texas, teaching in public schools is driven by federal guidelines (No Child Left Behind) and State guidelines (the TAKS). If a day were long, enough and I could put, as much time into teaching as I do into documenting and duplicating documentation, our children would be more successful. Using the learning I acquired at the Collaborative, I have increased the performance of my students. However, more important than that feat, they have increased in their love of learning."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Increase number of science benchmarks & formative assessments to monitor student learning and achievement**

The third highest comment response in a three-way tie from CAs (9.5%) is specific to addressing the use of local campus formats to monitor student learning throughout the year with district-produced benchmarks and formative assessments. The teacher survey (15%) comments place this topic as the fourth most important topic. Both CAs and teachers comments agree on the utilization of benchmarks and formative assessments for monitoring students ability to learn TEKS standards and to be able to assess student achievement potential for TAKS.

*Gary, Principal (Totem Elementary, Tincher ISD): "Science benchmarks need to be given with more frequency to monitor student growth and access instruction effectiveness."*

*(Comment from the Texas Campus Administrator Survey™)*

*Claudio, Assistant Principal (Amco Elementary, Adams-Farwell CISD): "We collect data from various assessments and use formal and informal methods to compliment our data gathering. Based on this data, our curriculum and instruction is geared to meet the needs of our students."*

*(Comment from the Texas Campus Administrator Survey™)*

*Alex, Teacher #2 (Binghamton Central Elementary, Binney-Burnham ISD): "I have taken it upon myself to give checkpoint assessments and four benchmark tests because this is what I know from experience of working with [a different] ISD near Houston."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Demands and requirements of TRC PD are too excessive and teachers are out-of-the-classroom too frequently**

In a three-way tie for the fourth position, this is the second item of a three-way time identified from the CA survey comment (9.5%). From the teacher survey (10.5%), this is a two-way tie for fifth position of importance. Comments from both the CA and teacher surveys are nearly identical from either the role of campus administrator describing the frequency of teachers' being out of their classrooms or from the teachers' perspective of time demands of the regional Collaborative programs.

*Marissa, Principal (Firestone Elementary, Firestone-Columbus ISD): "The 5th grade teacher who teaches all the 5th grade science attended. The time commitment is a struggle for classroom teachers who also have other core subjects for which they are responsible for TAKS."*

*Comment from the Texas Campus Administrator Survey™)*

*Esmerelda, Principal (Gomez Elementary, Diaz-Gomez ISD): "The time out of the classroom concerns me due to loss of instruction time. 5th grade has a high percentage rate to pass and I feel that students need to have their teacher in the class. If administrators are invited to attend the training sessions, I would like to sit in on some of it. This would help me support my teacher and know what is being taught in the training."*

*(Comment from the Texas Campus Administrator Survey™)*

*Pamela, Assistant Principal (Eldredge Elementary, Eisenhuth ISD): "The only complaint the teacher had was on the days missed from class while in training. She did not like being out of her classroom so many days."*

*(Comment from the Texas Campus Administrator Survey™)*

*D'awnna, Teacher (Gulf Flyer Elementary, Welch-Detroit ISD): "In addition to the problem of taking leave from teaching in my district, (there are no substitutes' either) in order to attend training, the distance I must travel to [a local regional Collaborative] is too great. Science is not present on this campus or emphasized by the district."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Alberta, Teacher (East Bendix Elementary, Bendix ISD): "Since I teach all subject areas, I feel that I need to address other training issues that apply to Language Arts* *and History as well as Science. I also thought that it was time for someone else on my campus to engage in the Science Collaborative."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**No observable impact on teacher behavior after attending TRC PD and / or teachers uncertain if participated in TRC PD program**

The last item of the three-way tie of fourth position from the CA survey comment (9.5%) include primarily observations regarding no or minimal change of teachers behavior after attending TRC science PD. From the teacher survey (10.5%), this item ranks in the $11^{th}$ position of importance. The CA comments are specifically about teachers returning from TRC science PD and not demonstrating new classroom teaching strategies. Some comments address issues that teachers did not improve in their pedagogical practices and require much more effort on the part of CAs to help these individuals more.

*Trinton, Principal (Overland Elementary, Overland Trails ISD): "I do not know which teachers if any have received the training."*

*(Comment from the Texas Campus Administrator Survey™)*

*Kendall, Principal (Steammobile Elementary, Stearns-Knight ISD): "I feel that none of the 5th grade teachers has had any science education training and my responses are based on my observations. I am new to this campus."*

*(Comment from the Texas Campus Administrator Survey™)*

## Teachers are reluctant teach science and attend TRC PD programs

The fourth position on the CA survey comment (7.0%) regards observations of the difficulties CAs have in convincing teachers to attend TRC science PD programs. There are no responses from the teachers' survey regarding reluctance to teach science or attend TRC science PD programs. In fact the opposite is true, as teachers' complained about the *lack of support* from both campus administrators and districts for allowing teachers to attend PD programs or even in support of teaching science as the second highest topic (15.5%) with no subsequent responses from the CAs.

> *Eliot, Assistant Principal (Endurance Elementary, Sutton-Essex ISD): "The collaborative was valuable for those attending, however, because not many Elementary Teachers view themselves as Science Teachers they are reluctant to attend since they think they are waiting for the opportunity to teach Reading/Language Arts. This is a real struggle in my case with very little turnover in professional personnel (1 vacancy in the last 3 years)."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

## CA Observed and noticeable change in teacher behavior and HQCT science knowledge

One highly positive topic on the CA surveys is in regards to noticeable changes in teachers behavior and approaches for teaching science. Many CAs indicate observing increased enthusiasm and excitement as teachers returned from regional Collaboratives science PD programs. This renewed interest is also discussed as one of the themes in how CAs defined *highly qualified elementary science classroom teachers*. From the teacher survey (2.4%), self-confidence and self-satisfaction abounds in the discussions about newly gained science content knowledge.

*Drake, Principal (Argonne Elementary, Ardsley ISD): "I have high confidence in all our teachers when it comes down to promoting the science curriculum. However, I can't say for certainty if any of our teachers have gone through this program."*

*(Comment from the Texas Campus Administrator Survey™)*

*Larry, Assistant Principal #2 (Beaver Pond Elementary, Erskine ISD): "The teachers who have been involved with TRC have improved their science knowledge base and skills. They have also become more confident in their science instruction. Student assessment has shown that the students' science achievements have also improved."*

*(Comment from the Texas Campus Administrator Survey™)*

*Pamela, Assistant Principal (Eldredge Elementary, Eisenhuth ISD): "The teacher at my campus really enjoyed the training. She came back and did staff development with all our fourth - sixth grade teachers."*

*(Comment from the Texas Campus Administrator Survey™)*

*Erasmo, Assistant Principal (Elija-Savannah Elementary, Santa Cruz ISD): "The teacher that has had the training is a model teacher and reaches out to teachers on other grade levels to get them excited about teaching science."*

*(Comment from the Texas Campus Administrator Survey™)*

*Chica, Teacher (Elkhart Elementary, Crow-Reyes ISD): "I am a firm believer in the collaborative and I am grateful for all the great opportunities that the collaborative has given me. I take everything that I learn and share with other teachers. I even* *invite some of them to attend workshops with me. The collaborative has boosted my confidence in teaching science. I feel like I can handle any situation that comes my way. I further encourage my co-workers to attend any workshop sponsored by [my local regional Collaborative] because the wealth of knowledge that we receive is incredible."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Elvita, Teacher (Benz-Hurtz Elementary, General Motors ISD): "I talk about the program, probably too much. The classes that I have taken through the university have opened a whole new me. I feel more confident and comfortable teaching science. I still have a ways to go, but I am enjoying the journey. I hope that I am like a lighthouse. People will see the difference that the classes have made in me and want to join."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Teachers need as much help possible for science teaching**

Both CA (5%) and teachers' (1.6%) commentary include references to more support of teacher learning and knowledge of science content from state-level as well as involvement by local regional Collaboratives.

*Jorge, Principal (Cadillac Elementary, Callaway ISD): "Science scores are still the most deficient. Concentration on how to assist student success on all levels is needed."*

*(Comment from the Texas Campus Administrator Survey™)*

*Maria, Principal (Maxwell Elementary, Chrysler CISD): "… we must develop and support, through ongoing professional development, science knowledge and skills for teachers. Teachers often feel overwhelmed by the sheer volume of material they need to address, and this is compounded when they are not comfortable with a particular area."*

*(Comment from the Texas Campus Administrator Survey™)*

*Javier, Assistant Principal (Xavier Middle School, Xavier Diego CISD):"Science teachers need all the help that they can get from the state."*

*(Comment from the Texas Campus Administrator Survey™)*

**CA attending TRC PD training to support Teachers attendance and participation**

Another topic of interest is CA (4.4%) interest in attending TRC science PD programs with their teachers. Although only one teacher (0.8%) suggests that her campus administrator would want to attend TRC training, all of the comments did discuss the necessity of CAs to understand the demands of the TRC science PD program and what were the benefits of participation.

*Eduardo, Principal (Maxwell Elementary, Chrysler ISD): "This is my second year at this campus/in this school district. We have not, as of yet, pursued TRC training. I would definitely like to become involved with TRC in order to better support our teachers and the students they serve."*

*(Comment from the Texas Campus Administrator Survey™)*

*Dorinda, Principal (Case Elementary, Case ISD):* "*My teachers at this school did not attend any of the TRC but I was at another district in which we hosted the* *program and I participated. Those teachers did need the extra help in science. The teachers at this campus are very strong and attend a variety of workshops. I do think the TRC would have benefited them; however they chose not to go. At the time it was offered I was not an administrator in this district."*

*(Comment from the Texas Campus Administrator Survey™)*

*Ken, Assistant Principal (Studebaker Elementary, West Terra ISD): "This was my first year as an administrator and on an elementary campus. It has been challenging, I would really like to attend trainings with the teachers so I can be well informed and be a better facilitator to support the teachers."*

*(Comment from the Texas Campus Administrator Survey™)*

**High TRC PD attendance participation demonstrates improvement for student achievement**

*Jax, Principal (Apperson Elementary, General Motors ISD): "The quality of our 5th grade science instruction improved tremendously and was shown in the increase in our TAKS scores."*

*(Comment from the Texas Campus Administrator Survey™)*

*Jenna, Principal (Viking Elementary, Oldsmobile ISD): "Our 5th grade TAKS science test scores have been above state average consistently since the teachers started attending [our local regional Collaborative]. Our TAKS scores in 2005 were 53% but started rising after the teachers started attending the science PD, in 2006 the TAKS average was 69%, in 2007 the TAKS average was 91%, and this year* [2008] *the TAKS average was 82%."*

*(Comment from the Texas Campus Administrator Survey™)*

*Reynaldo, Assistant Principal (Reyes-Ramos Elementary, Hamilton-Burr ISD): "I encourage and send my teachers to any training that will help them to be successful in teaching science objectives in the classroom."*

*(Comment from the Texas Campus Administrator Survey™)*

**Noticeable teachers' struggle with teaching science & lack of demonstrated ability to apply TRC PD experience to classroom teaching**

Some of the CAs indicate that they have observed teachers' struggling with science pedagogy and very few indicated that they felt this struggle was due to the teachers' inability to apply teaching strategies learned through their local regional Collaborative. Only one teacher (0.8%) indicates struggling with teaching science and believes that her struggle is directly related to the campus and district not supporting her need for PD.

*Alonzo, Assistant Principal (South Pack River Elementary, Paige ISD): "The teacher that has been involved in your program doesn't quite know how to teach and usually does too many things at one time without accomplishing anything. We are working with this teacher to try to get her on the right track."*

*(Comment from the Texas Campus Administrator Survey™)*

*Gabriella, Assistant Principal (Dusenberg Middle School, Dragon ISD): "Our school is in its 3rd year of being a middle school. Prior to that, our school was a 3rd through 6th grade elementary academy. It was during that time (and before my assignment here) that one of my science teachers participated in the TRC as an elementary teacher. The participation in the TRC perhaps was beneficial to her as* *an elementary teacher, but I feel somewhat ill qualified to describe its effect on her as a middle school teacher. She is struggling somewhat, as are two of our other science teachers, with the depth and complexity of the material required for middle school science, particularly in the areas of chemistry and physics. They are definitely more comfortable with biology and space/earth science. Our 4th science teacher comes to us from high school level and is also very biology oriented and less comfortable with physics and chemistry."*

*(Comment from the Texas Campus Administrator Survey™)*

*Mimi, Teacher #3 (Propulsion Elementary, Santa Cruz ISD): "I have not been asked to attend any science programs. I feel that I am still very unprepared and very weak in teaching science because of the lack of training I have not received. I feel like a failure as a teacher."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Lack of advertising TRC PD**

Issues about the lack of advertising or information regarding what and when local regional Collaboratives offer workshops continue to be addressed in both CA (3.2%) and teachers' (0.8%) comments.

*Marissa, Principal (Firestone Elementary, Firestone-Columbus ISD): "The TRC has been the best training that I have sent teachers to in 20+ years as an administrator. We will continue to use the resources for as long as we can. I wish that you did a better job advertising. Not all administrators know about the collaboratives or their worth."*

*(Comment from the Texas Campus Administrator Survey™)*

*Evan, Principal (Edsel Elementary, Lincoln-Ford ISD): "I haven't promoted the TRC lately because I was not aware that the programs were being offered again."*

*(Comment from the Texas Campus Administrator Survey™)*

*Clint, Teacher (South Oak Elementary, South Speedwell ISD): "I am not familiar with the Texas Regional Collaborative. Perhaps I have participated in the program under a different name. All of my post-graduate science in-service study has been through [a local] university and NASA."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Christine, Teacher (Dayton Intermediate School, Reliable Dayton ISD): "I'm a new teacher and was not aware that this program existed.[269]"*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Brianna, Teacher (Langford Field Elementary, Rauch Lange ISD: "I was not notified of any local regional Collaboratives science professional developments this summer."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**High turnover science teachers after participating in TRC PD program**

Another concern expressed by CAs (2.0%) ias about losing science teachers after they have participated in a local regional Collaborative science PD program. None of the teachers mention this in their discussion comments.

> *Dennis, Assistant Principal (Reliance Elementary, Santa y Rios ISD): "I hope the Science Collaboratives continue each year. Teacher turnover is an issue. We get science teachers trained, and they move from our district."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Sarah, Teacher #5 (Little Fox Elementary, Little Fox ISD): "I've been assigned mentor position for new TAP program beginning next school year. [I] Cannot devote time necessary for TRC commitments."*
>
> *(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Campus or District chose to no longer be involved in TRC PD programs due to numerous concerns**

Numerous teachers (15%) address the issue of their campus administrator and / or district choosing not to use the TRC science PD programs as well as the lack of support for science education on their campuses. Very few of these concerns are raised by CA (1.3%).

> *Roberta, Principal (Velie Elementary, Van Wagonner ISD): "Science is not emphasized in my district or on my campus."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

*Ivonne, Principal (Sears Elementary, Escobar ISD): "Currently, I feel the district does not provide a solid professional development program for our teachers. Therefore, we have to look outside the district for teacher training. I feel very strongly that the [local regional Collaboratives] could* help bridge the gap.*"*

*(Comment from the Texas Campus Administrator Survey™)*

*Ashley, Teacher (White Deer Elementary, Rockwell ISD): "Our district administration decided not to participate."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Emma, Teacher (O. L. Stanley Elementary, Staver ISD): "My school administrators do not encourage teachers in our district to seek additional training. The cost of gas is a factor and they feel teachers do not benefit from these workshops, but rather, use them as an excuse to* get out of work. *Very few workshops are allowed."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Jamie, Teacher #2 (Steam Ridge Elementary, Wagenhals ISD): "Leadership does just not push Science and TRC science PD opportunities on campus."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Monita, Teacher #2 (Ruxton Elementary, Rutenber ISD): "I was told by my district administration approximately a year and a half ago that I could no longer attend* *any [local regional] science collaborative. Any science PD would not be allowed. I miss the [Collaborative]people and networking dearly."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Ginger, Teacher (Hackett Hall Elementary, Welch-Detroit ISD): "Funds have been limited for training in the science department. My principal says that* 'I don't know anything about science'*... if I am lucky I will be moving to a new district----I'm trying to do so now."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Isabella, Teacher (Blue Jay Road Elementary, Flint ISD): "Our district did not allow teachers to attend this year because of budget constraints and multiple changes in administration from Superintendent on down. My principal did not approve of me being out of the classroom so much. As a 5-year member, I was most disappointed."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Virginia, Teacher #2 (Elcar Elementary, Emerson ISD): "I was an Elementary Science Lab teacher K-5 for the last 3 years before this year. At the end of last year the school district closed the labs and moved all the teachers to the new school as regular classroom teachers. I find it more difficult to keep up with the hands on science lab due to having to do all the other subjects also."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Annabelle, Teacher #1 (Sioux South Elementary, Wagenhals, ISD): "Securing the support of campus administrators can be difficult if they do not value realize the benefits of TRC participation and do not allow time for STMs to train other campus teachers. Administrators are often tunnel vision about TAKS scores and become restrictive about allowing teachers to attend science training during school hours."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Mimi, Teacher #3 (Propulsion Elementary, Santa Cruz ISD): "I have not been asked to attend any science programs. I feel that I am still very unprepared and very weak in teaching science because of the lack of training I have not received."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Lee, Teacher (Eldredge Elementary, Eisenhuth ISD): "School district and my campus administrator does not feel it is important and complained frequently that I was out of class too often. I stayed with it for two years. The second year I paid my own expenses."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Lack of technology access on campus impacts use of DIDM and TRC programs**

Even though there were few respondents commenting about the lack of technology access on their respective campuses, both campus administrators (1.3%) and teachers (2.4%) discuss very specifically how technology in education is sorely lacking.

*Allison, Assistant Principal (Melendez Elementary, Flint ISD): "Access to technology is an issue at our campus. It has taken several years to replace obsolete computers. I believe that elementary campus should have allocation(s) designated for 5th grade science teacher use only."*

*(Comment from the Texas Campus Administrator Survey™)*

*Grace Ellen, Teacher (Quinby Wood Elementary, Dragon ISD): "Technology is changing so rapidly that I can only hope it will continue to improve. Unfortunately for those of us in older buildings, all too often, our infrastructure cannot support the use of the most up-to-date technology. In my case, the technology in my district and on my campus is very unreliable and the wait-time to access or dig through the routing systems is cumbersome and inefficient."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Alex, Teacher #2 (Binghamton Central Elementary, Binney-Burnham ISD): "This is my third year at Binney-Burnham ISD and this district has no real curriculum (they have a scope and sequence) in place and only give one district benchmark (a released TAKS test) throughout the year … A lot of the technology that is mentioned above is not in place at Binney-Burnham ISD but I am familiar with it and have used it* [in my former district].

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Teaching assignment changed by district or campus administrator**
*(from Texas Elementary, Intermediate or Middle School Teacher Survey only)*

None of the responses from CA mention the need of moving or changing teaching assignments within their campuses. However from the teachers' perspective (16%), this is their #1 complaint for multiple reasons.

*Jesus, Teacher #4 (Royal Tourist Elementary, Escobar ISD): "My grade level is departmentalized now, and I currently do not teach Science."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Amando, Teacher #4 (Wilt Elementary, Oak Leaf Wilt ISD): "I loved teaching science in our school but because of medical reasons with our GT math teacher, my principal asked if I would teach math next year because of my math background and experiences. I was very successful at teaching science and had to give this a lot of thought before I changed back to the math department."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Noel, Teacher #4 (Marion Intermediate School, Marion ISD): "I taught science for our school district for 2 years and then went back to teaching math. I loved teaching science but our school needed me to go back to teaching math so we could hire a science teacher."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Keith, Teacher #3 (Oka Spring Elementary, South Speedwell ISD): "My emphasis as a Fourth Grade Teacher is Writing, Reading and Math ... There are days when it is put aside for Writing, Math and Reading."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Josue, Teacher #2 (Ricker Elementary, Advanced Technologies ISD): "Even if I am an ESOL teacher, I am very much into Science. My educational background is mostly based in Europe, where the encyclopedic education was the norm during those days. I would say that I am extremely grateful to having the privilege of amazing teachers that shaped so thoroughly my future becoming. In spite the fact that I have never had a teaching science assignment, I have been able to teach science related units successfully and to all my students. I believe that science is an important part of human life, and our young generation should be always incited to tackle the out of the ordinary (sometimes) puzzles. Despite the fact that I am not an evolutionist anymore, I would say that science is not only fascinating, but also a good exercise for the young minds."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Alana, Teacher (Laurel Tree Elementary, LaFayette ISD): "I have never taught science and only deal with science students in the content mastery environment.[270]"*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Cierra, Teacher (Guzman Elementary, Flint ISD): "I teach special education. We concentrate mainly on* reading and math. *However, this year we did start doing inclusion in our 5th grade science classes. I was not the special education teacher who did this inclusion."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Cara, Teacher (West Bendix Elementary, Bendix ISD): "… I am also the teacher of choice for the ESL and Special Education students and they require a more demanding level of interaction. I felt that my time was better spent in the classroom … It took a great deal of my personal time to prepare my class when the substitute and I decided to spare myself this added burden."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Joy teaching science diminished after TAKS / *NCLB* accountability requirements**
*(from Texas Elementary, Intermediate or Middle School Teacher Survey only)*

This topic is unique within the teachers' (4.0%) comments since it is directly related to how they feel about teaching science under the current accountability requirements of TAKS and *NCLB.*

*Sandi, Teacher (Commuter Elementary, Avanti ISD): "Teaching Science was a joy before the [TAKS] testing was implemented. Now it is a chore."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Nancy, Teacher (Smith Elementary, Smith Flyer ISD): "The Texas Regional Collaborative is what kept me in the science classroom. Without their help and guidance, I would have been asked to be resigned."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Destiny, Teacher #2 (Moline Elementary, Island Cove ISD): "If a day were long enough and I could put, as much time into teaching as I do into documenting and duplicating documentation, our children would be more successful. Using the learning I acquired at the Collaborative, I have increased the performance of my students. However, more important than that feat, they have increased in their love of learning.[271]"*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Mary Lou, Teacher (Propulsion Elementary, Santa Cruz ISD): "I believe that 3rd, 4th, & 5th grade teachers, should ALL get the same training, at the same time so that the students testing in 5th grade can have at student can get at least two years instructions to build a foundation and learn the terminology and vocabulary so that by the time they reach 5th grade, they are better prepared to work with 5th grade TEKS/TAKS Objectives and the 5th grade teachers can teach 5th grade Science! Sending one or two teachers to come train the rest of us does not work, if at best we get a watered down in-service and material handed to us that makes no sense to us.*

*If the lower grades are expected to teach science to help these students do well in 5th grade, a serious Science academy training needs to offer to every teacher in every grade level. Just like when we are asked to attend the Reading Academy or Reading First Training, where all teachers are expected to attend, the same rule should apply to Science."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

## COMMENTS FROM THE SURVEYS REGARDING THE IMPACT OF HIGHLY QUALIFIED CLASSROOM TEACHER DESIGNATION FROM *NCLB* ON 5TH GRADE SCIENCE TAKS

Only one question is identical on both *Texas Elementary Campus Administrator Survey™* and the *Texas Elementary, Intermediate or Middle School Teacher Survey™* that required a response from all participants to define what a *Highly Qualified Elementary Science Classroom Teacher* would be. This was the only required comment on both surveys and is specifically related to *Research Question #5: Is education policy's designation of a highly qualified classroom teacher, as currently defined by the No Child Left Behind Act of 2001, necessary for elementary science education?* As such, 394 comments received from participants on the CA survey and 233 comments received from participants on the Teachers' survey are used for this analysis. Even though this was a required item on both surveys, not every participant chose to answer the question.

From the CA survey, thirty-four topics were identified that defined a *highly qualified* elementary science *classroom teacher* (HQ*es*CT). These topics, presented in the order of importance on the CA survey included: (1) Teachers' application of various Science Pedagogy & strategies for improving student learning, (2) High use of Hands-on labs for teaching science concepts, (3) Teachers' knowledge of Science content, (4) Teachers' ability to motivate students for learning science, (5) Teachers' attend and utilize science Professional Development, (6) Collaborative &/or Cooperative Learning (applies to administration & teachers and with student learning), (7) Teachers' ability to apply Differentiated instruction strategies to meet needs of student learners, (8) Teachers' behavior of highly self-motivated learners / dedication to science teaching profession, (9) Teachers' enthusiasm about science, (10) Teachers have college credits in science (min. 18 hrs), (11) Relevancy of science lessons to real-world applications, (12) Teachers' knowledge and use of science TEKS for lessons to improve student learning, (13) Teacher Behaviors described as important components for HQCT: *Patience, Creativity, Flexibility & Multi-tasking, Sense of Humor, Organization*, (14) Certification appropriate for teaching science, (15) Overall knowledge and use of district-level Curriculum scope & sequence, (16) Teacher use of multiple Assessment applications, (17) Use of DIDM for curricular decisions (18) Importance of achieving high TAKS scores, (19) Teachers Mentor other teachers, (20) Teachers' ability for appropriate Classroom management during science instruction, (21) Teachers' incorporation of the Internet & other technologies for teaching science, (22) Teachers' have prior Experience teaching science, (23) Teachers use of journaling and other writing opportunities to improve student learning, (24) 5E Instructional Model use for teaching science,.(25) Teachers' use of C&I Research-based Instruction, (26) Teachers' participation and sponsorship of Science Fairs, Astronomy Club, Field Trips, etc., (27) Integration of science with reading and mathematics, (28) Teachers' and CA comments similar to *NCLB* definition of HQCT, (29) Teachers' Appraisals by CA, (30) Teachers' certification in English as Second Language (ESL) and / or Gifted & Talented (GT), (31) Teachers' abilities to involve the local community in science education for improving student achievement, (32) Teachers' ability to write Grants and solicit other funding for teaching science, (33) Teachers' enrollment and participation in Professional Memberships (state and federal) and (34) Use of national standards of science in developing lesson plans.

The maximum comments from campus administrators (N=394) reported a general definition of HQ*es*CT and teacher behaviors while the maximum comments reported by teachers (N=233) were regarding pedagogical strategies and science PD as crucial for HQ*es*CT.

### *Federal Policy Definition of HQCT*

According to *NCLB*, a *highly qualified classroom teacher* is described in Title I§1119[272] , which describes HQCT as an individual who possess the following especially in the areas of mathematics and science (**emphasis added**): Public Law 107-10, §9101(23)

**SEC. 1119. QUALIFICATIONS FOR TEACHERS AND PARAPROFESSIONALS.**

(a) **TEACHER QUALIFICATIONS** AND MEASURABLE OBJECTIVES-

(1) IN GENERAL- Beginning with the first day of the first school year after the date of enactment of the No Child Left Behind Act of 2001, each local educational agency receiving assistance under this part shall ensure that **all teachers hired after such day and teaching in a program supported with funds under this part are highly qualified**.

(2) STATE PLAN- As part of the plan described in section 1111, each **State educational agency receiving assistance** under this part shall develop a plan to **ensure that all teachers teaching in core academic subjects within the State are highly qualified** not later than the end of the 2005-2006 school year. Such plan shall **establish annual measurable objectives** for each local educational agency and school that, at a minimum

(A) shall include an **annual increase in the percentage of highly qualified teachers at each local educational agency and school, to ensure that all teachers teaching in core academic subjects in each public elementary school** and secondary school are **highly qualified** not later than the end of the 2005-2006 school year;

(B) shall include an **annual increase in the percentage of teachers who are receiving high-quality professional development to enable such teachers to become highly qualified and successful classroom teachers**; and

(C) may include such other measures as the **State educational agency determines to be appropriate to increase teacher qualifications.**[273]

***State Policy Definition of HQCT***

Within Texas, the definition of and certification processes for teachers is described in the Texas Administrative Code, TAC (19)7, Rule §228.1, Rule §228.30 and the Texas Education Agency code Texas Education Code, §21.049. The first quote describes the education preparation programs throughout the state of Texas and the second quote describes certified teacher expectations.

[*First Quote*] (b) Consistent with the Texas Education Code, §21.049, the SBEC's rules governing educator preparation are designed to promote flexibility and creativity in the design of educator preparation programs to accommodate the unique characteristics and needs of different regions of the state as well as the diverse population of potential educators.

(c) All educator preparation programs are subject to the same standards of accountability, as required under Chapter 229 of this title (relating to Accountability System for Educator Preparation).

[*Second Quote*] (b) The curriculum for each educator preparation program shall rely on **scientifically-based research** to ensure **teacher effectiveness and align to the TEKS**. The following subject matter shall be included in the curriculum for candidates seeking initial certification:

(1) the specified requirements for reading instruction adopted by the SBEC for each certificate;

(2) the code of ethics and standard practices for Texas educators, pursuant to Chapter 247 of this title (relating to Educators' Code of Ethics);

(3) child development;

(4) motivation;

(5) learning theories;

(6) TEKS organization, structure, and skills;

(7) TEKS in the content areas;

(8) state assessment of students;

(9) curriculum development and lesson planning;

(10) classroom assessment for instruction/diagnosing learning needs;

(11) classroom management/developing a positive learning environment;

(12) special populations;

(13) parent conferences/communication skills;

(14) instructional technology;

(15) pedagogy/instructional strategies;

(16) differentiated instruction; and

(17) certification test preparation.

Finally, teacher certification in Texas requires two tasks: (1) a baccalaureate or higher degree in the subject taught, (2) passing the Texas certification exam for content knowledge and (3) demonstrating pedagogical knowledge. To maintain a teacher license, every five years teachers are required to document professional development within their field. Many campus administrators wrote comments that were nearly identical to federal and state policy, however one campus administrator in particular describes a *HQesCT* succinctly.

> *Janice, Principal (Norma Florez Elementary, Rios Riotte ISD): "The law requires that all teachers of core academic subjects in the classroom be highly qualified. This is determined by three essential criteria: (1) attaining a bachelor's degree or better in the subject taught; (2) obtaining full state teacher certification; and (3) demonstrating knowledge in the subjects taught. In looking at describing a highly qualified teacher for elementary school I would add continued professional development in all the science objectives (Nature of Science, Life Science, Physical Science, and Earth Science). I would require at least two hours a week devoted to a lab type experience in each elementary classroom. I would require teachers to look for ways to integrate science into all daily subjects and keep a science journal. That is how I would describe a highly qualified science teacher for the elementary grades. I have one teacher who has attended some of the regional collaborative sessions."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

### Qualitative Data Analysis of *Research Question #5*

All comments from the *Texas Elementary Campus Administrator*™ were analyzed and selected comments are presented individually. Any names, campuses and districts used in this document are primarily pseudonyms from either American car manufactures and car names from 1895 to 2007 or from international car manufactures and car names from 1900 to 2007. Campus administrators are identified by first name, position help, school and district; *Jóse, Assistant Principal (Duesenberg Elementary, Dragon ISD).*

| **Uses of Data - Topics** | **% Teacher Survey Comments* (N = 80)** | **% Campus Admin. Survey Comments * (N = 63)** |
|---|---|---|
| 1. Teachers' application of various Science Pedagogy & strategies for improving student learning | **87.6%** | **69.0%** |
| 2. High use of Hands-on labs for teaching science concepts | **82.4%** | **65.2%** |
| 3. Teachers' knowledge of Science content | **77.3%** | **64.0%** |
| 4. Teachers' ability to motivate students for learning science | **76.1%** | **79.6%** |
| 5. Teachers attend and utilize science Professional Development | **73.4%** | 26.6% |
| 6. Collaborative &/or Cooperative Learning (applies to administration & teachers and with student learning) | **50.2%** | 22.8% |
| 7. Teachers' ability to apply Differentiated instruction strategies to meet needs of student learners | 49% | 47.2% |
| 8. Teachers' behavior of highly self-motivated learners / dedication to science teaching profession | 49% | 19.2% |
| 9. Teachers' enthusiasm about science | 47.6% | 34.5% |
| 10. Teachers have College credits in science (min. 18 hrs) | 47.6% | 28.9% |
| 11. Relevancy of science lessons to real-world applications | 39.9% | 35.0% |
| 12. Teachers' knowledge and use of science TEKS for lessons to improve student learning | 36.0% | **50.2%** |
| 13. Teacher Behaviors described as important components for HQCT: *Patience, Creativity, Flexibility & Multi-tasking, Sense of Humor, Organization* | 29.6% | 0.0% |
| 14. Certification appropriate for teaching science | 28.3% | 34.3% |
| 15. Overall knowledge and use of district-level Curriculum scope & sequence | 24.5% | 31.4% |
| 16. Teacher use of multiple Assessment applications | 24.5% | 29.7% |
| 17. Use of DIDM for curricular decisions | 21.9% | 32.7% |
| 18. Importance of achieving high TAKS scores | 20.6% | 20.5% |
| 19. Teachers Mentor other teachers | 18.0% | 22.0% |
| 20. Teachers' ability for appropriate Classroom management during science instruction | 15.6% | 19.8% |

| | | |
|---|---|---|
| 21. Teachers' incorporation of the Internet & other technologies for teaching science | 14.2% | 11.4% |
| 22. Teachers' have prior Experience teaching science | 14.2% | 9.1% |
| 23. Teachers use of journaling and other writing opportunities to improve student learning | 11.6% | 20.5% |
| 24. 5E Instructional Model use for teaching science | 11.6% | 19.0% |
| 25. Teachers' use of C&I Research-based Instruction | 11.6% | 8.4% |
| 26. Teachers' participation and sponsorship of Science Fairs, Astronomy Club, Field Trips, etc. | 11.6% | 7.6% |
| 27. Integration of science with reading and mathematics | 9.0% | 38.8% |
| 28. Teachers' and CA comments similar to *NCLB* definition of HQCT | 6.4% | 7.6% |
| 29. Teachers' Appraisals by CA | 4.0% | *No comments* |
| 30. Teachers' certification in English as Second Language (ESL) and / or Gifted & Talented (GT) | 3.9% | *No comments* |
| 31. Teachers' abilities to involve the local community in science education for improving student achievement | 2.6% | *No comments* |
| 32. Teachers' ability to write Grants and solicit other funding for teaching science | 1.3% | 2.3% |
| 33. Teachers' enrollment and participation in Professional Memberships (state and federal) | 1.3% | *No comments* |
| 34. Use of national standards of science in developing lesson plans | *No comments* | 4.6% |

* **Bold** indicates top 5 comments in each survey

Table 4.75. Campus Administrator and Teacher Survey comment topics.

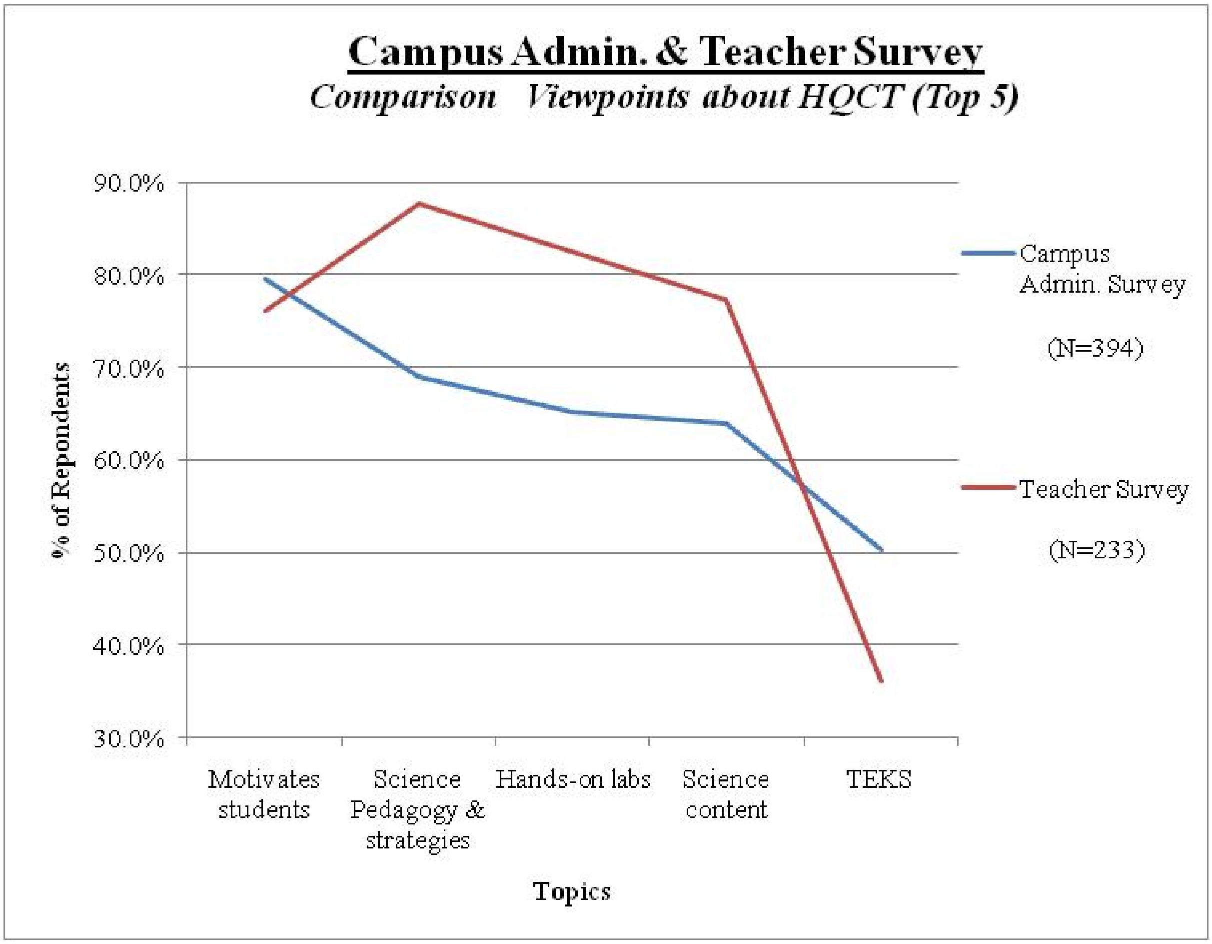



Figure 4.43. Campus Administrator and Teacher Survey, comment comparison, top 5 comments

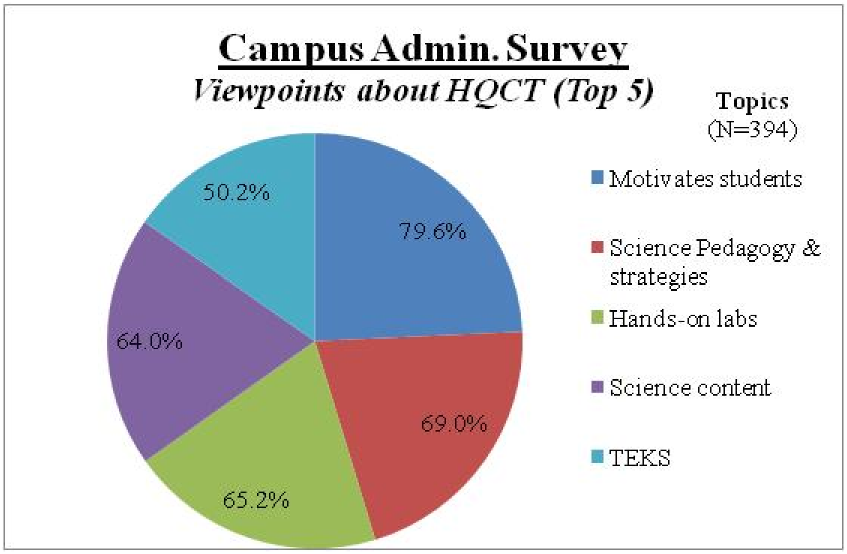


Figure 4.44. Campus Administrator Survey, viewpoints about HQCT, top 5 comments

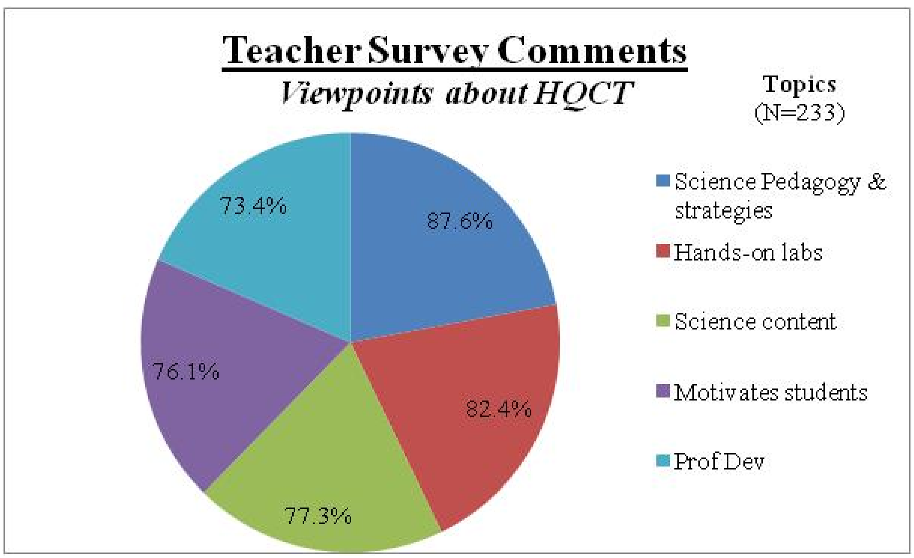



Figure 4.45. Teacher Survey, viewpoints about HQCT, top 5 comments

Due to the large number of topics and comments documented for Research Question #5, only the top 5 topics from each survey are reported.

**Teachers' ability to motivate students for learning science**

This topic is the highest level from the teacher survey comments and the fourth level from the CA survey comments. Overall comments on both surveys are quite similar and this topic corresponds with the 19TAC expectations for professional educators.

> *John, Principal (Overland Trails Elementary, Niagara Falls ISD: "A teacher who is motivated and passionate about their calling into the teaching field."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Evan, Principal (Edsel Elementary, Lincoln-Ford ISD): "They need to be highly motivated to teach science. This will in turn motivate students to want to learn science."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Deb, Principal (Bailey Elementary, Bailey Electric ISD): "A classroom that is filled with hands on learning coupled with appropriate assessments that mirror state testing. In addition, the classroom should incorporate a lot of technology with games that motivate students to learn."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

> *Joan, Assistant Principal (Chalmers Elementary, Chalmers-Detroit ISD): "A teacher who is highly motivated and passes that motivation on to his/her students through the use of judgments, projects, labs, and investigations. A teacher must be certified and knowledgeable in their content and to constantly stay in tune with the best practices of teaching science."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

*Diana, Assistant Principal (Biesel Elementary, Berwick Electric County ISD): "A highly qualified science classroom teacher is one that is involved in developing curriculum plans for a campus. They are knowledgeable in their subject matter and are creative in lesson planning to optimize student success. Teachers share their ideas, teaching strategies, and successful lessons with fellow teachers. Highly qualified teachers are involved in teacher training to develop the overall strength of the campus. Their classrooms are alive with activities, projects, demonstrations, discussions, and enthusiasm for learning."*

*(Comment from the Texas Campus Administrator Survey™)*

*Frankie, Assistant Principal (Fostoria Elementary, Fostoria ISD): "A highly qualified science teacher knows the TEKS and the curriculum. She utilizes a variety of instructional strategies and methodologies in her teaching. Her data drives instruction. She works in a classroom that contains lab and safety equipment. She collaborates with her peers in planning and integrates the other disciplines in with the science lessons. She involves all of the stakeholders in the learning. She motivates her students by having relevant material that brings science into the students' everyday lives."*

*(Comment from the Texas Campus Administrator Survey™)*

*Lenora, Teacher (Griswold Elementary, Rio Grande Valley ISD): "A highly qualified classroom teacher is someone who strives to keep up with innovative teaching practices. This person is also someone who is highly self-motivated and finds interesting ways to motivate the students to learn. This person never thinks that he/she already 'knows it all,' but is ready to learn from others. A highly* *qualified teacher loves her work and loves being able to go to in-services that help her learn more. A highly qualified teacher also shares with other teachers."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Maritza, Teacher (Lincoln Elementary, Imperial ISD): "A highly qualified teacher in science is one that can motivate the students to do their work, learn and obtains good TAKS scores. Seriously, a teacher may not have 12 college hours of science but who works hard; get the information to teach her students. Finds appropriate activities, obtains CPE hours joins collaborative and learns things she needs to teach her class."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Ronald, Teacher #4 (Fisker Elementary, Avanti ISD): "A Highly Qualified Classroom Science Teacher is very well trained and able to exhibit their knowledge when modeling and leading the student in the field of Science Investigations and Explorations. Being prepared for most possible inquiries from the student is necessary. The student should be able to see the knowledge of the teacher, which will motivate and assure the student."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Brenda, Teacher (Stoddard Road Elementary, Stephens-Duryea ISD): "A highly qualified science teacher should have a love of and a strong background in how to teach science at the level that he/she is teaching."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Julie, Teacher (Monroe Elementary, Mitchell ISD): "A teacher that can motivate students to learn and keep them engaged. Understands the concepts, processes that need to be mastered by students, and is resilient to change."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Sal, Teacher #1 (Arsado Elementary, Chrysler ISD): "An instructor that: uses hands-on inquiry based lessons, a variety of material presented for students working on task, uses vocabulary that's appropriate to the lesson and has students engaged in the lesson."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**Teachers' application of various Science Pedagogy & strategies for improving student learning**

*Martin, Principal (Eastman Elementary, Emerson ISD): "Engaged in deep discussion in various models, such as Earth, Life. Making learn fun and interesting for students. Generates interest in the field of science, such as an astronomy club. Connects learning to real-world experiences."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Saul, Principal (Mercedes Elementary, Niagara Falls ISD): "One who follows the TEKS and uses the data from assessments to drive instruction. The classroom* *would be set up in small collaborative groups where majority of instruction is hands on based with higher level questioning being given as the teacher monitors the classroom and each individual group. Students would be expected to complete the three dimensional lesson and reword it into a 2 dimensional format in science journals being sure to convey information in an application manner as opposed to comprehension and knowledge. The teacher would be sure to continue to track progress in order to create lessons for each individual student based on needs. Re-teaching and extension would be continuous. In summary: hands on, high rigor, thought provoking, and teacher learner interaction."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*George, Principal (DeSoto Elementary, Chrysler ISD): "… Lastly, a highly qualified science teacher uses many hands on lab work and experiments in the implementation of the science curriculum to support student learning."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Doreen, Principal (Ortega Elementary, Chrysler ISD): "… uses the following: best practices, learner-centered instruction, hands-on labs, high level inquiry, science journals …"*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Angie, Assistant Principal (Berg Elementary, Benham County CISD): "Knows her/his science content. Understands TEKS and knows how to work with essential questions. Focuses on nouns and verbs in the SE's. Seeks ongoing staff development. Collaborates with teachers at own campus and other campuses. Disaggregates and analyses data. Uses data to drive instruction. Uses technology* *to connect science to real-world learning. Maintains continuity and consistency. Provides hands-on experiments. Hands-on experiments are tied to instruction."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Naomi, Teacher #3 (Tucker Road Elementary, Trihawk ISD): "Someone who has a balance between science content knowledge and appropriate pedagogy."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Erica, Teacher# 2 (Tucker Road Elementary, Trihawk ISD): "The profile of a Highly Qualified Classroom Teacher: Willing to innovate, make changes, test pedagogy, not just* 'following the herd' … *Willing to learn from all experiences in the classroom, in department meetings and willing to apply these learning experiences in the daily activity."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Janie, Teacher (Blast Elementary, Berrien Buggy ISD): "A highly qualified teacher is one who A. goes above and beyond the minimal classroom requirements B. stays current on testing and teaching strategies C. shares ideas and experiences with others in the district as well as other school districts D. has the ability to identify when a strategy is not successful and make changes accordingly I think too many teachers are set in their ways and are not willing to adjust to what students need now - not 15 years ago."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Josue, Teacher #2 (Ricker Elementary, Advanced Technologies ISD): "A well-trained, knowledgeable professional capable to present material to students of diverse background and linguistic abilities; i.e. a professional who understands the role of both hands-on teaching, but also a professional who analyzes the composition of the class from both the academic perspective and the various needs the students might have. I believe that a highly qualified Science teacher uses discovery, interactive learning to engages high level thinking skills and has available a large gamut of teaching strategies/visual support to make knowledge accessible to all students. Empowering students through consistent engagement and facilitating the ownership of learning are crucial, in my opinion, in the development of scientific curiosity, and, consequently to student progress."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

*Mark, Teacher (Rayfield Lane Elementary, Dragon ISD): "Someone who understands science concepts and theory and also understands and can use appropriate teaching strategies."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

**High use of Hands-on labs for teaching science concepts**

*Dan, Principal (Pond Drive Elementary, Miller Pond ISD): "The best science teachers I've seen are the ones who use best practices, have learner-centered instruction and 'science centers', lots of hands-on labs for student learning, high level inquiry, and incorporates writing by using science journals."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Alice, Principal (Dodson Middle School, Dorris ISD): "A science teacher should teach using many methods. The teacher should use experiential learning (models, demonstrations, projects, experiments, hands-on materials) for core concept instruction. They should involve students in cooperative learning groups to share ideas and discuss science with others. The classroom should be print rich with science vocabulary and examples. The students should be required daily to explain their own learning either verbally or through writing. Students should be given opportunities to take their learning from the hands on application to the paper and pencil task (3D to the 2D). The teacher should frequently assess learning in multiple ways and immediately correct science misconceptions."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Susanne, Principal (Valiant Elementary, Dodge ISD): **"**One who understands and is able to apply the TEKS to everyday hands on activities with the students. This teacher is also able to serve as a lead teacher, mentoring other teachers, presenting information at staff and district level meetings, and inspiring students to participate in Science Camps and Science Fairs."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Ira, Assistant Principal (Viking Elementary, Oldsmobile ISD)**: "**A highly qualified science teacher would present science material in a number of different formats to reach the learning styles of as many students as possible. A high percentage of science instruction would be hands on. There would be opportunity for students to question and to explain their understanding to the teacher and their peers."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Jim, Assistant Principal (Vector Elementary, Tesla ISD): "A highly qualified science teacher teaches the TEKS. He or she also follows a timeline to ensure that the TEKS are covered before testing. That science teacher also does many hands on experiments to follow along with the focused timeline."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Shirley, Assistant Principal (Allan Elementary, Kingston ISD): "The HQ teacher uses varied assessments, labs, hands-on approach, data analysis, and higher level questioning techniques."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Nettie, Assistant Principal (Norma Florez Elementary, Rios Riotte ISD): "A teacher that uses daily labs, hands on activities, and manipulative. A teacher who test weekly so that data from the test can be used to assess the students learning and preparation for the TAKS test. A teacher who is willing to attend staff development for science so that she grows and is prepared to have her students be successful. A teacher who can manage her classroom and willing to attend staff development on classroom management. A teacher who keeps who students engaged so no down time occurs. A teacher who challenges her students and meets the needs of her students."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Shirleen, Assistant Principal (Texas Republic Elementary, Reo Republic ISD): "A highly qualified science teacher is one that can find the time to bring in important* *science TEKs while teaching necessary reading and math skills. This person can integrate the science with the other subjects and still give its' due importance. This highly qualified teacher can spark interest in the children and provide hands on experiences that will provide lasting impressions and knowledge. A highly qualified teacher can encourage and model this for other teachers."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Bridgette, Teacher (Melendez Elementary, Flint ISD): "In my opinion a HQC Teacher is someone who is passionate and enthusiastic about science. They should not be afraid to do investigations, activities, labs, or any other form of hands on activities. I do not believe a science curriculum should be all labs or all book learning."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Katelynn, Teacher (Sheridan Elementary, Scripps-Booth ISD): "Use hands on methods - adaptable & flexible teaching -student centered -teaches grade level TEKS."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Madison, Teacher (Greystone Elementary, Frontenac ISD): "Someone who meets all of the required TEKS through hands on lessons and other concrete means for ensuring the students complete understanding. Someone who is constantly modifying based on ongoing classroom assessments and is not stagnant in their means of teaching."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Cecilia, Teacher (Grapefruit Elementary, Rio Grande Valley ISD): "A teacher that is prepared for all levels of students. A teacher that does not have to worry about buying supplies all the time for lab. A teacher that has the proper knowledge to teach Science. A teacher that knows and understands the Science TEKS and uses that knowledge in lesson plans. A teacher that is able to mix hands on activities into Science lessons. A teacher able to give a student life long experiences in Science."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

**Teachers' knowledge of Science content**

*Gary, Principal (Totem Elementary, Tincher ISD): "A highly qualified science classroom teacher is one that understands the content and can successfully instruct the students in the learning of the content. The teacher uses multiple forms of instruction and strategies to ensure the learning of the students. In my upper section of elementary, the science teacher has her degree in science."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Neto, Principal (Marion Hill Elementary, Marion-Handley ISD): "A teacher who has knowledge in the content subject area of science. Somewhat with a teaching certification to teach at the specific grade level assigned. A teacher who is a highly* *qualified Science classroom teacher has the knowledge of understanding of the state standards/TEKS, local objectives and curriculum frameworks."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Mary Kate, Assistant Principal (Pullman Elementary, Dragon ISD): "There is a combination of hands-on learning and content/concept learning. Teacher is following the 5E Model in her teaching. Students are talking and explaining what they are learning and making connections. Science equipment is available and students have interactive notebooks."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Celeste, Assistant Principal (Formula One Elementary, Avanti ISD): "* Have course work in science content. * Attend professional development in science. * Provide hands-on activities for students. * Need to know curriculum. * Enthusiastic about science."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Joan, Assistant Principal (Chalmers Elementary, Chalmers-Detroit ISD): "A teacher who is highly motivated and passes that motivation on to his/her students through the use of judgments, projects, labs, and investigations. A teacher must be certified and knowledgeable in their content and to constantly stay in tune with the best practices of teaching science."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Pasqual, Assistant Principal (Vargas Elementary, Castillo ISD): "Teachers who have a degree in science and maintain professional development hours each year in science content or science instruction."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Jackie, Teacher (Rockne Intermediate School, Rockne ISD): "A certified Science teacher who teaches to all students at every level so that they will gain in knowledge of Science concepts in the classroom."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Christine, Teacher (Dayton Intermediate School, Reliable Dayton ISD): "A Highly Qualified Science Teacher is one who has more than enough content area knowledge to teach the grade level curriculum. He/she also has the ability to effectively deliver the content to students of different abilities."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Leslie, Teacher #2 (Arrow Creek Intermediate School, Argo Hills ISD): "One who is knowledgeable in science and is able to teach the content in a variety of methods."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Mike, Teacher #3 (Arrow Creek Intermediate School, Argo Hills ISD): "One who knows content and works well with children to facilitate their learning."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Greg, Teacher (Dolson Elementary, Doble ISD): "A Highly Qualified teacher is one who has all the necessary educational requirements from undergraduate/graduate studies. In addition to that, s/he should continue professional development in their area through regional collaboratives, workshops, staff development, or any other type of educational development opportunities. Knowing the content that one teaches is of prime importance; however, of equal importance is the delivery of the content. Science teachers should be open to continual training in effective ways to teach the content to the particular age of the student being taught. Science teachers should be required to attend annual professional development such as CAST to keep abreast of the ever-changing field."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

**Teachers' attend and utilize science Professional Development**

Although the priority level of this topic is vastly different, both CA and teachers express very similar beliefs about the importance of continual PD. From the teachers' survey, this topic ranks #4 and on the CA survey it ranks #15.

*Cynthia, Principal (Callaway Elementary, South Speedwell ISD): "Teachers that have both college background in science and have participated in a wide variety of science professional development opportunities. Teachers that are aware of the Science TEKS and the NCLB guidelines for a highly qualified teacher."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Dennis, Principal (Bluebell Lake Elementary, Maya ISD): "* The teacher should be able to use constructivist methods to reach his/her students. * The teacher should willingly be seeking professional development opportunities in the science field to keep up with the latest developments. * The teacher should exhibit an innate curiosity about the world around him/her and its workings."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Denise, Principal (International Academy Middle School, Emperor Lake ISD): "One who … has accumulated a significant number of professional development hours pertaining to science/science instruction (50+ hours)."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Paul, Assistant Principal (Callaway Elementary, South Speedwell ISD): "Teachers that have both college background in science and have participated in a wide variety of science professional development opportunities."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Irene, Assistant Principal (Aleo Vera Intermediate School, Margareta Valley ISD): "Teachers who have a degree in science and maintain professional development hours each year in science content or science instruction."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Joseph, Assistant Principal (ArBenz Elementary, General Motors ISD): "Uses 5 E Model for instruction and continually seeks professional development/training in the area of science."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Emma, Teacher (O. L. Stanley Elementary, Staver ISD): "I would describe a Highly Qualified Science Classroom Teacher as one who continuously strives for personal professional development in Science and uses this to update curriculum with strategies and activities that will promote student success, uses data to direct instruction, and applies 3-Tier reading model to guide instruction based on student progress."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Mary, Teacher (Red Rock Elementary, Franklin ISD): "I would describe a highly qualified classroom science teacher as one who has an enthusiastic approach to science, continues to seek professional development in not only science theories and principals but also strategies for teaching science to all children and is of course certified for classroom instruction."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Linda, Teacher #3 (Shoreline Elementary, Jersey City ISD): "I believe there is more than one way to become a highly qualified teacher in any field. For me in elementary education, I obtained my degree in Interdisciplinary Studies, Early Childhood (EC - 6th), and learn first the best ways to teach young children. THEN, go on in your professional development and attend a multitude of conferences, workshops and trainings across Texas and the U.S., and become highly qualified in 'science' and know just as much, if not more, than the teacher who simply majored* *in it and goes without adequate professional development in the field of science each year."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Jennifer, Teacher (Expedition Elementary, Saint George ISD): "Someone who stays up to date on science information through professional development."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

**Collaborative &/or Cooperative Learning** *(applies to administration & teachers and with student learning)*

*Pat, Teacher (McIntyre Elementary, Michigan ISD): "Classroom strategies for cooperative learning and having students involved in their learning."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Julie, Teacher (Monroe Elementary, Mitchell ISD): "This teacher must also be enthusiastic about the subject matter, and be willing to collaborate with other teachers who are struggling with the content or who need to be inspired."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

**Teachers' knowledge and use of science TEKS for lessons to improve student learning**

*Carol, Principal (Plymoth Elementary, Dodge ISD): "A teacher who knows the Science TEKS and expectations of the students she is teaching."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Robert, Principal (Fisker Elementary, Avanti ISD): "Someone who has had extensive training in all aspects of the Science TEKS."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Jax, Principal (Apperson Elementary, General Motors ISD): "A highly qualified science classroom teacher is one who follows the TEKS and allows adequate hands-on activities for the students."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*David, Principal, (Drexel Elementary, Dual-Ghia ISD): "Knowledgeable of science TEKS for all grade levels; Knowledgeable of science topics from a national perspective for lessons planning."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Emily, Assistant Principal (Balzar, Astra ISD): "A classroom that is prepared to teach the science concepts as aligned with the science TEKS."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Thomas, Principal (Babcock Car Elementary, Babcock Car ISD): "Superior knowledge of the content. Risk taker. Curious and creative. Flexible when teaching content. Excited about science and ignites students' interest in science. Able to integrate science concepts into other subject areas. Willing to mentor other teachers. Willing to attend professional development outside of school hours. Presenter at district, region, etc."*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Michael, Principal (Eureka Intermediate School, Erskine ISD): "Highly qualified traits: * energized about teaching Science and see that students share that enthusiasm * attend trainings and then apply new learning or information to the class * know grade level TEKS and student expectations *"*

*(Comment from the Texas Elementary Campus Administrator Survey™)*

*Hannah, Teacher #2 (Blue Jay Road Elementary, Flint ISD): "This teacher would be completely knowledgeable in all Science TEKS from Pre-K recommendations through middle school."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Sherry, Teacher #2 (Guzman Elementary, Flint ISD): "A highly qualified classroom science teacher knows the TEKS and how to get children interested in them."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Sarah, Teacher #5 (Little Fox Elementary, Little Fox ISD): "A teacher who can address all styles of learning, TEKS assigned/aligned, and still have fun in the classroom."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Alana, Teacher (Laurel Tree Elementary, LaFayette ISD): "This teacher would be knowledgeable in his/her subject matter and TEKS. He/she would be "hands-on"* *and conduct experiments with her class on a regular basis to reinforce skills taught. This teacher would reinforce the Scientific Method with all students regardless of the student's skill level. All students would be involved in investigative learning."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

*Deanna, Teacher (Vector Elementary, Tesla ISD): "A highly qualified teacher uses the curiosity of the student along with the TEKS to build the knowledge, experience, and competence of the student. By building a strong curriculum based on inquisition, investigation, knowledge, skills, and application, students become scientists' not just testers."*

*(Comment from the Texas Elementary, Intermediate, or Middle School Teacher Survey™)*

**LIMITATIONS OF ANALYSIS**

This study is a quasi-experimental study, there is no random assignment to groups, given that invited teacher participants attended a TRC – PD elementary science education program between 2003 and 2008. This study is not a multivariate study to predict the outcome of 5$^{th}$ grade science TAKS due to the direct relationship of TRC – PD trained teachers and TAKS test scores. It does not have respondent campus assignments of teachers and campus administrators who are not involved in TRC – PD; therefore, this research study does not provide discriminating evidence in this area. Even in the survey compilation, where some statistically significant differences in 5$^{th}$ grade science TAKS achievement for the two groups of participants (Campus Administrators and Teachers) support this study's hypotheses, the researcher is not able to claim that the influence of teachers' professional development or the resulting policy changes caused differences in the TAKS achievement.[274] The data interpretation is discussed in Chapter 5.

As a quasi-experimental study, this research is not organized to compare the same students over time, since "those kids 5 years ago may have done better or not now".[275] Other factors that would be evident today may be implicated, and those situations cannot be controlled. For example, one circumstance that is apparent in the data concerns districts and campuses with low socio-economic-status (LoSES) versus those with high socio-economic-status (HiSES). Numerous LoSES campuses demonstrates high or very high 5th grade science TAKS test scores. Furthermore, some HiSES campuses demonstrate mediocre or low 5th grade science TAKS test scores.

# Chapter 5 - *Pandora's Box now Open*

This dissertation study began by wondering how do Texas elementary campus administrators monitor and support elementary science through *highly qualified classroom teachers?* The inherent complexity to unravel multiple layers within education is a difficult task. To find relevance of how campus administrators could have an impact on student achievement success through the HQCT teacher became the missing link. The purpose of my dissertation was determining the impact of educational policy on elementary science education curriculum based on the decisions made by Texas elementary school campus administrators as *Campus Instructional Leaders* (CIL).

This research focused on clarifying whether a Texas elementary campus with high or consistently improving state-mandated standardized assessments, TAKS 5$^{th}$ grade science test scores, owes this success to a CIL choosing appropriate science education curriculum that values a highly qualified *elementary science* classroom teacher.[276] Prior research shows that sustained professional development (PD) and use of data-informed decision making processes can lead to improved student test scores on standardized assessments.[277]

By the end of the study, the statistical results of the survey questions on the *Texas Elementary, Intermediate or Middle School Teacher Survey*™ or the *Texas Elementary Campus Administrators Survey*™ provided a pathway through the maze of information as well as allowing the individual voices to speaking loudly and succinctly. Their individual stories of encouragement were told as well as stories of desolation. Some elementary campus leaders, while chasing illusive test scores required by educational policy in limited subject areas, ignore science entirely since there are no consequences for low student achievement test scores for science as there are for high-stakes accountability in elementary reading and mathematics. Nonetheless, there is still a hopeful story told within the mounds of data and comments from the Texas elementary campus administrators as well as dedicated elementary teachers of science remain focused on the development of relevant and meaningful science learning experiences for the diverse student populations in classrooms across the state.

## ANSWERS TO RESEARCH QUESTIONS

The supporting research questions are answered individually:

*1. What formats of data analysis are used to support science education instructional decisions determined by Texas elementary campus administrators?* Evidence from both surveys indicated that Texas campuses use multiple formats of data analysis for monitoring science education. However, for addressing student achievement on 5$^{th}$ grade science TAKS tests, the only form of data warehouse analysis that showed improvement were Student Information Systems.

*2. How are Texas elementary school campus administrators, as Campus Instructional Leaders, utilizing available data when monitoring elementary science?* This question was not as clearly defined as originally intended since the overall analysis showed that CIL tended to use their personal experiences and general educational knowledge when monitoring elementary science within their campus domains. Quite a few CA were new to the campus assignments and did not know the teachers or the teachers experiences in science PD through local regional Collaborative programs. Numerous CAs expressed their lack of knowledge or experience with the TRC science PD programs while others expressed high praise for improving student achievement on 5$^{th}$ grade science TAKS tests. To actually determine how CA actually utilize data for monitoring science education is highly variable according to each individual's personal experience, professional training or length of time as a CA on any particular campus.

*3. Do the CIL decisions support the selection of pre-eminent teacher staffing arrangements to enhance student learning through teacher instruction?* For all of the possible configurations of influence, teachers' had the most influence on CIL decisions to support the selection of pre-eminent teacher staffing arrangements to enhance student learning.

*4. How does the science education professional development opportunity for teachers impact TAKS fifth grade students' science scores?* From the viewpoint of CA who are familiar with and support teachers' attendance at a TRC science education PD, these training opportunities are highly valued for improving students' 5$^{th}$ grade science TAKS test scores. On campuses where the CA does not know about local, regional Collaboratives, or see the value of science education on their campus, the connection between teachers' PD and students' success on the 5$^{th}$ grade science TAKS tests does not correlate.

*5. Is education policy's designation of a highly qualified classroom teacher, as currently defined by the No Child Left Behind Act of 2001, necessary for elementary science education?* Similar to the results in *Research Question #4*, the viewpoint of CA who are familiar with and support teachers' attendance at a TRC science education PD, the belief that the PD training opportunities develop teachers' science content knowledge pedagogy are highly valued qualities that directly impact students' 5$^{th}$ grade science TAKS test scores. Even on campuses where the CA are not familiar about local, regional Collaboratives science PD, or do not see the value of science education on their campus, CA viewpoint correlates with state and federal definitions of HQCT as integral components for professional teaching staff. Teachers see HQCT important based on their personal growth and knowledge gained through local regional Collaboratives science education PD.

The primary research question for this study was “How do Texas elementary school campus administrators influence student achievement in science education?” Based on all of the data analyzed, the answer is *it depends*. Many Texas elementary CA expressed pride and joy as they see science education an integral part of their campus’ academic instruction for both students and teachers. Nevertheless, at least 14% do not see the value of science education since they appear to measure *value* according to what measurements are applied to their campuses through *NCLB* and state accountability systems for mathematics and reading. More research needs to be completed to understand these interactions and relationships.

## Hypotheses

### Hypothesis 1: TRUE

Fifth grade teachers who participated in Texas Regional Collaborative (TRC) science education professional development programs **have a positive influence** how campus administrators apply federal educational policy regarding the development of Highly Qualified Science Teachers (HQST). The changes in campus policy resulting from this **influence** will increase student achievement on the 5$^{th}$-grade TAKS science test and, therefore, the percentage of students passing the science TAKS test has increased.

Unfortunately, though when teachers who have participated in local regional Collaboratives science PD change jobs, are no longer involved or no longer supported by their CA or district, loose interest in teaching science, or otherwise are no longer involved in science education then student achievement on the 5$^{th}$ grade science TAKS tests can be diminished or no longer shows improvement over time. CA and district continual support of teacher development through science education PD is vital across all elementary grade levels if continual improvement of students’ achievement on state-mandated science exams is required.

| | TRC~ Prof. Develop. | TRC Participants influence Campus Admin. | Campus Admin. change policies regarding development of HQCT^ | TAKS* Test Scores Change |
|---|---|---|---|---|
| **Hypothesis 1** | Yes | Yes | Yes | Significant increase in the percentage of students passing subsequent 5th grade science TAKS test |

~Texas Regional Collaborative
*Texas Assessment of Knowledge and Skills
^Highly Qualified Classroom Teachers

Table 5.1. Hypotheses

However, due to the multifaceted nature of this research, there were some elementary campuses where the teachers' participated in science PD training and were able to influence Campus Administrators' but no policy changes occur that TAKS test scores on the 5th grade science test. For some schools, the TAKS test scores increased, decreased and some remained within one or two average percentage of students' passing. Likewise, an opposite event occurred when it appears from the data that there was no influence on Campus Administrators' decisions but policy application did change and the 5th grade science TAKS tests scores increased, decreased and some remained within one or two average percentage of students' passing. These individual cases need further research and analysis since the circumstances were beyond the scope of this research study.

## THEMES

Five themes emerged from the quantitative and qualitative data gathered from this research study: **(1)** Principal and Teacher Effectiveness, **(2)** TEKS / TAKS, **(3)** Policy

Applications, **(4)** Power and Control, and **(5)** Communications. Each theme is discussed individually below.

### THEME #1: PRINCIPAL AND TEACHER EFFECTIVENESS WITH DIDM

Barufaldi[278] expressed the results of student achievement as a combination of multiple affects:

Campus leadership PD +

data-systems uses +

SUPPORT of Teachers PD +

Science Content Knowledge Learning = **Student achievement**[279]

In order to achieve these results, a clearly defined and well-understood vision of teaching and learning must exist at a campus as a minimum requirement, and throughout a district at best, before DIDM can realize its potential[280]. This level of vision takes time, leadership, focused efforts, and the willingness to explore. Training for everyone to use data appropriately for improving instruction is crucial for both classroom teachers and CA.[281] Unfortunately, there is not a common framework regarding what classroom teachers and CA should know and be able to do when working with and utilizing DIDM fully.[282]

Additionally DIDM capacity building, whether it is with central administration, CA, or classroom teachers, is vital to achieve high quality uses of DIDM.[283] In order to sustain data use, along with understanding what data interpretation is and the application of, the roles of central office members and types of PD offered to CA and teachers may need to change as well.[284] As such, *thinking outside of the box* about scheduling time for PD training to occur in such a manner for all personnel to gain the best possible learning experiences is crucial to understand data use within school settings. Even so, it is equally important for everyone within a district and campus level to have similar levels of understanding about the function of *learning and teaching* so data applications are appropriately crafted to address students' learning and teachers' improvement of pedagogical practices.[285] Furthermore, PD needs to be offered to everyone in the district when first launched, and offered on a continual basis as long as each individual remains employed as changes in software industry and accountability requirements are modified.[286] Correct use, interpretation of, application and analysis of data, and consistent PD can no longer be a *one-day wonder* or *self-taught experience* as currently practiced in multiple school districts. Continual professional education (CPE) is both a state and federal requirement for teachers and CA. PD primary focus regarding the use of multiple data formats, as well as accessing data addressing student achievement in science education[287] is essential for informed instructional decision-making. The appropriate application of data is a vital and indispensible tool for classroom teachers who expect to utilize such information in appropriate ways to address every individual student's unique learning requirements.[288]

Effective data use necessitates a school atmosphere that promotes inquiry based thinking,[289] a basic element in science education methodology.[290] Schools in districts with official plans for widespread data use are more likely to use data for educational improvement.[291] Calibration is an important concept emphasizing that districts should use a process (e.g., crucial conversations, etc.) to determine which data are important, how they are accessed, and how they can be utilized to support the education of all students.[292]

The use of data coaches may be another solution for schools to assist them in disaggregating data, manipulating computer technology, and developing collective inquiry, and collaboration among campus personnel.[293] What's more, research literature noted that data coaches are a beneficial asset and tool when a school is making an effort to instill the process of DIDM across an entire campus.[294]

To use PD experiences as part of the decision-making equation by campus administrators, and apply this level of skills and knowledge within DIDM is needed. The use of data systems for linking student achievement [learning] to best practice [teaching] may have an impact in a way that no one has yet considered. As *The Carnegie Report*[295] described, campus administrators cannot be expected to accept exclusive responsibility for student achievement *any more than teachers should be* exclusively responsible for student achievement. Our nation's policymakers need to recognize accountability is everyone's responsibility and implement the right tools – professional development, data-informed leadership, support for science educator training for teachers and campus administrators – must absolutely be included within mandated policies. "If accountability is the mantra of the land, why not share the accountability with policymakers, who insist on high achievement yet fashion policies that undermine that goal?"[296] Imagine what would happen for teaching and learning.

**Data-Informed Decision Making**

In DIDM research literature, numerous studies echo similar beliefs and call for more training specifically geared for the unique situation CA leaders are in, particularly in the utilization and interpretation of data. Current data use efforts are often superficial and fragmented, as educators often lack the skills necessary to analyze and use data quickly and effectively.[297]As such PD opportunities for data-use techniques is crucial to ensure that educators develop true data literacy, beyond cursory familiarity.[298] Despite the wealth and availability of data when addressing student achievement and learning, many teachers and CA are making decisions using a combination of anecdotal information, experience, and intuition (i.e., professional judgment), rather than information collected systematically (e.g., research, evaluation findings).[299] The extent to which districts use data-information as an application process for determining appropriate decisions, however, may vary depending upon the type of decision that needs to be addressed (e.g., curriculum vs. professional development) as well as whom the decision may impact (e.g., student vs. teacher).[300]

Public policy enhances instrumental and conceptual use for student data used to ensure content knowledge and achievement since districts and schools are required to report data specific to student learning. *NCLB* demands information about school organizational systems performance and creates occasions for inquiry into the quality of its educational program through federal AYP[301] or the Texas accountability system. Nevertheless for science education standards to be part of all elementary campuses, appropriate statues for addressing PD requirements for CA and teachers' to collaborate and learn together will be necessary to ensure that Texas elementary campuses are lead by *highly qualified campus leaders* in the same manner as demands for *HQCT and highly qualified campus administrators* continue.

### THEME #2: TEKS / TAKS

Another theme that appeared consistently throughout participant's survey comments is about the importance of a campus' achieving high TAKS scores as well as teachers' abilities to match TEKS to TAKS for incorporating this knowledge into lesson plans. Overall, comments and discussions were how teachers' are expected to use the TEKS standards in designing lesson plans and to use when teaching students. The use of TAKS testing data was specific to student achievement on the state-mandated standardized tests.

*Olga, Principal (Orlo River Elementary, Niagara Falls ISD): "Texas schools are judged on TAKS. In 2007 we had 89% of our students pass Science TAKS and 46% were commended in Science. Our district has an assistant superintendent for student success and with his help we concentrated on fifth grade science and the results speak for themselves. We have taken the Science TEKS and unpacked them, we study the data analysis provided by the state, and take diagnostic tests throughout the year. <u>We are a data driven campus</u>!"*

*(Comment from the Texas Campus Administrator Survey™)*

*Beth, Principal (Macaw Elementary, Niagara Falls ISD): "The TRC program helped our school improve science instruction and raise our passing rate on TAKS."*

*(Comment from the Texas Campus Administrator Survey™)*

## THEME #3: POLICY APPLICATIONS

### No Child Left Behind Act of 2001 – Highly Qualified Classroom Teachers and Principals

With *NCLB* adoption in 2002,[302] the 107th U.S. Congress representatives believed this new education policy direction would bring closure "[To]… the achievement gap with accountability, flexibility, and choice, so that no child is left behind. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled."[303]Although the intention of this federal mandate was to address gaping issues within the public education organizational system, not one state in America, nor any individual citizen, expressed a desire for substandard education for the nation's children. Achieving equitable and fair educational programs for all children is illusive at best, and a disaster at worst, for addressing elementary science education programs. One of the leading challenges focused on *school effectiveness,* which is different from *teacher effectiveness* or *principal effectiveness*. The differences created dilemmas for policymakers with the question of how can policy accurately measure effectiveness.[304]

As *NCLB* identifies basic premise of HQ classroom teachers and principals in §1119 "… all *teachers* hired… and teaching ...with funds under this part are highly qualified … and all *principals* are highly qualified…"[305] At the state level, a similar policy demands that public schools are staffed by professional educators deemed as *highly qualified* according to federal guidelines. For Texas, *HQCT* and *HQ principal* is determined to be an individual who possess a Bachelor's degree in the Subject area that h/she is teaching, pedagogy courses required (via college courses or through alternative certificate programs), "other [undefined] prescribed course work", and practicum and/or student teaching experiences.[306]

Under the current presidential administration, these directives have not changed. The 2007 reauthorization of *NCLB* contained potential modifications for one section regarding a stronger, clearer definition of *HQCT* to *highly qualified* ***and effective*** *classroom teacher* in order to include levels of accountability standards. At the same time, principals were included within the definition for highly qualified personnel within public schools. Discussions in the U.S. House of Representatives were postponed by summer 2008 with the intent to address the need to establish a clearer definition of *highly qualified* ***and effective teachers and principals*** remaining.[307]

When DIDM is added, effective *HQCT and principal* measures may be defined only by the test scores of individual students – a singular data point measured over time. Until both teachers and CA can interpret such singular data in a manner that has the ability to modify and change pedagogical practices that reach all children's learning needs, this new vision of a *highly qualified and effective classroom teacher and principal* may end up as federal policy with further disastrous results[308] for America's public education system.

As this study demonstrates, *teachers'* effectiveness lie within support provided by CA through career development of science PD programs. Guskey, Loudes-Horsley, and Barufaldi[309] are only a few educational researchers whose studies point out the necessity of sustained, continuous, and supported PD opportunities for teachers has the impact on student achievement for state-mandated test scores.

Teachers and campus administrators are defined as HQ in a similar manner in the Texas Education Code, §21.049 as well as the SBEC's rules governing educator preparation as designed to promote flexibility and creativity[310] for highly qualified individuals to be able to practice and exhibit the following characteristics: motivation, knowledge of learning theories, knowledge of and applications for TEKS organization, structure, and skills, knowledge of and applications for TEKS in the content areas, state assessment of student learning, curriculum development and lesson planning, classroom assessment for instruction and diagnosing learning needs, classroom management and developing a positive learning environment, address the learning needs of special populations, parent conferences and communication skills, instructional technology applications, pedagogy and instructional strategies, differentiated instruction, and certification test preparation. Finally, teacher certification in Texas requires three tasks are completed: (1) a baccalaureate or higher degree in the subject taught, (2) passing the Texas certification exam for content knowledge, and (3) demonstrating pedagogical knowledge. Comments from both the *Texas Elementary, Intermediate or Middle School Teacher Survey*™ and the *Texas Elementary Campus Administrator Survey*™ were nearly identical in matching the SBEC and TEA guidelines.

However, the first three qualities listed in the state policy documents were never mentioned by participants on either survey.

"(1) the specified requirements for reading instruction adopted by the SBEC for each certificate;

(2) the code of ethics and standard practices for Texas educators, pursuant to Chapter 247 of this title (relating to Educators' Code of Ethics); and

(3) child development."[311]

Many teachers discussed their experiences with Reading Academies[312] and the Three-Tier Reading Model,[313] and indicated that science PD could be improved by following a similar pedagogical PD format. Implementation or modifications for such pedagogical approaches to improving science PD is outside the parameters of this study.

With *NCLB* demands for meticulous data for AYP reporting, which strains finite and at times inadequate resources, science tends to be a subject that is easily dropped from daily teaching schedules. Based on these data-informed decisions, the elementary campus administrator analysis for predicting teachers' impact on successful student learning and achievement based on the teachers' prior PD experiences tends to not occur. Absent from the decision-making process was much consideration that continuous, sustained, and content-focused annual professional development for science content and pedagogy can attribute to students' achievement in science. In my opinion, additionally issues arose due to state policy ambiguities and local interpretations, as well as campus administrators' frequent assignment changes, that contributes to the federal policy not being operationalized nor validated throughout the districts and campuses.

## THEME #4: POWER AND CONTROL

### Organizational Management Systems for Education

The ultimate story is about *power* found inside an organizational system known as school. The *power* identified throughout this research is expected by our societal structure demands from an *elementary campus administrator* in areas such as instruction, leadership, budget allocations, and staffing. This *power* position of CA provides teachers the instructional support, or lack of support, by campus-level interpretations of federally-mandated, state-required, *annual* professional development opportunities to advance elementary teachers' conceptual knowledge of science. The *power* wielded by CA controls resources and materials which are *necessary* for successful science education pedagogical approaches. The *power* of the CA to establish and promote students' successful achievement to learn science through hands-on learning in a classroom laboratory through investigations of scientific problems, by developing logical thinking required in the scientific method approaches, and basic enthusiasm and excitement of student's learning. The *power* of communication through appropriate, concise, and succinct expressions between elementary campus administrators, classroom teachers, students and parents, and local communities geared to focus all pedagogical and curricular strategies specifically for the unique learning needed by all children. This story of *power*, as well as for those who become *powerless* in this complex organizational system, has the ability to coax, cajole, wheedle, charm, entice, or in some circumstances twist someone's arm in order to achieve the ultimate goal of student successful achievement on the state-mandated 5$^{th}$ grade science TAKS test.

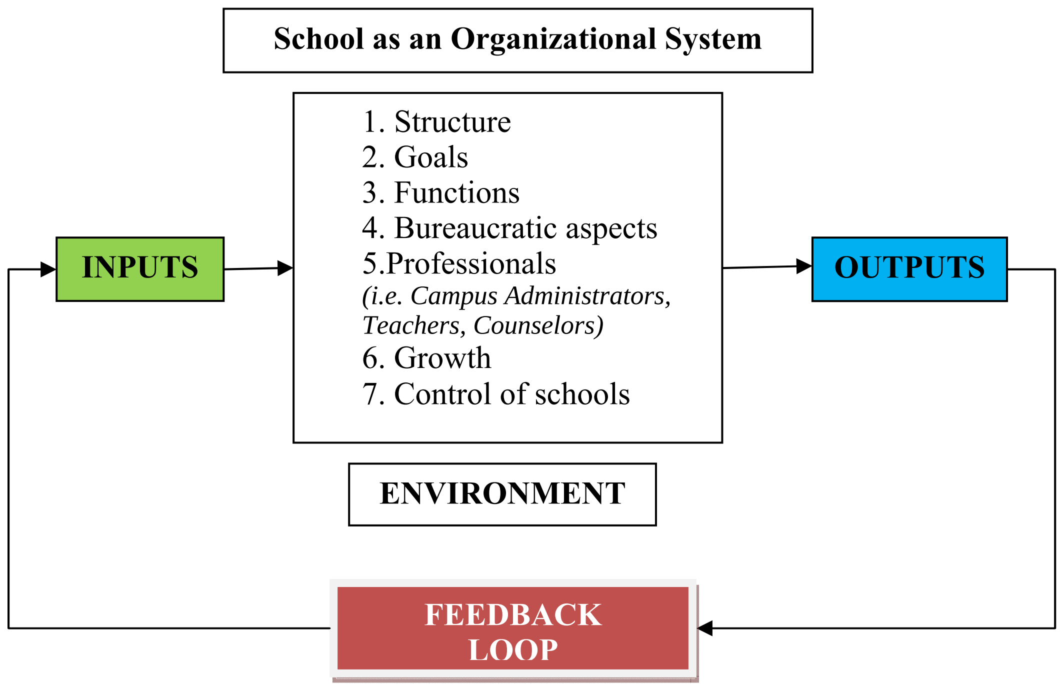



Illustration 5.1. Ballantine’s open system model of educational organization

Teachers teaching students remain a consistent message from our national belief of public education when referring to student achievement. As Ballantine’s sociology of educational organizational model points out there is an organizational system process that teachers work with daily addressing student achievement. The *inputs* arrive from all aspects of society: data about students, parental concerns, community involvement, local, state and federal policy requirements and expectations that the school environment will address each of these for all children’s needs. Within the school environment, campus administrators and classroom teachers have multiple responsibilities demanded of them ranging from the structure of the school to control of the school. The *outputs* expected from the school environment are high-stakes testing for all children to succeed while meeting the needs of the local, state and federal policies. This process is continuous with information gathered, collected and analyzed from the *outputs* and returning as *inputs.*

Even within this complex organizational system process, there remain other individuals involved in the paradigm of student achievement success who are equally accountable, primarily the elementary campus administrator. Up until now in the education field, the interrelated and corresponding connections are easily lost since a direct connection linking student learning / achievement to campus administrators is rarely notices.

Beginning with the position of the elementary campus administrators, this study demonstrates just as much contribution to student success and achievement in a similar manner as a classroom teachers' responsibility lies directly with teaching. Campus administrators represent the *power* within schools since decisions about budgets, professional development, campus policies, and a multitude of challenges facing principals daily.

In a business structure, these individuals are management or the chief executive officer (CEO) and every employee within that business knows that any decision made has potential to impact each individual. Unfortunately, schools and organizational school systems within the industry of *education* are not considered in the same way as a business is within their separate industry

**Lack of support for Science Education or Science PD opportunities for Teachers**

Teachers' provided a wealth of detailed information in both the survey and comments regarding concerns of the lack of support from CA regarding science education and science PD opportunities. This topic occurred in four of the five supporting research questions, and was referred to numerous times by participants in both surveys. Overall, 14% of the CAs admit that science is not a priority on their respective campuses and this omission is due to science does not have the severe consequences of failure as elementary reading and mathematics are held to in *NCLB*.

In a state where over 57% of the students are considered as '*leavers*' (e.g. 27 drop-out categories for Texas districts to document students who are no longer enrolled in public education), it is appalling to recognize that the lack of science education could be a new factor of '*leavers*.' Basic science concepts are just as important for children to learn in elementary classrooms, as are basic reading and mathematics. For elementary education CA to purposefully ignore science education is inexcusable in any account. With recent Texas legislation implementing a rigorous high school graduation plan for the majority of students, known as the *4 x 4 graduation plan*[314], for elementary schools to not teach elementary science concepts is unforgivable.

**THEME #5: COMMUNICATIONS**

Close examination and analysis of the quantitative and qualitative data collected during this study revealed a deeper underlying faction that was not immediately apparent. Throughout the comments written by CA and teachers', many discussed the end results of the use of DIDM or expectations of science PD or how individual teachers are addressing science topics with students.

> *Joy, Principal (Dort Elementary, Doble ISD): Many teachers in the fine arts have gone to the TRC conference and have brought back ideas to use cross-curricular wise in their subject. For instance, our art teacher incorporates life science by having the students' plant and maintain a butterfly garden. She also has the students dip paint on dead fish and then press the fish on paper to make an imprint of the fish. Our art teacher also sponsors Feather Fest and creates activities around environmental issues and the effect it has on birds.*
> *(Comment from the Texas Campus Administrator Survey™)*

## AN ENGAGING FUTURE FOR ELEMENTARY CAMPUSES – POTENTIAL SOLUTIONS

### The Need for *Highly Qualified Campus Leaders*

Research literature, unfortunately, does not identify the link between CAs and student achievement when programs like the TRC's science PD provides such opportunities for elementary teachers. As Grosso De León[315] points out, "[By] definition, the principal – as the school's highest-ranking official – is indeed *a significant and important person*." Job tasks required from CA demand knowledge and skills beyond what most are capable of, yet performance and leadership is expected from the individuals leading all of America's 96,000 campuses.[316] PD is found at individual districts through mentoring or district-level programs; however a comprehensive plan for the training of key educational leaders has not been forthcoming.

As reported in *The Carnegie Reporter*[317] "One result of a two-year NCEE study was the 2005 publication of *The Principal Challenge, Leading and Managing Schools in an Era of Accountability*, a virtual primer on the school leadership crisis". Three programs in the states of Pennsylvania, New York, and California for training and mentoring principals were discussed regarding how each state is addressing this school leadership crisis. However it is widely believed that schools of education "simply have not done the job of preparing principals to make…the connection between what they [are] expected to do, and how they [are] prepared…schools of education tend to function largely as 'cash cows' for the university. With millions of dollars a year spent on curriculum, there is no coherence in the curriculum for the training of principals".[318]

Deming's 14 points of management transformation (Table 2.4) demonstrated high levels of success throughout numerous business environments. These 14 points are not concepts considered unique to business leadership, but are points that are easily adapted to an educational organizational system. With a few changes or additions, Deming's 14 points of management transformation can be modified to apply to educational organization management transformation as well. In Table 5.1, the education modifications are italicized.

| | **14 Points of Educational Organization Management Transformation** |
|---|---|
| 1 | Create constancy of purpose for improvement of product and service *focusing on student learning.* |
| 2 | Adopt a new philosophy *based on the success for both student achievement and teacher learning.* |
| 3 | Cease dependence on mass inspection. *It does not work with children or adults.* |
| 4 | End the practice of awarding business on the basis of *assigning best teachers to best schools and worst teachers to worst school*. |
| 5 | Improve constantly and forever the system of production and service. *Serving children should be the focus of service for they are the next generation.* |
| 6 | Institute training *consistently and communicate – communicate – communicate!* |
| 7 | Adopt and institute leadership. *Every person in the school environment needs the opportunity to learn leadership.* |
| 8 | Drive out fear. *It is crucial for the positive growth for teachers and the students.* |
| 9 | Break down barriers between staff. *Silos are meant to store grain, not create barriers that keep individuals separated.* |
| 10 | Eliminate quotas for the teachers and people in *educational environments*. |
| 11 | Remove barriers that rob people of pride of workmanship. *Set expectations high and support every person to achieve new standards of learning.* |
| 12 | Encourage education and self-improvement for everyone *through consistent, sustainable, and annual opportunities*. |
| 13 | Take action to accomplish the transformation |
| 14 | *Take time to walk along the path that others walk. There may be another viewpoint to consider while appreciating the experience.* |

Table 5.2. Brown's 14 points for Educational Organization management transformation[319]

## The Current *Bottom Line* for Education

The *bottom line*, a familiar quarterly term within any profit-oriented or not-for-profit business, is a continual measurement. The bottom line is measured through multiple layers of data ranging from customer service interactions to statistical analysis of products or data to sales or cash flow. Each layer is determined to be measures of success for businesses. Nevertheless, today's current practice of measuring and defining *student achievement and success* within any education organizational systems that is based on a singular data element (e.g., TAKS test scores) is ridiculous. No CEO or business manager or board of directors would participate in such absurdity. Still, such measures are applied to education where numerous broken lines of accountability within the organizational system of education remain for determining direct responsibility for student achievement to the teacher.

Deming's lifetime of work focused on how to identify and achieve business goals necessary for profitable enterprises. He examined business models, educational systems, and sought various solutions applicable for both. Although he popularized the *Theory of Constraints* model as a mechanism developed for improving production within manufacturing, there are basic constructs that can be applied directly to education organizational systems.

In Deming's model[320], three practices are required for business: (1) *necessary conditions* – what is needed for success, (2) *undesirable effects* – what effects would inhibit success, and (3) *identify core problems* – where are the issues and or concerns that would prevent success. The same practices are necessary for education as well when addressing student learning and achievement successes.

Once these three practices are identified, the information gathered in the process is considered *data* recognized for determining what *critical success factors* need to be met (e.g. 5$^{th}$ grade students learning science). From this point, decisions regarding how to proceed are required which brings one into the realm of recognizing *constraints*, also described as *bottlenecks* that inhibit, restrain, slow down, or hinder successful progress. Each constraint may reveal other constraints that need to be identified in order to reach the ultimate *goal* (e.g. improved student achievement on 5$^{th}$ grade science TAKS). Whether the process used to build widgets or teaching students is not as important as the *logical thinking* required through effective communication between CA and teachers.

When Deming's *Theory of Constraints* model is applied to education organizational systems, the process does not change. Campus administrators identify the *necessary conditions* for campus operations (e.g. high scores on TAKS tests, hands-on science instruction, HQCT professional staff) and communicate the *undesirable effects* (e.g. students not passing TAKS, teachers' and / or campus administrators loss of jobs, campus being closed by TEA) and identify the *core problem* (e.g. multiple causes). From these data sources, CAs determine staffing and budget decisions in regards to constraints of available science PD opportunities for teachers as well as maintaining HQCT requirements. The expected outcome is improved levels of student achievement on 5$^{th}$ grade science TAKS tests.

Many elementary teacher education programs do not emphasize science education pedagogy. In this scenario, the bottleneck remains with the *Teacher* because regardless of power, communication efforts, budget, or PD opportunities wielded by CA, a Teacher will continues to be a bottleneck since h/she remains limited by his/her ability to provide *x-factor of teaching* for improving student learning. When the *Teacher* is denied access to data, or PD opportunities, or any other provision where a CA has power and control over, then the Teacher remains cemented within the organization the primary constraint. See Illustration 5.3.

> *Paul, Assistant Principal (Duesenberg Elementary, Dragon ISD): "The ones that attended were reading teachers that were assigned to teach Science. The challenge is to make science a priority in their undergraduate studies. The teachers weren't prepared at all to teach science coming out of their undergraduate programs."*
>
> *(Comment from the Texas Campus Administrator Survey™)*

*Laura, Assistant Principal (Smith Elementary, Smith Flyer ISD): "[Due to our low TAKS Science 5$^{th}$ grade test scores] we have determined that many of our teachers are not as effective with teaching Science due to lack of knowledge of the content."*

*(Comment from the Texas Campus Administrator Survey™)*

*Mimi, Teacher #3 (Propulsion Elementary, Santa Cruz ISD): "I have not been asked to attend any science programs. I feel that I am still very unprepared and very weak in teaching science because of the lack of training I have not received. I feel like a failure as a teacher."*

*(Comment from the Texas Elementary, Intermediate or Middle School Teacher Survey™)*

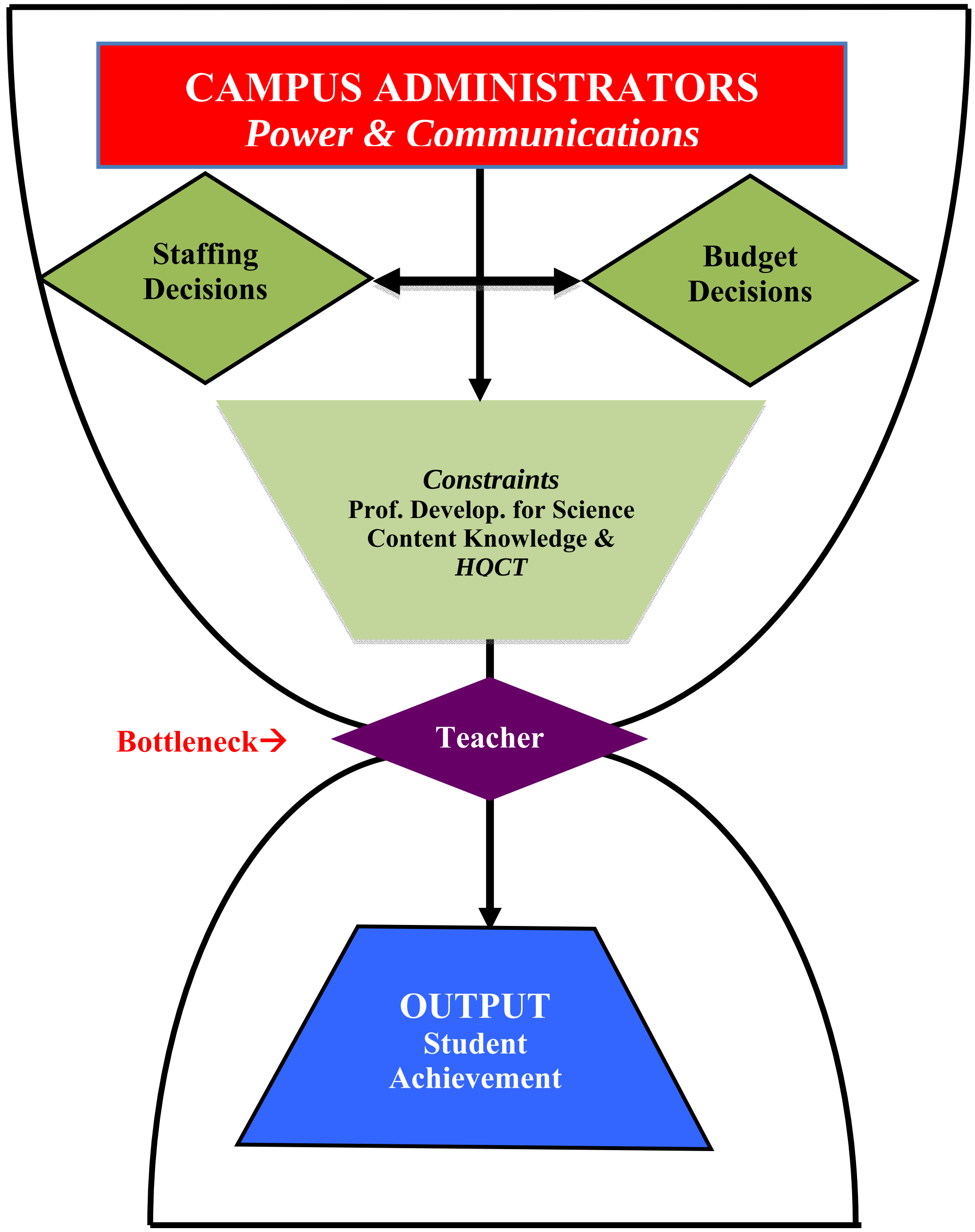



Illustration 5.2: Brown's Application of *Theory of Constraints* Model to Education

## Establishing A New *Bottom Line* for Education

Although Deming's *Theory of Constraints* model has justifiable applications to education, where it does not work is when one recognizes that both students and teachers are *human beings* – not *widgets* that are molded, counted, standardized or conformed. To take into account the intrinsic value and qualities of humanity that are difficult to measure such as creativity, morality, thinking, reasoning, and artistry to name a few demands a different theoretical model for education application. Current policy consists of pieces and parts that are left up to individual interpretations. Furthermore, the ambiguous rendering of federal policy does not provide a concise structured model towards promoting educational success for all.

When Texas' public education was included in the state constitution as the responsibility of local control districts, the economic and social structure in the 1800's was vastly different than 21$^{st}$ century. Texas in 1876 was an agriculture-based economy with few local or state-level job opportunities requiring much more than basic educational curriculum offerings. However, the 21$^{st}$ century brings an advanced and sophisticated economic basis of a global village requiring much higher and technological skills requiring advanced knowledge of science. The lack of providing a concise structured path for development of highly qualified educational leaders can no longer be left to the whims of local control districts.

A new model merging CA and teachers that utilizes DIDM, power, PD and policy is necessary in order to achieve levels of *highly qualified educators* for the purpose of boosting student achievement. A theoretical model is available where communication is the primary element that leads the essential components which are required for student success. This model removes the known constraints, supports teamwork as well as collaborative efforts in order to accommodate diverse students' learning needs.

As a result of this extensive research, seeking answers to the complexities of elementary science education throughout Texas public schools, this proposed model is diagrammed in Illustration 5.4, Brown's *Theory of Educational Constraints Model*. In this model, the major components are *Teachers*, *Campus Administrators* and *Professional Development* which share responsibility for *power*, *DIDM* and ultimately *student achievement*.

Central to all of the components is the policy requirement for *highly qualified*. In this model, highly qualified goes beyond current policy requirements in that it demands synthesis and evaluative skills of DIDM and analysis applications for addressing students' learning and demonstrated achievement by those students on the $5^{th}$ grade science TAKS test. Teachers and campus administrators share the burden overall for improving student achievement. The task is accomplished through continual communications between teachers' and CA as lessons are planned from TEKS, data is gathered through classroom assessments, and students are engaged in the process of learning science.

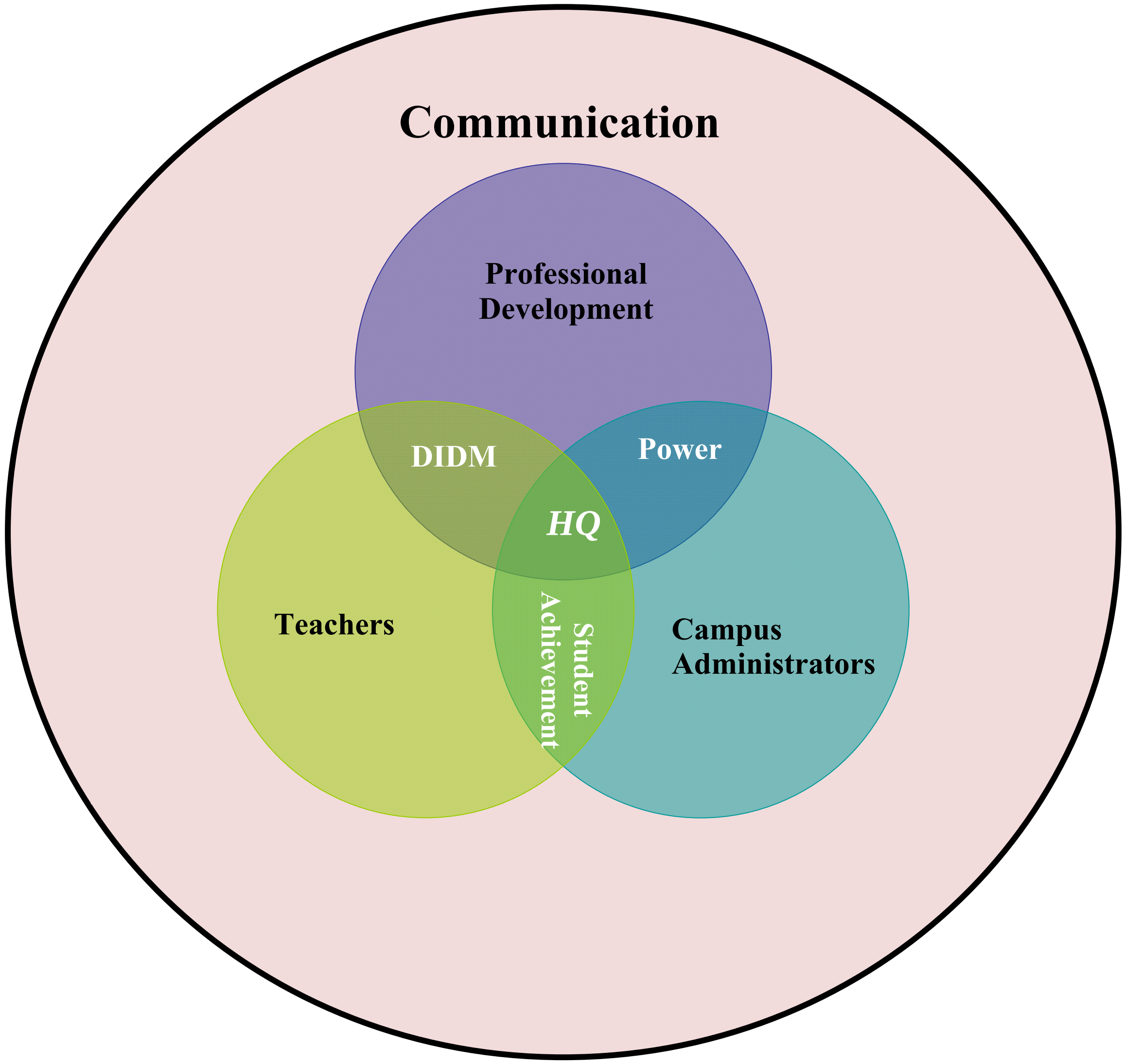



Illustration 5.3. Brown's Theory of Education Constraints Model

## EVIL SIDE OF PANDORA'S BOX NOW OPEN

This research study focused on four elements – science professional development for elementary teachers, the use of data-informed decision-making for influencing 5th grade students' achievement on state-mandated science tests, the impact of campus administrators' utilization of DIDM and science PD for 5th grade students' achievement in science and how federal policy of *'highly qualified classroom teachers and principals'* is applied to improve students' achievement in science. After careful and thoughtful research, analysis, and numerous hours of discussion and thinking about the data results from this study, an even deeper understanding unfolded that were profound.

All of these elements are symptoms of a deeper issue that permeates education. This issue is one that has haunted the hallowed halls of educational institutions for centuries. The issue is communication. Communication between individuals whose primary job is working with children. Communication between teachers and campus administrators. Communication between human beings. This issue has plagued humans, I believe, as long as our early ancestors first learned the power of speech.

For educational applications, however, the issue of communication is defined in Illustration 5.3 Brown's Theory of Education Constraints Model and is the primary interaction that needs to happen for any of the elements discussed throughout this research. Over my career history, I have been part of or observed the power of communications from both the positive and negative aspects. When an individual can communicate her or his desires or needs explicitly to another, an interaction occurs. Communication requires both verbal as well as non-verbal facets – it is not only one being able to speak out loud, but it is equally crucial to listen and appropriately respond.

Many of the problems that occur in an organization are the direct result of people failing to communicate. Faulty communication causes the most problems. It leads to confusion and can cause a good plan to fail. Communication is the exchange and flow of information and ideas from one person to another. It involves a sender transmitting an idea to a receiver. Effective communication occurs only if the receiver understands the exact information or idea that the sender intended to transmit.

Studying the communication process is important because the ability for leaders to coach, coordinate, counsel, evaluate, and supervise through this process is essential. It is the chain of understanding that integrates the members of an organizational system from top to bottom, bottom to top, and side to side.

Unfortunately, in the education organizational system, communication tends to be the least effective skill in a world where communications are highly prized. As such, communication could be the 'evil side' of an opened Pandora's box. In my career, I have worked with and observed many educators *talk-the-talk* about the importance of collaboration and cooperation, yet not be able to *walk-the-walk* since these same individuals rarely understood the behaviors and nuances necessary for successful application of these skills. For many, the defined roles and functions of Teacher and Campus Administrator erect invisible barriers preventing such interactions. For others, perceived, or in some instances real, repercussions stop any possibility of open communication efforts. One only needs to look at any daily newspaper or Internet blog or media newscasts to find the result of closed communications.

Communication efforts can be frightening when one person begins the conversation due to risks associated with the receiver who may or may not understand the exact information or idea that the sender intends to transmit.

Yet, for educational organizational systems, I believe that open and honest communication is necessary more so than ever before in the history of America's public educational system. Demands on educators to perform as measured by students' achievement on state-mandated standardized tests has become the single data-point that all educators and education is measured. As the data from this study indicate, the lack of communication has an impact on student achievement over time. The lack of communication between campus administrators' and teachers' regarding sustained, continuous, and content-focused science PD has created animosity, reduced morale, and discouragement *at the cost of* the students' short window of opportunity for learning science. The lack of communication between campus administrators' and district leadership regarding the overwhelming burden and demands that many CILs face daily has created high-burnout and very short tenure in the job as campus leaders.

When all of these lost communication opportunities are viewed together, the greater loss becomes the burden of the children for *'passing the TAKS'*. Yet, the tools, skills and strategies necessary for elementary CILs and Teachers' cannot be found when *communication* is lacking.

## RECOMMENDATIONS

Although data analysis of teacher comments from the survey found three factors that were limitations: (1) teachers attended one TRC – PD from 2003 to 2008 with no future for continuous participation, (2) elementary CA changed *at least once* in the same time period, and (3) the interest in science education was not always supported by leadership that could result through negatively impact on student achievement on the 5th grade science TAKS test. This dire consequence did not occur in the majority of campuses due to numerous ways individual CAs and Teachers' found solutions – sometimes working together but most situations creating their own.

Overall, as Wayman and Stringfield[321] found, information in research literature linking professional development with DIDM is sorely lacking. As this research notes, CA need to be communicating and involved with science education to support teachers' PD and ultimately improve student achievement on state-mandated tests. In order to be considered *good* as leaders in the crusade for effective data use and as instructional leaders, CAs must have opportunities as well to attend science education PD along with campus teachers as well as find ways to reduce portions of their current duties.[322] An accountability policy such as *NCLB* serves as a catalyst to focus on using student data to inform CA decisions regarding student achievement and learning.[323] *No Child Left Behind* has increased data collection but has not increased its use by school leaders in order to reach levels of effective measurable change.[324] The lack of knowledge and practice for CA and teachers to actually use data appropriately is still an issue for many educators.[325] As Wayman writes, "[Districts and schools are] simultaneously data-rich but information-poor."[326] The inability to comprehend information provided from data is tragic for the children since the window of opportunity to educate is brief.

As this study confirms, when DIDM processes are calibrated to assess science education, pedagogy, instructional strategies, and teachers' PD opportunities, student achievement on state-mandated tests improve. Perie, Marion, and Gong[327] provide extensive interim assessment guidelines for campuses who want to embark along the path as data-informed leadership for using the wealth of data available to teachers and campus administrators. Black and Wiliam's[328] seminal piece argues that formative assessment cannot stand alone but must be a part of an entire system that uses the information from assessments to adapt teaching to meet learner's needs through three phases:

1. Assessment (item development and delivery)
2. Diagnosis (analysis and reporting)
3. Prescription (pedagogy and professional development)

Yet, my argument is that there are three remaining parts missing in the development of core leadership on campuses. First, it is crucial that CA are included in each of these assessment stages because if the CA demonstrates a lack of coherent, focused, and '*just-in-time*' relevant PD opportunities for DIDM and science education leadership, then not only are the students' successes for science learning denied but also that for teachers' science content knowledge through PD. Second, communication skills of teachers and CAs needs to be addressed. And third, moreover, the lack of focused, succinct, and specific federal and state educational policies addressing the need of highly qualified CAs supported with corresponding PD experiences, and requirements for opportunities to learn with the teachers is necessary. Each level of policy use, from the state down to the teacher, could benefit from such applications of data. It is time for educational industry to truly learn the value of data and proper utilization.

The children depend on us.

## Chapter 1 - End Notes

[1] Direct quote from multiple 5th grade teachers from the *Texas Elementary – Intermediate – Middle School Teacher Survey*™ conducted during this dissertation and from the "*Bridging the Gap in Science for Latino Students*" research project conducted through the Texas Regional Collaboratives by Brown, L., Fletcher, C., and Sherron, T. during the 2007-08 school year in a Rio Grande Valley school district.

[2] The term "the test" has become standard among Texas educators when describing federal- and state-mandated standardized tests which measure an individual student's progress. On the federal level, NCLB requires reading and mathematics tests each year, from Grade 3 through Grade 11. The state of Texas tests are referenced as "TAKS tests," or Texas Assessment of Knowledge and Skills, and also begin in Grade 3 (reading and mathematics). In Grade 4, a writing test is added, and in Grade 5 a science test is also added.

[3] *"No Child Left Behind,"* Public Law 107-10, §9101(23) enacted in January 2002, had no references regarding accountability for principals as a separate group within the educational system. This 790-page document has numerous accountability measures regarding student attendance and performance and teacher requirements within a classroom; definitions for 'highly qualified classroom teacher; descriptions of parent responsibilities for supporting their child's learning; as well as procedures for seeking education outside of an assigned school; and district-level accountability regarding students' progress through "Annual Yearly Performance" (AYP) on standardized, grade-level exams. In 2004, 2005 and 2008 reappropriations of the *NCLB* policy, these omissions were corrected. Within this research study, the 2008 *NCLB* is referenced unless otherwise indicated.

[4] "*Austin ISD Will Proceed with Proposal to 'Repurpose' Johnston Campus."* Austin Independent School District, News Release, June 3, 2008. "*TEA orders Johnston High School's closure*." KXAN News, Wednesday, June 4, 2008. "*Johnston H.S. makes gains on TAKS; future remains unclear."* KXAN News, Friday, May 30, 2008. "*Parents and Teachers Protest Possible AISD School Closures."* Fox News, Saturday, 31 May 2008.

[5] Fletcher, C. 2006. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005.* Report to the Texas Education Agency. Texas Regional Collaboratives. The University of Texas at Austin, Austin, TX.

Texas Regional Collaboratives. 2005. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. Austin: The University of Texas at Austin, Center for Science and Mathematics Education, Texas Regional Collaboratives. http://www.thetrc.org/trc/

[6] The selected list of published authors covers a 70-year span of research literature, beginning with John Dewey (1938) in *Experience and Education* and continuing through one of James Barufaldi's many presentations in 2008. One more recent was Barufaldi, J. (2008) *Professional Development in Science Education: How do we know if it Works?* The Twelfth Consultation of the International Consortium for Research in Science and Mathematics Education, Universidad Tecnological Equinoccial, Quito, Ecuador, May 15, 2008.

[7] Biological Sciences Curriculum Study (BSCS). 1989. *New Designs for Elementary School Science and Health*. Boulder, Colorado: BSCS.

[8] Texas Regional Collaboratives. 2005. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*.

[9] Ibid.

Meyer, J., Barufaldi, J., Fletcher, C., Tinoca, L. and Lee, E. 2004. *The role of sustained professional development in renewing science teachers.* Paper presented at the National Association of Research in Science Teaching Vancouver, Canada.

Borko, H. 2004. "Professional development and teacher learning: Mapping the terrain." *Educational Researcher, 33*(8), pg. 3-15.

Meyer, J. and Barufaldi, J. 2003. *The 4 W's of sustained professional development for science teachers.* Paper presented at the Annual International Meeting of the Association for the Education of Teachers of Science, St. Louis, Missouri.

Guskey, T. R. 2003. "What makes professional development effective?" pg. 748-750.

Koballa, J. T. R. and Tippins, D. J. 2001. "Portraits of professional development models in science teacher education: A synthesis of perspectives and issues." In E. D. R. Lavoie and W. Roth (Ed.), *Models of science teacher preparation - Theory into practice* (pp. 213-224). Dordrecht, The Netherlands: Kluwer Academic Publishers.

[10] Ibid.

[11] The phrase "opening Pandora's Box" refers to ancient Greek mythology. "Pandora's box" was a large jar carried by Pandora that contained evils to be unleashed on mankind – ills, toils, and sickness – and finally hope. The myth began after Prometheus' theft of the secret of fire. Zeus ordered Hephaestus to create the woman Pandora as part of the punishment for mankind. Pandora was given many seductive gifts by Aphrodite, Hermes, Charites, and Horae. For fear of additional reprisals, Prometheus warned his brother Epimetheus not to accept any gifts from Zeus, but Epimetheus did not listen and married Pandora. Though Pandora had been given a large jar and instructed by Zeus to keep it closed, she had also been given the gift of curiosity and, ultimately, opened it. Once opened, all of the evils, ills, diseases, and burdensome labor mankind had not previously known escaped from the jar; but the one thing that was good that came out of the jar was hope (from Wikipedia, The Free Encyclopedia, http://en.wikipedia.org/wiki/Pandora's_Box ).

[12] Data-informed decision-making is the most recent terminology describing the method of utilizing data as a baseline for guiding and determining decisions regarding student learning. Data-driven decision-making, data-based decisions, and data-driven discussions were earlier descriptions for this phenomenon.

[13] Neustadt, R. E., and May, E. R. 1986. *Thinking in time: The uses of history for decision makers*. New York City NY: The Free Press.

[14] Dewey, J. 1897. "My pedagogic creed." *School Journal*, vol. 54 (January 1897), pp. 77-80. Article 5: The School and Social Progress.

[15] Ravitch, D. 2000. *Left Back: A century of battles over school reform*. New York: Simon and Schuster.

[16] Ibid. Pg. 13

[17] Ibid. Pg. 13.

[18] Ibid. Pg. 13.

Berliner, D. and Biddle, B. 1995. *The Manufactured Crisis: Myths, fraud, and the attack on America's public schools*. Massachusetts: Perseus Books.

The National Commission on Excellence in Education. (1984). *A Nation At Risk: The Full Account*. USA Research, Inc.: Oregon

[19] Head Start is a national program in the U.S. Department of Health and Human Services under Acting Director Patricia Brown. Its mission is to promote school readiness by enhancing the social and cognitive development of children through the provision of educational, health, nutritional, social and other services to enrolled children and families. Accessed November 2008, http://www.acf.hhs.gov/programs/ohs/

[20] Sparks, D., and Hirsh, S. 2006. "A national plan for improving professional development "[Electronic Version]. *National Staff Development Center*, 1-19. Retrieved July 20, 2006, from http://www.nsdc.org/library/authors/NSCDPlan

Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." *American Journal of Education, 112*, pg. 549 - 571.

Black, P., and Wiliam, D. 2006. "Inside the Black Box: Raising Standards Through Classroom." *Phi Delta Kappan, 80*.

Ingram, D., Louis, K. S., and Schroeder, R. G. 2004. "Accountability policies and teacher decision making: Barriers to the use of data to improve practice." *Teachers College Record, 106*(6), pg. 1258-1287.

Salpeter, J. 2004. "Data: Mining with a mission" [Electronic Version]. *techLearning*. Retrieved Nov. 3, 2006, from http://www.technlearning.com/shared/printableArticle.jhtml?articleID=18311595.

Wellman, B., and Lipton, L. 2004. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*. Connecticut: MiraVia, LLC.

Bernhardt, V. 2003. *Using data to improve student learning in elementary schools*. New York: Eye on Education.

Borman, G. D., Hewes, G. M., Overman, L. T., and Brown, S. 2002. *Comprehensive school reform and student achievement: A meta-analysis* (Federal Report No. 59): Office of Educational Research and Improvement).

Earl, L., and Katz, S. 2002. "Leading schools in a data-rich world." In *Second International handbook of educational leadership and administration.* Dordrecht, Germany; Boston, Mass.: Kluwer Academic. Pg 1003 – 1022.

Wagstaff, J. G. 1995. "Site-based management, shared decision making, and science and mathematics education: A tale of two districts." *Theory Into Practice, 34*(1), pg. 66-73.

Spady, W. G. 1988. "Organizing for results: The basis of authentic restructuring and reform." *Educational Leadership, 46*(2), pg. 4-8.

[21] Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." *American Journal of Education, 112*, pg. 549 - 571.

[22] U.S. Dept. of Education. 2007. Press Release: Secretary Spellings' Remarks on the Fifth Anniversary of the No Child Left Behind Act. Retrieved Feb. 17, 2007, from http://www.ed.gov/print/news/speeches/2007/01/01082007.html.

Azzam, A. M., Perkins-Gough, D., and Thiers, N. 2006. "The impact of NCLB." *Educational Leadership, 64*(3), pg. 94-96.

Cawelti, G. 2006. "The side effects of NCLB." *Educational Leadership, 64*(3), 64-68.

Darling-Hammond, L., and Berry, B. 2006. "Highly qualified teachers for all." *Educational Leadership, 64*(3), pg. 14-20.

Scherer, M. 2006. "The NCLB issues." *Educational Leadership, 64*(3), 7.

Gross, P. R. (Cartographer). 2005. *Less than proficient: A review of the draft science framework for the 2009 National Assessment of Educational Progress*.

Laws, P. W., and Hastings, N. B. 2002. "Reforming science and mathematics teaching." *Change, 34*(5), pg. 28-35.

Lloyd, K., Ramsey, D., and Bell, T. H. 1997. *Reclaiming our Nation At Risk. Lessons Learned: Reforming our public schools* (2nd edition ed. Vol. 517). Washington DC: Knowledge Network for Education Reform.

[23] *Education Week*. 2007. "Revising Teacher Quality and School Finance." January 5, 2007.

[24] James P. Barufaldi. 2008. Class Lecture Notes. The University of Texas at Austin.

[25] Texas Regional Collaborative. 2005. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. Austin: The University of Texas at Austin, Center for Science and Mathematics Education, Texas Regional Collaborative.

[26] U.S. Dept. of Education. 2007. Press Release: Prepared opening statement for U.S. Secretary of Education Margaret Spellings before the U.S. House of Representatives Appropriations Subcommittee on Labor, HHS, and Education. Retrieved June 15, 2007, from http://www.ed.gov/print/news/speeches/2007/03/03122007.html.

Grosso De Leon, A. Fall 2006. "The school leadership crisis: Have school principals been left behind?" *The Carnegie Reporter, The Carnegie Corporation of New York, 4*(1), 32 - 39.

Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." pg. 549 - 571.

Black, P., and Wiliam, D. 2006. "Inside the black box: Raising standards through classroom." *Phi Delta Kappan, 80*.

Earl, L., and Katz, S. 2002. Leading schools in a data-rich world. In *Second International handbook of educational leadership and administration* (pp. 1003 - 1022). Dordrecht, Germany; Boston, Mass.: Kluwer Academic. Cohn, C.A. (2005).

"N C L B implementation challenges: The local superintendent's view." *Peabody Journal of Education, 80*(2), pg. 156-169.

Lewis, A. E. 2000. "School governance for a new century." *Phi Delta Kappan, 81*(6), pg. 419-420.

Ortiz, F. I., and Ogawa, R., T. 2000. "Site-based decision-making leadership in American public schools." *Journal of Educational Administration, 38*(5), pg. 486-499.

Wagstaff, J. G. 1995. "Site-based management, shared decision making, and science and mathematics education: A tale of two districts." pg. 66-73.

Ferris, J. M. 1992. "School-based decision making: A Principal-Agent perspective." *Educational Evaluation and Policy Analysis, 14*(4), pg. 333-346.

Manasse, A. L. 1985. "Improving conditions for principal effectiveness: Policy implications of research." *The Elementary School Journal, 85*(3, Special Issue: Policy Implications of Effective schools Research), pg. 439-463.

Leithwood, K. A., and Montgomery, D. J. 1982. "The role of the elementary school principal in program improvement." *Review of Educational Research, 52*(3), pg. 309-339.

[27] Wayman, J.C., Cho, V., and Johnston, M.T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. Austin: The University of Texas.

[28] Ibid.

Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." pg. 549 – 571.

Black, P., and Wiliam, D. 2006. "Inside the black box: Raising standards through classroom."

Ingram, D., Louis, K. S., and Schroeder, R. G. 2004. "Accountability policies and teacher decision making: Barriers to the use of data to improve practice." pg. 1258-1287.

Salpeter, J. 2004. Data: Mining with a mission [Electronic Version]. *techLearning*. Retrieved Nov. 3, 2006, from http://www.technlearning.com/shared/printableArticle.jhtml?articleID=18311595.

Wellman, B., and Lipton, L. 2004. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*. Sherman, CT: MiraVia, LLC.

Bernhardt, V. 2003. *Using data to improve student learning in elementary schools*.

Borman, G. D., Hewes, G. M., Overman, L. T., and Brown, S. 2002. *Comprehensive school reform and student achievement: A meta-analysis* (Federal Report No. 59): Office of Educational Research and Improvement.

Earl, L., and Katz, S. 2002. "Leading schools in a data-rich world." pp. 1003 – 1022

Bracey, G. W. 2000. *Thinking about tests and testing: A short primer in "Assessment Literacy"* (Report). Washington, DC: American Youth Policy Forum: National Conference of State Legislature.

[29] Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties of examination of student data for instructional improvement." pg. 549-571.

Black, P., and Wiliam, D. 2006. "Inside the black box: Raising standards through classroom."

Ingram, D., Louis, K. S., and Schroeder, R. G. 2004 "Accountability policies and teacher decision making: Barriers to the use of data to improve practice." pg. 1258-1287.

Salpeter, J. 2004 "Data: Mining with a mission" [Electronic Version].

Wellman, B., and Lipton, L. 2004. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*.

Bernhardt, V. 2003. *Using data to improve student learning in elementary schools*.

Borman, G. D., Hewes, G. M., Overman, L. T., and Brown, S. 2002. *Comprehensive school reform and student achievement: A meta-analysis*.

Bracey, G. W. 2000. *Thinking about tests and testing: A short primer in "Assessment Literacy"* (Report). Washington, DC: American Youth Policy Forum: National Conference of State Legislature.

[30] Rudolph, John. 2002. *Scientists in the classroom: The Cold War reconstruction of American science education.* Palgrave: New York.

[31] National Center for Educational Statistics. 1984. *NCES Handbook of Survey Methods: Technical Report, April 2003.* U. S. Dept. of Education, Institute of Education Sciences, NCES 2003-603. Washington, D.C.: U.S. Department of Education.

[32] Atkin, J. M., and Black, P. 2003. *Inside science education reform: A history of curricular and policy change* (1st ed.). New York City, NY: Teachers College Press, Columbia University.

Bordeaux, A. V. 2001. *Science education reform for the 21st century: Analyzing policy imperatives for effective teaching through recruitment, renewal, and retention.* Unpublished Dissertation. George Mason University. U.S. Congress – House of Representatives (2000/2001).

*From the Hill:* Bid to improve math and science education programs fails. *Issues in Science and Technology, 17*(2), 30.

*The Fordham Foundation. (*2000). *Selected readings on school reform*. 2000. Washington, D.C.: The Thomas B. Fordham Foundation.

Traub, J. 1999. *Better by design? A consumer's guide to school wide reform*. Washington, D.C.: The Thomas B. Fordham Foundation.

Lloyd, K., Ramsey, D., and Bell, T. H. 1997. *Reclaiming our Nation At Risk. Lessons Learned: Reforming our public schools* (2nd edition ed. Vol. 517). Washington DC: Knowledge Network for Education Reform.

Tyack, D., and Cuban, L. 1995. *Tinkering toward utopia - A century of public school reform*. Cambridge: Harvard University Press.

Besvinick, S. L. 1988. “Twenty years later: Reviving the reforms of the '60s.” *Educational Leadership, 46*(1), pg. 52.

[33] Wayman, J., and Stringfield, S. 2006. “Technology-supported involvement of entire faculties of examination of student data for instructional improvement.” pg. 549-571.

Black, P., and William, D. 2006. “Inside the black box: Raising standards through classroom.”

Wayman, J., Stringfield, S., and Yakimowski, M. 2004. *Software enabling school improvement through analysis of student data* (Report #67). Baltimore MD: The Johns Hopkins University.

Earl, L., and Katz, S. 2002. “Leading schools in a data-rich world.” pp. 1003 - 1022.

Bracey, G. W. 2000. *Thinking about tests and testing: A short primer in "Assessment Literacy"* (Report).

[34] The Texas Legislature, 2007 session, (Texas House of Representatives, 79th Session. Session Law Chapter: Acts 2006, 79th 3rd C.S., Ch. 5.) passed a new graduation requirement for all Texas high schools. This new requirement is known as the ‘4 x 4 plan’ and requires all students (graduating in 2012) to document 4 years of study and to pass all 4 required core courses (Language Arts, Mathematics, Science, and Social Studies/Economics). The freshman class of 2008 will be the first class to graduate under this new state law for graduation.

[35] Texas Regional Collaborative. 2005. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*.

[36] Wayman, J., and Stringfield, S. 2006. “Technology-supported involvement of entire faculties in examination of student data for instructional improvement.” pg. 549 - 571.

Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*.

Trochim, W. M. K. 2001. *Research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog Publishing. A few examples include Heck, Ronald H. (2004). *Studying educational and social policy.* Lawrence Erlbaum Assoc., Publishers: New Jersey.

[37] Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*.

Wayman, J., and Stringfield, S. 2006. “Technology-supported involvement of entire faculties in examination of student data for instructional improvement.” pg. 549 - 571.

[38] Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*. Austin: pg. 19.

[39] Trochim, W. M. K. 2001. *Research methods knowledge base* (2nd ed.). pg. 18-20.

[40] Ibid. pg. 19.

[41] Crotty, M. 2003. *The foundations of social research*. Thousand Oaks, CA: Sage Publications.

Trochim, W. M. K. 2001. *Research methods knowledge base* (2nd ed.). pg. 19.

[42] Ibid. pg. 19.

[43] Wayman, J., Cho, V., and Johnston, M. T.2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*.

Wayman, J., and Stringfield, S. 2006 "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." pg. 549 - 571.

[44] Crotty, M. *The foundations of social research.* pg. 7.

[45] Ibid. pg. 7

[46] Ibid. pg. 7

[47] Ibid. pg. 8

[48] Trochim, W. M. K. *Research methods knowledge base* (2nd ed.). pg. 20.

[49] Thomas, S. J. 2004. *Using web and paper questionnaires for data-based decision making: From design to interpretation of the results*. Thousand Oaks, CA: Corwin Press, A Sage Publications Company.

Donnellan, B. A. 2006. *A snapshot of school information support systems in Nassau and Suffolk Counties of New York State: To what degree are information support systems in place in these school districts?* Unpublished dissertation (Foundations, Leadership, and Policy Studies Department). Hofstra University. New York: NY.

[50] The *Texas Elementary Campus Administrator Survey*™ and the *Texas Elementary-Intermediate-Middle School Teacher Survey*™ are partially modified from the National Center for Educational Statistics (NCES), with original questions developed by myself for the purpose of this dissertation study. NCES granted me permission to modify the 1997 *School Survey Study* in June 2007, since it is a government document with no copyright and its use ended in 2001. Ms. Brown has over 25 years of career experience in developing, creating, and implementing survey research.

[51] The *Texas Elementary Campus Administrator Survey*™ and the *Texas Elementary-Intermediate-Middle School Teacher Survey*™ were conducted through a private company. Hosted Survey™ is a fully web-hosted survey software application developed for researchers, evaluators, and organizational improvement specialists. Through Hosted Survey ™, researchers can create electronic surveys, 360 feedback reviews, questionnaires, and other online forms for data collection, analysis, and reporting. Additionally, Hosted Survey™ offers discounts and very low pricing for accredited universities, colleges, K-12, and other academic uses, such as dissertation research. http://www.hostedsurvey.com/home.html

[52] Texas Superintendents received information regarding this dissertation research, and were notified that their individual district and a few randomly selected teachers and campus administrators were selected for this study. They were provided with The University of Texas at Austin IRB reference, in addition to being asked for their cooperation in not only notifying the IT department to allow the survey information to reach the teachers and campus administrators, but also encouraging the selected participants to respond to the appropriate survey, since participants were representing that district in this state-wide research study. The final result was a combined level of 79% participation in the *Texas Elementary Campus Administrator Survey*™ and 69% participation in the *Texas Elementary-Intermediate-Middle School Teacher Survey*™. These results will be discussed, in detail, in Chapter 4.

[53] The definitions used within this writing were derived from all the References listed at the end of this dissertation and the following sources: *Merriam-Webster Online Dictionary*, http://www.merriam-webster.com, *The American Heritage College Dictionary, 3rd edition*. (1993). Houghton Mifflin Company: New York.

[54] The National Commission on Excellence in Education. 1984. *A Nation At Risk: The Full Account*. USA Research, Inc.: Oregon.

[55] The National Commission on Excellence in Education. 1984. *A Nation At Risk: The Full Account*. USA Research, Inc.: Oregon. Pg. 9, 53-54. Selections used throughout this research include the following passages: Chapter 1, page 9 discusses science indicators of the risk, as identified by members of the Commission. Chapter 4: Public Testimony, pages 53-54 discusses concerns regarding science, mathematics, and technology education. Chapter 6: Recommendations, Recommendation A: Content discusses high school graduation requirements similar to those recently passed by the 81st session of the Texas Legislature. Recommendation D: Teaching focuses on improvement of preparation of teachers, or making teaching a rewarding and respected profession. Recommendation E: Leadership and Fiscal Support focuses on the Nation holding educators and elected officials responsible for providing the leadership necessary to achieve these goals.

[56] The National Commission on Excellence in Education. 1984. *A Nation At Risk: The Full Account*. USA Research, Inc.: Oregon. Authors preface describes President Reagan's missive to Education Secretary T. Bell. Pgs. i to x.

Lloyd, K., Ramsey, D. and Bell, T. 1997. *Reclaiming our Nation at Risk: Lessons learned – Reforming our public schools*. Authors preface describes President Reagan's missive to Education Secretary T. Bell.

[57] Lloyd, K., Ramsey, D. and Bell, T. 1997. *Reclaiming our Nation at Risk: Lessons learned – Reforming our public schools*.

[58] A few examples include Heck, Ronald H. 2004. *Studying educational and social policy.* Lawrence Erlbaum Assoc., Publishers: New Jersey.

Lloyd, K., Ramsey, D. and Bell, T. 1997. *Reclaiming our Nation at Risk: Lessons learned – Reforming our public schools*.

Ravitch, D. 2000. *Left Back: A century of battles over school reform*.

[59] Merriam-Webster Online Dictionary definition of the noun accountability, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/accountability

[60] Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*. pg.. 19.

[61] Merriam-Webster Online Dictionary definition of the noun collaborative, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/collaboration

[62] Merriam-Webster Online Dictionary definition of the noun collaborative, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/collaboration

[63] Merriam-Webster Online Dictionary definition of the noun collaborative, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/collaboration. Additional information provided on the Texas Regional Collaboratives web-site "Home" page, http://www.thetrc.org/trc/

[64] Merriam-Webster Online Dictionary definition of the noun cooperation, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/cooperating

65 Merriam-Webster Online Dictionary definition of the noun culture, accessed November 10, 2008 at http://www.merriam-webster.com/dictionary/culture

66 Sources used for this definition include the following noted authors: Bruner, J.S. (1971). *The Relevance of Education*. Norton and Company, Inc.: New York.

Flinders D.J. and Thornton, S. J. 2004. *The Curriculum Studies Reader, 2nd Edition*. Routledge Falmer: New York.

Foshay, A. W. 2000. *The Curriculum: Purpose, Substance, Practice*. Teachers College Press: New York.

Pinar, W.F. 2004. *What is Curriculum Theory?* Lawrence Erlbaum Associates, Publishers: New Jersey.

Reid, W.A. 1999. *Curriculum as Institution and Practice*. Lawrence Erlbaum Associates, Publishers: New Jersey.

Tyler, R.W. 1949. *Basic Principles of Curriculum and Instruction*. The University of Chicago Press: Chicago.

67 Ibid.

68 Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*.

Wayman, J., and Stringfield, S. 2006 "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." pg. 549 - 571.

69 "*No Child Left Behind",* Public Law 107-10, §9101(23). www.ed.gov/nclb/

70 Ibid.

71 "*No Child Left Behind",* Public Law 107-10, §9101(23). www.ed.gov/nclb/
Additional summary information obtained on Nov. 11, 2008 at http://en.wikipedia.org/wiki/No_Child_Left_Behind_Act

72 Mink, O., Shultz, J., and Mink, B. (1979) *Open Organizations*. Learning Concepts: Texas.

73 Morgan, G. 1997. ***Images of Organization, 2nd Edition.*** Sage Publications: CA.

74 19 TAC RULE §228.2. Accessed January 18, 2009.
http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=Randapp=9andp_dir=andp_rloc=andp_tloc=andp_ploc=andpg=1andp_tac=andti=19andpt=7andch=228andrl=2

75 Guskey, T. 2000. ***Evaluating Professional Development.*** Corwin Press, Inc.: California. pg. 37-39.

76 Ibid. pg. 215.

77 Definition of "Student Information System" from Wikipedia, Accessed December 10, 2008.
http://en.wikipedia.org/wiki/Student_information_system

78 All information regarding the Texas Education Agency is directly quoted from various TEA web-sites, http://tea.state.tx.us

79 Texas Education Agency. 2001. ***Learning Standards for Texas Students: A guide for Texas parents.*** Texas Education Agency, Austin, Texas.

[80] 19 TAC RULE §228.2. Accessed January 18, 2009.
http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=Randapp=9andp_dir=andp_rloc=andp_tloc=andp_ploc=andpg=1andp_tac=andti=19andpt=7andch=228andrl=2

## CHAPTER 2 – LITERATURE REVIEW – END NOTES

[81] Wayman, J., and Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." pg. 549

Black, P. and William, D. 2006. "Inside the Black Box: Raising Standards Through Classroom."

Ingram, D., Louis, K. S. and Schroeder, R.G. 2004. "Accountability policies and teacher decision making: Barriers to the use of data to improve practice."

Salpeter, J. "Data: Mining with a mission" [Electronic Version].

Wellman, B. and Lipton, L. *Data-Driven Dialogue: A facilitator's guide to collaborative inquiry.*

Bernhardt. V. *Using Data to Improve Student Learning in Elementary Schools*.

Borman, G.D., Hewes, G.M., Overman, L.T., and Brown, S. 2002. *Comprehensive school reform and student achievement: A meta-analysis.*

Earl, L. and Katz, S. 2002. "Leading schools in a data-rich world." pg. 1003-1022.

Bracey, G. W. 2000. *Thinking about tests and testing: A short primer in Assessment Literacy*.

[82] Statements made on the *Texas Campus Administrator Survey*,™ a significant part of this research study, indicated that many campus administrators did not understand how to determine adequately qualifications of a highly qualified elementary science educator, and over 10% indicated that science was not part of the elementary curriculum taught on their campuses. Chapter 4 details the results of this survey.

[83] Texas Education Agency, TAKS Aggregate Reporting. Available at http://www.tea.state.tx.us/index3.aspx?id=3631andmenu_id3=793

[84] From United States Congress (2002). 115 STAT. 2090 PUBLIC LAW 107–110—JAN. 8, 2002.

[85] Opposition to Education Law, Legislature in several states has taken measures against the *No Child Left Behind Act of 2001.* Eight Democrat-controlled states: Washington, New Mexico, Tennessee, West Virginia, Hawaii, Connecticut, New Hampshire and Maine. Six Republican-controlled states: Utah, Arizona, Minnesota, Indiana, Ohio, and Virginia. Both political parties: Vermont. The nature of the protest in each state is *Arizona*: Senate resolution requests exemptions for students with disabilities. House introduced opt-out bill. *Connecticut*: Senate resolution requests waivers from NCLB. *Hawaii*: House resolution authorized state to opt out of NCLB. Did not pass Senate. *Indiana*: Senate bill would authorize waivers for NCLB accountability requirements that conflict with state requirements. *Maine:* Senate resolution would bar state funding of NCLB. *Minnesota:* Opt-out legislation proposed in House and Senate. *New Hampshire:* Bill would bar state from spending state money on law and only allow spending of federal funds. *New Mexico:* Opt-out bill introduced in House. *Ohio:* Released cost study estimating cost to state of implementing NCLB at $1.5 billion. *Tennessee:* Senate joint resolution calls for increased federal funding for NCLB. *Utah:* House passed bill opting out of NCLB provisions for which there is insufficient federal funding, similar to Vermont law. *Vermont:* Passed law in 2003 barring state funding of NCLB. *Virginia:* House resolution requests exemptions from NCLB. *Washington:* House passed resolution-describing NCLB as "largest act of federal intrusion in history." *West Virginia:* House passed resolution criticizing inadequate level of federal funding. Source: National Council of State Legislatures, published in *The Washington Post*, February 19, 2004.

[86] Chambers, M. "Native Language Programs Running Afoul of No Child Left Behind," *Associated Press and Local Wire*, January 24, 2004.

Hook, J. "No Politics Left Behind in Education Debate: Bush's reforms have drawn heat even within the GOP, but the White House isn't yielding," *LA Times*, January 25, 2004. Available: http://www.latimes.com/news/politics/.

Lynn R. "Feds coming to Utah to discuss No Child Left Behind," *The Salt Lake Tribune*, February 3, 2004. Available: http://www.sltrib.com/2004/Feb/02032004/utah/135238.asp.

[87] CNN World News, "States redefine student progress: Education Department to allow changes in performance measurement" Available: http://cnn.worldnews.com. Nov. 18, 2005.

U.S. Department of Education, Press Release. "Key policy letters signed by the Educational Secretary Margaret Spellings." Available: http://www.ed.gov, Oct. 11, 2005.

[88] CNN World News, "States redefine student progress: Education Department to allow changes in performance measurement." Nov. 18, 2005. Quotes used "Education Secretary Margaret Spellings was announcing the 'growth model' policy on Friday, Nov. 18, 2005 'We're open to new ideas, but we're not taking our eye off the ball.' The Educational Department, eager to show it is not weakening the law, will require states to take many steps before they can qualify for the 'growth' option." Available: http://cnn.worldnews.com.

[89] Brown, L. L.G. "Review of No Child Left Behind Act of 2001", unpublished document written for graduate course, The University of Texas at Austin, October 5, 2004.

[90] Although not an exhaustive list, few such examples referred to include the following authors:

Cornbleth, C. [Ed.] 2000. *Curriculum Politics, Policy, Practice*: Cases in comparative contest. New York: NY. Offering a range of studies on the intersections of curriculum politics, policy, and/or practice. It includes case studies that span school levels, subject areas, and national boundaries, thus enriching the possibilities for cross-case analysis, interpretation, and insight.

Sen. J. Brademas, 1987. *Politics of Education: Conflict and Consensus on Capitol Hill.* Oklahoma City, OK: University of Oklahoma Press.

Ginsberg, R. and Plank, D. [Eds.] 1995. *Commissions, Reports, Reforms, and Educational Policy*. Westport, Conn. Praeger Publisher.

[91] A few such examples referred to include the following authors. However, this is not an exhaustive list.

Berliner, D. and Biddle, B. 1995. *The Manufactured Crisis: Myths, fraud and the attack on America's public schools.* Cambridge, MA: Perseus Books. Pgs. 4, 30, 50-64, 194-202, 236-238, 294, 295-298, 310-318, 340.

Strong, R.W., Silver, H.F., and Perini, M. J. 2001. *Teaching What Matters Most; Standards and Strategies for Raising Student Achievement.* Association for Supervision and Curriculum, pg.. 110-114.

[92] Ballantine, J. 1993.*The Sociology of Education: a Systematic Analysis*. New York, NY: Prentice Hall College Div. Pgs. 37, 88-99, 122, 227, 384-385.

Heck, R. H. 2004. *Studying Education and Social Policy: Theoretical concepts and research methods.* Mahwah, New Jersey. Lawrence Erlbaum Associates, Pub. pg. 6-10,15-17, 31, 60, 136, 140.

[93] Neustadt , R. and May, E. 1988. *Thinking in Time: The uses of history for decision makers*. New York City: The Free Press. Pg.69, 232-246.

Additional information obtained from my personal class notes transcribed on September 19, 2005 while attending course "Curriculum Policy Analysis", Dr. O. L. Davis, Jr., a doctoral graduate seminar course at The University of Texas at Austin.

[94] Ravitch, D. and Vinovskis, M. A. (Eds.). 1995. *Learning from the Past*. Baltimore, MD. The Johns Hopkins University Press. pg.171

[95] Davidson, J.W. and Lytle, M. H. 2001. *After the Fact: The Art of Historical Detection, 5$^{th}$ Edition. Vol. 1*. New York, NY: Alfred A. Knopf. pg. 24.

[96] Berliner, D. and Biddle, B. *The Manufactured Crisis: Myths, fraud and the attack on America's public schools.* pg. 4, 30, 50-64, 194-202, 236-238, 294, 295-298, 310-318, 340.

[97]Texas Education Agency. Texas Essential Knowledge and Skills (TEKS), 1986, Appendix 6 contains the state of Texas standards for science and mathematics education for K-12 public schools. http://www.tea.state.tx.us

[98] The National Commission on Excellence in Education, 1984. *A Nation at Risk: The Full Account*. Portland, OR: USA Research, Inc. Pg. 5.

[99] The National Commission on Excellence in Education, 1984. *A Nation at Risk: The Full Account*. pg. 11

[100] Ibid. Pg. 11

[101] Ibid. Pg. 12

[102] Ibid. Pg. 12

[103] Ibid. Pg. 13

[104] Ibid. Pg. 53

[105] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. Seattle, WA: Center for the Study of Teaching and Policy, University of Washington. Pgs. 3-8, 10-20.

Nelson, S. W., Meno, L.R. and Slater, C. L. 2007. Fulfilling the Promise of Educational Accountability. *Phi Delta Kappan*: pg. 702-709.

[106] Grosso De Leon, A. 2006. "The school leadership crisis: Have school principals been left behind?" pg. 32.

[107] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. Pgs. 3-8, 10-20.

Wayman, J.C., Cho, V. and Johnson, M.T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District.* pg. 1-60.

[108] Smith, W. F. and Andrews, R. L. 1989. "Instructional Leadership: How principals make a difference," *Association for Supervision and Curriculum Development*. Out-of-print, now available and accessed online at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1f/cb/a9.pdf

[109] "*No Child Left Behind",* Public Law 107-10, §9101(23). www.ed.gov/nclb/

19 TAC RULE §228.2. Texas Board of Teacher Certification, defining a 'highly qualified classroom teacher.'

[110] Berliner, D. and Biddle, B. *The Manufactured Crisis: Myths, fraud and the attack on America's public schools.* pg. 4, 30, 50-64, 194-202, 236-238, 294, 295-298, 310-318, 340.

Kirst, M. W. 1995. "Who's in Charge? Federal, State, and Local Control." In D. Ravitch and M.A. Vinavskis (Eds.) *Learning from the Past: What history teaches us about school reform*. Baltimore, MD: The Johns Hopkins University Press. pg. 29 – 56.

[111] Ibid. Pg. 29.

[112] Deming, W.D. 1982. *Out of the Crisis.* Cambridge, MA: Center for Advanced Engineering Study, Massachusetts Institute of Technology. pg..18-96, 248-275, 465-474.

[113] Ibid., pg. 23

[114] Ibid., pgs. 40 – 86.

[115] Ibid, pg. 88.

The Shewhart Cycle as presented in Deming's work is from Walter A. Shewhart, *Statistical Method from the Viewpoint of Quality Control* (Graduate School, Department of Agriculture, Washington, 1939: Dover, 1986), pg. 45.

[116] Ibid, pg. 88.

[117] Ballantine, J. *The Sociology of Education: a Systematic Analysis*. pg. 146-159.

[118] Ibid. pg. 147, Figure 5-1.

[119] Ibid. pg. 147.

[120] Coburn, C. E., Honig, M. I. and Stein, M. K. What is the evidence on districts' use of evidence?

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. Pgs. 6-30.

[121] Ibid. pg. 6-30.

Lachat, M.A. and Smith, S. 2005. Practices that support data use in urban high schools. *Journal of Education for Students Placed At Risk, 10*(3), pg. 333–349.

Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

Wayman, J. C., Stringfield, J. C. and Yakimowski, M. 2004. *Software enabling school improvement through analysis of student data*. Baltimore MD: The Johns Hopkins University. Report #67.

Wayman, J. C., and Stringfield, S. Technology-supported involvement of entire faculties in examination of student data for instructional improvement. pg. 549 - 571.

[122] Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 10–35.

Wayman, J.C., Conoly, K., Gasko, J. and Stringfield, S.C. Supporting equity inquiry with student data computer systems.

Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

Wayman, J., and Stringfield, S. Technology-supported involvement of entire faculties in examination of student data for instructional improvement. pg. 549.

[123] Coburn, C. E., Honig, M. I. and Stein, M. K. (in print). "What is the evidence on districts' use of evidence? "In J. Bransford, L. Gomez, D. Lam, and N. Vye (Eds.) *Research and practice: Towards a reconciliation*. Cambridge, MA: Harvard Educational Press.

[124] Kirst, M. W. Who's in Charge? Federal, State, and Local Control. pg. 26.

[125] Ibid. pg. 27.

[126] Ibid. pg. 28.

[127] Wagstaff, J.G. 1995. Site-based management, shared decision making, and science and mathematics education: A tale of two districts. *Theory Into Practice, 34*(1): pg. 66-73.

[128] Knapp, M. S., Swinnerton, J. A., Copland, M. A., and Monpas-Huber, J. *Data-informed leadership in education*. pg. 29

[129] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. pg. 6 – 20.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*. Philadelphia, PA: Consortium for Policy Research in Education, University of Pennsylvania.

Wayman, J. C. 2007. Student data systems for school improvement: The state of the field. In *TCEA Educational Technology Research Symposium: Vol. 1*. Lancaster, PA: ProActive. pg. 156–162.

Wayman, J. C., Conoly, K., Gasko, J. and Stringfield, S. C. 2004. "Supporting equity inquiry with student data computer systems."

Wayman, J. C. and Stringfield, S. 2006 "Technology-Supported Involvement of Entire Faculties in Examination of Student Data for Instructional improvement" pg. 112

[130] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. . pg. 6-26.

[131] Ibid. pg. 6-26.

[132] Wayman, J. C., Conoly, K., Gasko, J. and Stringfield, S. C. 2004. "Supporting equity inquiry with student data computer systems."

[133] Coburn, C. E., Honig, M. I. and Stein, M. K. (in print). "What is the evidence on districts' use of evidence?"

[134] Ibid. pg. 2-35.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. pg. 2-35.

[135] Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 22-29.

[136] Ibid. pg. 22-29

M.S. Knapp, J.A. Swinnerton, M.A. Copland, and J. Monpas-Huber. 2006. *Data-informed leadership in education*. Chart, pg7.

D. Ingram, K. S. Louis, and R. G. Schroeder. 2004. "Accountability policies and teacher decision making: Barriers to the use of data to improve practice." pg. 1258-1287.

C. E. Coburn, M. I. Honig, and M. K. Stein. (in print). “What is the evidence on districts’ use of evidence?”

[137] Ibid.

M.S. Knapp, J.A. Swinnerton, M.A. Copland, and J. Monpas-Huber. 2006. *Data-informed leadership in education*. pg.. 6-15.

V. Bernhardt. *Using Data to Improve Student Learning in Elementary Schools.* pg.. 12-20.

[138] Grosso De Leon, A. The school leadership crisis: Have school principals been left behind? pg. 32.

[139] C. E. Coburn, M. I. Honig, and M. K. Stein. (in print). “What is the evidence on districts’ use of evidence?”

J. C. Wayman and S. Stringfield. 2006. “Technology-Supported Involvement of Entire Faculties in Examination of Student Data for Instructional improvement.” pg. 549.

Lachat, M.A. and Smith, S. 2005. “Practices that support data use in urban high schools.” pg.. 333–349**.**

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

[140] National Science Resources Center, www.nsrconline.org/ National Science Resources Center (NSRC) publicizes general information, events, and resources for developing science education leadership.

NSTA – National Science Teacher Association, www.nsta.org/ Its site has extensive collection of information about the teaching of science.

AAAS - American Association for the Advancement of Science, www.aaas.org/ The world’s largest science society, it focuses on research news, issues policy papers. The site also includes educational programs and science policy (US and international).

NRC – National Research Council. The National Research Council functions under the auspices of the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE). www.nationalacademies.org/**nrc**/

[141] Sparks, D. and Hirsh, S. 2006. “A national plan for improving professional development” [Electronic Version]. *National Staff Development Center*, 1-19. Retrieved July 20, 2006, from http://www.nsdc.org/library/authors/NSCDPlan.cfm

[142] Ibid.

Fletcher, C. 2006. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005.* Texas Regional Collaboratives, Center for Science and Mathematics Education. The University of Texas at Austin.

Meyer, J., Barufaldi, J., Fletcher, C., Tinoca, L. and Lee, E. 2004. *The role of sustained professional development in renewing science teachers.* Paper presented at the National Association of Research in Science Teaching Vancouver, Canada.

Tinoca, L. 2004. *From professional development for science teachers to student learning in science.* Unpublished Dissertation. The University of Texas at Austin. Austin: TX.

Borko, H. 2004. “Professional development and teacher learning: Mapping the terrain.” *Educational Researcher, 33*(8), pg. 3-15.

Meyer, J. and Barufaldi, J. 2003. *The 4 W's of sustained professional development for science teachers.* Paper presented at the Annual International Meeting of the Association for the Education of Teachers of Science, St. Louis, Missouri.

Guskey, T. R. 2003. "What makes professional development effective?" pg. 748-750.

Koballa, J. T. R. and Tippins, D. J. 2001. "Portraits of professional development models in science teacher education: A synthesis of perspectives and issues." In E. D. R. Lavoie and W. Roth (Ed.), *Models of science teacher preparation - Theory into practice* (pp. 213-224). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F. and Yoon, K. S. 2001. "What makes professional development effective? Results from a national sample of teachers." *American Educational Research Journal, 38*(4): pg. 915.

Laws, P. W. and Hastings, N. B. 2002. "Reforming science and mathematics teaching." *Change, 34*(5): pg. 28.

[143] Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition). Thousand Oaks: Corwin Press, Inc., Sage Publications Company.

[144] Nelson, S. W., Meno, L. R. and Slater, C.L. 2007. "Fulfilling the Promise of Educational Accountability." *Phi Delta Kappan*, pg. 702-709.

[145] Grosso De Leon, A. "The school leadership crisis: Have school principals been left behind?" pg. 32-39.

[146] Coburn, C. E., Honig, M. I. and Stein, M. K. (in print). "What is the evidence on districts' use of evidence?"

[147] Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

Nelson, S. W., Meno, L. R. and Slater, C.L. "Fulfilling the Promise of Educational Accountability." pg. 702-709.

Grosso De Leon, A. "The school leadership crisis: Have school principals been left behind?" pg. 32-39.

[148] Coburn, C. E., Honig, M. I. and Stein, M. K. "What is the evidence on districts' use of evidence?"

Wayman, J. C. and Stringfield, S. 1006. "Technology-Supported Involvement of Entire Faculties in Examination of Student Data for Instructional improvement." pg. 549.

Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg. 333–349.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

[149] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. pg. 6-10.

[150] Ibid.

[151] Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

[152] Wayman, J. C. and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties in Examination of Student Data for Instructional improvement." pg. 549.

Lachat, M. A., and Smith, S. *Practices that support data use in urban high schools*. pg. 333–349.

[153] Warshauer, H. K. 2008. *Analysis and Critique of a Dynamic Professional Development System Model.* Unpublished paper submitted to James P. Barufaldi, Ph.D., Advanced Topics-EDC 385G, Research on Professional Development in Science and Mathematics Education.

[154] Loucks-Horsley, S., Hewson, P., Love, N. and K. Stiles, K.. 1996.*Designing Professional Development for Teachers of Science and Mathematics*. pg. 3-5.

[155] Texas Regional Collaboratives. 2008. *Dynamic Partnerships for Twenty-First Century Education.* The University of Texas at Austin, College of Education, Center for Science and Mathematics Excellence in Education. Pg. 20

[156] Wayman, J. C. and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties in Examination of Student Data for Instructional improvement. pg. 548-550."

Wayman, J. C., Stringfield, S. C. and Yakimowski, M. 2004. *Software enabling school improvement through analysis of student data*.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*.

Lachat, M.A. and Smith, S. 2005. Practices that support data use in urban high schools. pg.. 333–349**.**

Meyer, J., Barufaldi, J., Fletcher, C., Tinoca, L. and Lee, E. 2004. *The role of sustained professional development in renewing science teachers.* Paper presented at the National Association of Research in Science Teaching Vancouver, Canada.

Tinoca, L., Lee, E., Fletcher, C., Barufaldi, J. and Meyer, J. 2004. "From Professional Development for Science Teachers to Student Learning in Science." Paper presented at the National Academy of Research in Science Teaching, 2004.

Tinoca, L. 2004. *From professional development for science teachers to student learning in science.* Unpublished Dissertation. The University of Texas at Austin. Austin: TX.

[157] Texas Regional Collaboratives. 2008. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. Center for Science and Mathematics Education, College of Education. The University of Texas at Austin. Pgs. 1-25

[158] Senator Nevers, Louisiana Senate, Regular Session 2009. SCR No. 66. Date June 1, 2009.

[159] This section is primarily from a co-authored chapter from *to be published* book, R. Ravid and J. Slater, Eds. *Collaboration in Education*. Routledge Inc. At the time of this dissertation, the chapter has not been assigned within the publication.

[160] Barufaldi, J. and Brown, L.L.G. (in press). A System's Perspective for Professional Development in Science and Mathematics Education: The Texas Regional Collaboratives. In R. Ravid and J. Slater, Eds. *Collaboration in Education*. Routledge Inc.

[161] Texas Regional Collaboratives. 2008. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. Pgs. 1-25

[162] Ibid. pgs. 1-25.

[163] Ibid. pgs. 1-25.

[164] Ibid, pg. 10.

[165] Barufaldi, J.P., and Reinhartz, J. (2001). "The dynamics of collaboration in a state-wide professional development program for science teachers, models of science teacher preparation." *Theory into Practice*, Kluwer Academic Publishers, p89-104.

[166] Texas Regional Collaboratives. 2008. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. pgs. 12-16.

[167] Smith, W.F. and Andrews, R. L. 1989. Instructional Leadership: How principals make a difference. *Association for Supervision and Curriculum Development*. Out-of-print, now available and accessed online at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1f/cb/a9.pdf

[168] Ibid., pg 2.

[169] Statements from the *Texas Campus Administrator Survey*™ designed and implemented for this dissertation research study by L.L.G. Brown. Prepared in 2006, issued Nov. 2007-Jan. 2008, and May 2008-Aug. 2008.

[170] Texas Elementary and Secondary Principals Association web site, http:// www.tespa.org.

[171] The State Board for Educator Certification approved, TEXAS Alternative Certification Program http://www.texasacp.com/.

[172] Ibid.

[173] Senate Bill 1, 74th Texas Legislature, Regular Session, 1995.

[174] Texas State Board for Educator Certification, An Inventory of State Board for Educator Certification Records at the Texas State Archives, 1996-1998. Accessed on November 15, 2007 at: http://www.lib.utexas.edu/taro/tslac/30141/tsl-30141.html

[175] The Texas Education Agency submitted multiple plans for achieving the NCLB goal of 100% HQCTs to the U.S. Department of Education. Examples of the various Texas HQCT Plans.

Final *Texas Cover Letter #3 - December 16, 2006*. 2006. Retrieved January 20, 2007 from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx.

*Texas Review of Highly Qualified Teacher Plan - Sept. 29, 2006*. 2006. Retrieved January 20, 2007 from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx.

*State Plan for Meeting the Highly Qualified Teacher Goal*. 2006. Retrieved January 20, 2007 from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx.

*Texas plan for equitable distribution of highly qualified teachers*. 2006. Retrieved January 20, 2007 from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx.

*NCLB Making a Difference in Texas*. (2006). Retrieved January 21, 2007 from http://www.ed.gov/nclb/overview/importance/difference/texas.pdf.

[176] Source: 2004-2005 Highly Qualified Teacher Compliance Report, Revised 6-21-06, and 2005 AYP.

[177] Hoerr, T. R. 2008. "What is Instructional Leadership?" *Educational Leadership*, 65, No 4, Dec. 2007-Jan. 2008, Alexandria, VA. Association for Supervision and Curriculum Development. pg. 84.

[178] Ibid.

[179] Comments from the *Texas Elementary – Intermediary – Middle School Teacher Survey*™ conducted for this dissertation study between Nov. 2007 to Jan. 2008, and May 2008 to Aug. 2009.

[180] Barth, R. 1991. I*mproving schools from within.* San Francisco, CA: Jossey-Bass.

[181] Hoerr, T. R. 2008. "What is Instructional Leadership?"

[182] Ibid. Pg. 84

[183] Ferrandino, V. L. 2007. "Leading in an era of challenges and inspiration." *Principal*, 86, No. 5, May/June 2007: Pg. 64.

[184] Ibid. Pg. 64

[185] Ibid. Pg. 64

[186] Cavanagh, S. 2008. "Guidance by Principals Emerging as Crucial in Science Education." *Education Week*, September 3, 2008, Focus on: Leadership and Management. Pg. 8.

[187] Merck Institute for Science Education, http://www.mise.org/mise/index.jsp?p=about_us

[188] Cavanagh, S. 2008. "Guidance by Principals Emerging as Crucial in Science Education." Pg. 8-9.

[189] Ibid. Pg. 8

[190] Ibid. Pg. 8-9

[191] Ibid. Pg. 9

[192] George Mason University web site, http://gse.gmu.edu/programs/science/academics/sci_ed/

[193] National Science Education Leadership Association web site, http://www.nsela.org/

[194] Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Carlson-Powell, P., Westbrook, A. and Landes, N. 2006. *The BSCS 5E Instructional Model: Origins and effectiveness.* A report prepared for the Office of Science Education, National Institutes of Health. June 12, 2006.

[195] Brown, .L.G.L. 2005. Dr. Addison Lee and the BSCS Laboratory Block. Paper presented at the annual conference of the Midwest Educational History Society Conference. Chicago, Illinois, October 20, 2005.

[196] Ibid.

[197] Schwab, J. J. 1978. *Science, Curriculum and Liberal Education: Selected Essays.* Chicago: The University of Chicago Press. Pg. 287-290.

[198] Foshay, A. W. *The Curriculum: Purpose, substance, practice.*

[199] Tyler, R. *Basics principles of Curriculum and Instruction.*

[200] Pinar, W. Ed. 1975. *Curriculum Theorizing: The reconceptualists*. Berkley, CA: McCutchan Publishing Corp. Pg.384-395.

[201] Conant, J. 1963. *The education of American teachers.* New York, NY: McGraw-Hill.

[202] Tyack, D. and Cuban, L. 1997. *Tinkering toward Utopia: a Century of public school reform.* Cambridge, MA: Harvard University Press.

[203] Senge, P. 1990. *The Fifth Discipline*. New York, NY: Doubleday. Part 1, pgs 1 -56.

Deming, W. E. 2000. *The New Economics*. Cambridge, MA: The MIT Press. Chapter 1, pgs 1-21.

Public Education Visioning Institute. 2008. *Creating a new vision for public education in Texas*. A report by Superintendent Participants in the Public Education Visioning Institute. Published by the Texas Association of School Administrators. May 2008.

[204] Systems thinking and complexity of systems are described by these authors (this is by no means an exhaustive list) and have numerous components that can be applied directly to educational reform issues.

Dörner, D. 1996. *The Logic of Failure*. New York, NY: Metropolitan Books, English translation.

Hock, D. 1999. *Birth of the Chaordic Age*. San Francisco, CA: Berrett-Koehler Publishers, Inc.

Morgan, G.. 1997. *Images of Organization, 2nd Edition*. Thousand Oaks, CA: SAGE Publications.

[205] Goldratt, E. 1995. *The Goal: A process of ongoing improvement*. New York: North River Press.

[206] Ibid.

Goldratt, E. 1997. *Critical Chain: A business novel.* New York: North River Press. The novel aims to provoke readers into examining and reassessing their business practices and to transform the thinking and actions of managers.

Goldratt, E. 1994. *It's not luck*. New York: North River Press. This text highlights strategies for technological work that an individual needs in order to survive at home and at work.

[207] This researcher brings to this dissertation personal knowledge, background, and experiences influenced by the work of E. Goldratt from her eight-years as the training systems manager at Motorola's R and D facility. The continuous improvement cycle became the model for the Pilot Line manufacturing for 4 years and improved output production of semiconductor wafers. This process was also implemented, contemporaneously, by Texas Instruments, AMD, 3M, and other hi-tech industries throughout central Texas.

[208] Senge, P.. 1990. Part 1, pg. 1 -56.

[209] Deming, W. E. 2000. pg. 1-21.

[210] Ibid. Pgs. 1-21.

[211] Ibid. Pgs. 1-21.

[212] Bessen, J. 2002. The skills of the unskilled in the American Industrial Revolution. Research on Innovation, Feb. 2002. Accessed online January 2009 at http://www.researchoninnovation.org/skills.pdf. pg.. 2.

[213] Ibid. Pg. 2-3

[214] Bybee, R. 1997. "The Sputnik Era: Why is this educational reform different from all other reforms?" Symposium Paper, Center for Science, Mathematics, and Engineering Education, National Research Council. The National Academies, http://www.nas.edu/ pg. 1

[215] Ibid., Pg. 2

[216] Ibid., Pg. 3.

[217] Ibid., Pg 4.

[218] Rudolph, J. 2002. *Scientists in the Classroom.* pg. 109.

[219] Ibid., pg. 110.

[220] Ibid., pg. 110.

[221] Bruner, J. 1960.*The Process of Education.* New York: Vintage Books. pg. 3.

[222] Rudolph, J. *Scientists in the Classroom*. pg. 111.

[223] Bruner, J. *The Process of Education.* pg.. ix.

[224] Ibid., pg. 11.

[225] Ibid., pg. 54-68.

[226] Ibid., pg. 64.

[227] Rudolph, J. *Scientists in the Classroom*. pg. 134-135.

[228] Ibid., pg. 136.

[229] Ibid., pg. 194-195.

[230] Ibid., pg. 196-199.

[231] England, C. 2003. *None of Our Business: Why business models don't work in schools.* Portsmouth, NH: Heineman. pg. 4-20.

[232] Ibid. pg. 4.

[233] Ibid., pg. 87.

[234] Ibid., pg. 88-89. Originally from J. Bonstingl. 1992. *Schools of Quality: An introduction to Total Quality Management in Education*. Alexandria, VA: Association for Supervision and Curriculum Development: pg. 77-82.

## CHAPTER 3 – METHODOLOGY – END NOTES

[235] The phrase “highly qualified classroom teacher” is part of the *No Child Left Behind Act of 2001* teacher qualifications. (PUBLIC LAW 107–110—U.S.C. 115 STAT. 1425, §§201 and 202). For the purpose of this dissertation study, the addition of “elementary science” defines the specific nature of this research.

[236] Bernhardt, V.  2003. *Using data to improve student learning in elementary schools*.

Darling-Hammond, L., and Berry, B. 2006. Highly qualified teachers for all. pg. 14-20.

Fletcher, C. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005.*

Loucks-Horsley, S., N. Love, K. E. Stiles, S. Mundry, and P. W.  Hewson. *Designing professional development for teachers of science and mathematics* (2nd edition).

Earl, L., and S. Katz. “Leading Schools in a Data-Rich World.”

Garet, M. S., Porter, A. C., Desimone, L., Birman, B.F. and Yoon, K. S.. “What Makes Professional Development Effective?” *Results from a National Sample of Teachers*. pg. 915-45.

Guskey, T.R. “What Makes Professional Development Effective?” pg. 748-50.

Guskey, T. R. “Research Needs to Link Professional Development and Student Learning.”

Smylie, M. A., Lazarus, V. and Brownlee-Conyers, J. 1996. “Instructional Outcomes of School-Based Participative Decision Making.” *Educational Evaluation and Policy Analysis* 18, no. 3. pg. 181-98.

Wagstaff, J. G.  1995. “Site-Based Management, Shared Decision Making, and Science and Mathematics Education: A Tale of Two Districts.” pg. 66-73.

[237] Texas Education Agency. www.tea.state.tx.us/

[238] TRC publication – www.thetrc.edu. *Dynamic Partnerships for Twenty-First Century Education,* 2005.

[239] Tinoca, L., Lee, E., Fletcher, C., Barufaldi, J. and Meyer, J. 2004. “From Professional Development for Science Teachers to Student Learning in Science.” Paper presented at the National Academy of Research in Science Teaching, 2004.

Guskey, T.R. “What Makes Professional Development Effective?” pg. 748-50.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and. Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition).

Meyer, J., and Barufaldi, J.. “The 4 W's of Sustained Professional Development for Science Teachers. “

Foshay, A. W. *The Curriculum: Purpose, Substance, Practice*.

[240] ‘Train-the-Trainer’ delivery of new knowledge and skills is part of the American business industry. Dee Hock (*Birth of the Chaordic Age*, 1999), W. Edward Deming (*Out of the Crisis*, 1982 and *The New Economics: For industry, government, education*, 2000), and Peter Senge (*The Fifth Discipline: The art and practice of the learning organization*, 1990) are well-known business leaders who have written extensively about the importance of continual learning in industry and education.

[241] Fletcher, C. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005*.

Meyer, J., Barufaldi, J., Fletcher, C., Tinoca, L. and Lee, E. 2004. *The role of sustained professional development in renewing science teachers.* Paper presented at the National Association of Research in Science Teaching Vancouver, Canada.

Tinoca, L., Lee, E., Fletcher, C., Barufaldi, J. and Meyer, J. 2004. "From Professional Development for Science Teachers to Student Learning in Science." Paper presented at the National Academy of Research in Science Teaching, 2004.

Tinoca, L. 2004. *From professional development for science teachers to student learning in science.* Unpublished Dissertation. The University of Texas at Austin. Austin: TX.

[242] TRC publication – www.thetrc.edu. *Dynamic Partnerships for Twenty-First Century Education,* 2005.

[243] Bybee, R, and BSCS. 1996. *National Standards and the Science Curriculum*. Edited by Editor Rodger W. Bybee. 1st edition ed. Dubuque, IA: Kendall - Hunt Publishing Company.

[244] Initial participating teachers are known as CMs, Cadre Members, during their first year within the TRC program. Usually, the CMs attend 10 to 30 hours of science content courses provided by a regional TRC facility.

[245]Black, P., and D. William. "Inside the Black Box: Raising Standards through Classroom."

Fletcher, C. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005*.

Wayman, J., Midgley, S. and Stringfield, S. 2006. "Leadership for Data-Based Decision Making: Collaborative Educator Teams." In *New Models of Professional Development for Learner Centered Leadership*, edited by A. Danzig, Borman, K., Jones, B., and Wright, B.: Lawrence Erlbaum.

Christensen, C., Aaron, S. and Clark, W. 2005. "Can Schools Improve?" *Phi Delta Kappan* 86, no. 7. pg. 545-50.

Darling-Hammond, L. 2004. "Inequality and the Right to Learn: Access to Qualified Teachers in California's Public Schools." *Teachers College Record* 106, no. 10. pg. 1936-66.

Ingram, D., Seashore Louis, K. and Schroeder, R. G. 2004. "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." *Teachers College Record* 106, no. 6 (2004): pg. 1258-87.

Guskey, T.R. "What Makes Professional Development Effective?" pg. 748-50.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition).

Earl, L., and Katz, S. "Leading Schools in a Data-Rich World."

Guskey, T. R. "Research Needs to Link Professional Development and Student Learning."

Wagstaff, J. G. "Site-Based Management, Shared Decision Making, and Science and Mathematics Education: A Tale of Two Districts. "

Spady, W. G. "Organizing for Results: The Basis of Authentic Restructuring and Reform." *Educational Leadership* 46, no. 2 (1988): pg. 4-8.

[246] Texas Education Agency. TAKS –*Assessment System.* http://ritter.tea.state.tx.us/student.assessment/reporting/taksagg/

[247] Texas Education Agency - TAKS Assessment System.
http://ritter.tea.state.tx.us/student.assessment/reporting/taksagg/

[248] Wayman, J., Stringfield, S. and Yakimowski, M. 2004. "Software Enabling School Improvement through Analysis of Student Data."

[249] Thomas, S. J. *Using Web and Paper Questionnaires for Data-Based Decision Making: From Design to Interpretation of the Results*.

[250] Bradshaw, D. M., Johnson, T.E., Searcy, S. and Lott, A. 2006. "Using electronic surveys on line." Accessed Dec. 2007. http://pareonline.net/htm/v8n1.htm

Shannon, D. M. and Bradshaw, C. C. 2002. A comparison of response rate, speed and costs of mail and electronic surveys*." Journal of Experimental Education,* 70(2).

[251] Dillman's popularized survey methodology in the 1970's through a process that became known as "*The Dillman Total Design Survey Method*". His methodology continues to remain the primary manner for conducting survey research and new applications are being made to address uses of electronic methods of the Internet and email.

[252] Barufaldi, J.  and Fletcher, C. personal communications, The University of Texas at Austin, November 2006.

[253] Donnellan, B. A. 2006. A Snapshot of School Information Support Systems in Nassau and Suffolk Counties of New York State: To What Degree Are Information Support Systems in Place in These School Districts? Hofstra University, New York.

[254] Cook, T., Habib, F. N., Phillips, Settersten, M. R., Shagle, S. and Degirmencioglu, S.. 2000. "Comer's School development program in Prince George's County, Maryland: A Theory-Based evaluation." *American Educational Research Journal, 36*(3), pg. 543-597.

Supovitz, J. and Turner, H. 1999. The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching, 37*(9), pg. 963-980.

[255] *NCES Handbook of Survey Methods, Technical Report*, April 2003, p. 35

[256] Thomas, S. J. *Using Web and Paper Questionnaires for Data Based Decision Making: From Design to Interpretation of the Results*.

[257] Donnellan, B. A. A Snapshot of School Information Support Systems in Nassau and Suffolk Counties of New York State: To What Degree Are Information Support Systems in Place in These School Districts?

Thomas, S. J. *Using Web and Paper Questionnaires for Data Based Decision Making: From Design to Interpretation of the Results*.

[258] from the *Hosted Survey*™ Web site, originally accessed June 1, 2007 https://www.hostedware.com/home.html. Contracted services for additional number of responses were acquired on May 15, 2008.

[259] Hosted Survey web-site https://www.hostedware.com/home.html.

[260] Wayman, J. C., Stringfield, S. and Yakimowski, M.. Software Enabling School Improvement through Analysis of Student Data.

[261] Lincoln, Y. and Guba, E. 1985. *Naturalistic Inquiry*. San Francisco: CA, Sage Publications, Inc.

[262] Ibid.

[263] Mauchly, John W. (June 1940). "Significance Test for Sphericity of a Normal n-Variate Distribution". *The Annals of Mathematical Statistics* **11** (2): 204–209. doi:10.1214/aoms/1177731915. http://links.jstor.org/sici?sici=0003-4851%28194006%2911%3A2%3C204%3ASTFSOA%3E2.0.CO%3B2-O. Retrieved on Feb. 12, 2009.

[264] The statistical analysis information described in this chapter has been summarized from multiple sessions (January 2009 through May 2009) with Dr. Michael Mehomata, a statistician at The University of Texas at Austin's Department of Statistics.

[265] Lincoln, Y. and Guba, E. *Naturalistic Inquiry.*

[266] *CScope* is a curriculum package developed by three Texas Educational Regional Collaboratives during 2007-2008 and is not defined as a data warehouse system**.**

[267] Two comments from the *Texas Elementary Campus Administrator Survey*™

[268] Texas Education Agency, TAKS Aggregate Reporting. Available at http://www.tea.state.tx.us/index3.aspx?id=3631andmenu_id3=793

[269] Although this teacher indicates that he or she did not know that the TRC science PD program existed, all of the participants invited to participate in this research study were from the TRC data-base of information about 5th grade participants between 2003 to 2008 and all teacher names, school / district, and email addresses were verified prior to either survey sent via email. No random teachers were contacted who had not participated in a regional local Collaborative science PD program.

[270] Ibid. Although this is a different teacher, the information about all participants came from the TRC database.

[271] This quote is repeated in this sub-section of Teacher Comments because what she has to say is important to acknowledge. Many teachers expressed similar comments.

[272] "*No Child Left Behind,*" PUBLIC LAW 107–110—JAN. 8, 2002 115 STAT. 1457, enacted on January 8, 2002, had no references regarding accountability for principals as a separate group within the educational system. This 790-page document has numerous accountability measures regarding student attendance and performance and teacher requirements within a classroom; definitions for 'highly qualified classroom teacher; descriptions of parent responsibilities for supporting their child's learning; as well as procedures for seeking education outside of an assigned school; and district-level accountability regarding students' progress through "Annual Yearly Performance" (AYP) on standardized, grade-level exams. In 2004, 2005 and 2008 re-appropriation of the *NCLB* policy, these omissions were corrected. Within this research study, the 2008 *NCLB* is referenced unless otherwise indicated.

[273] Ibid. PUBLIC LAW 107–110—JAN. 8, 2002 115 STAT. 1457, §1114.

[274] Excerpts from email communications between researcher and Dr. Terry Clark, from March 22, 2009 to April 11, 2009.

[275] Dr. Steven Jackson. Personal conversations with researcher, October. 2007.

## Chapter 5 – Pandora's Box now Open – End Notes

[276] The phrase “highly qualified classroom teacher” is part of the *No Child Left Behind Act of 2001* teacher qualifications. (PUBLIC LAW 107–110—U.S.C. 115 STAT. 1425, §§201 and 202). For the purpose of this dissertation study, the addition of “elementary science” defines the specific nature of this research.

[277] Bernhardt, V. 2003. *Using data to improve student learning in elementary schools*.

Christensen, C., Aaron, S. and Clark, W. “Can Schools Improve?”

Tinoca, L., Lee, E., Fletcher, C., Barufaldi, J. and Meyer, J. “From Professional Development for Science Teachers to Student Learning in Science.”

Wellman, B., and Lipton, L. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition).

Earl, L. and Katz, S. 2002. “Leading schools in a data-rich world.” pg. 1003-1022.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F. and Yoon, K. S. 2001. “What makes professional development effective? Results from a national sample of teachers.” pg. 915.

Koballa, J. T. R. and Tippins, D. J. 2001. “Portraits of professional development models in science teacher education: A synthesis of perspectives and issues.” pg. 213-224.

Guskey, T.R. “What Makes Professional Development Effective?” Pg. 748-50.

Guskey, T. R. ***Evaluating Professional Development.*** pg. 37-39.

Smylie, M. A., Lazarus, V. and Brownlee-Conyers, J. 1996. “Instructional Outcomes of School-Based Participative Decision Making.” pg. 181-98.

Wagstaff, J. G. “Site-based management, shared decision making, and science and mathematics education: A tale of two districts.” pg. 66-73.

[278] Barufaldi, J. (2008). *Advanced Topics: Professional Development for Science and Mathematics Teachers.* Class notes – Spring 2008, The University of Texas at Austin. Austin, Texas.

[279] Ibid.

[280] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

[281] Ibid

[282] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

[283] Lachat, M.A. and Smith, S. 2005. “Practices that support data use in urban high schools.” pg.. 333–349**.**

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 35.

[284] Ibid. pg. 35.

[285] Ibid. pg. 35.

Ingram, D., Seashore Louis, K. and Schroeder, R. G. (in print) "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

[286] Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg. 333–349**.**

Ingram, D., Seashore Louis, K. and Schroeder, R. G.(in print) "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

[287] Darling-Hammond, L. 2004. "Standards, Accountability, and School Reform." Pg. 1258-87.

Ingram, D., Seashore Louis, K. and Schroeder, R. G. "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

Wellman, B., and Lipton, L. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*.

Bernhardt, V.  2003. *Using data to improve student learning in elementary schools*.

Guskey, T. R. "What Makes Professional Development Effective?" 748-50.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition).

[288] Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg.. 333–349**.**

Wayman, J. C., and Stringfield, S. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." *American Journal of Education* 112 (2006): 549-71.

Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[289] Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg. 333–349**.**

Ingram, D., Seashore Louis, K. and Schroeder, R. G. "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

[290] Fletcher, Carol. "Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005."

Tolley, K. 2003. *The science education of American girls***.** New York: NY. Routledge Falmer.

Brooks, J. G. and Brooks, M. G. 1999. *The Case for Constructivist Classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

[291] Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

[292] Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[293] Ibid.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

[294] Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg.. 333–349**.**

Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[295] Grosso De Leon, A. "The school leadership crisis: Have school principals been left behind?" pg. 32-39.

[296] Ibid, pg 34.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg.. 333–349**.**

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

Wayman, J. C., Stringfield, S. and Yakimowski, M. 2004. "Software Enabling School Improvement through Analysis of Student Data."

[298] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Wayman, J.C., Cho, V. and Johnston, M. T. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[299] Ingram, D., Seashore Louis, K. and Schroeder, R. G. "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[300] Coburn, C. E., Honig, M. I., & Stein, M. K. (in press). What is the evidence on districts' use of evidence? In J. Bransford, L. Gomez, D. Lam, & N. Vye (Eds.), *Research and practice: Towards a reconciliation*. Cambridge, MA: Harvard Education Press.

[301] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Coburn, C. E., Honig, M. I., & Stein, M. K. (in press). “What is the evidence on districts' use of evidence?”

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

Wayman, J. C., Stringfield, S. and Yakimowski, M. 2004. "Software Enabling School Improvement through Analysis of Student Data."

Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

[302] From United States Congress (2002). 115 STAT. 2090 PUBLIC LAW 107–110—JAN. 8, 2002.

[303] From United States Congress (2002). 115 STAT. 2090 PUBLIC LAW 107–110—JAN. 8, 2002.

[304] Ingram, D., Seashore Louis, K. and Schroeder, R. G. "Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice." pg. 1258-87.

[305] United States Congress (2002). 115 STAT. 2090 PUBLIC LAW 107–110—JAN. 8, 2002.

[306] State Board for Educator Certification http://www.sbec.state.tx.us

[307] *Highly Qualified Teachers for Every Child – Reauthorization*, U.S. Department of Education reports August 2008, http://www.ed.gov/nclb/methods/teachers/stateplanfacts.html, National Center of Educational Statistics report cart regarding NCLB reauthorization http://nces.ed.gov/nationsreportcard/nclb.asp.

Senator Lamar Alexander web-site, PROPOSES LEGISLATION TO GIVE STATES MORE FLEXIBILITY UNDER "NO CHILD LEFT BEHIND"
http://alexander.senate.gov/index.cfm?FuseAction=PressReleases.DetailandPressRelease_id=1318andMonth=11andYear=2007

All of these web-site discuss various aspects of how the current reauthorizations of NCLB changes may impact the ‘highly qualified classroom teacher’ definition, and change with the addition of “AND EFFECTIVE” for describing what this HQCT person is. Sen. Alexander’s proposal is currently the policy that would allow for contracts between States and Department of Education to set higher achievement standards overall, thus leading to the “AND EFFECTIVE” standard of measurement that data from test scores would show, and professional development training and opportunities would be a direct result as required under the current NCLB mandate for all classroom teacher.

[308]Booher-Jennings, J. 2005. “Below the Bubble: ‘Educational Triage’ and the Texas Accountability System.” *American Education Research Journal* 42: Pg. 231-268.

Nelson, S. W., McGhee, M. W., Meno, L. R. and Slater, C. L. "Fulfilling the Promise of Educational Accountability." *Phi Delta Kappan* (2007): Pg. 702-09.

[309] Tinoca, L., E. Lee, C. Fletcher, J.F. Barufaldi, and J. Meyer. “From Professional Development for Science Teachers to Student Learning in Science.”

Meyer, J., and J. Barufaldi. “The 4 W's of Sustained Professional Development for Science Teachers.” January 30 - February 2, 2003.

Guskey, T.R. “What Makes Professional Development Effective?” Pg. 748-50.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. and Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics* (2nd edition).

[310] Texas State Board of Education Certification (SBEC), Chapter 229 and Chapter 247.

[311] Ibid.

[312] Reading Academies are a trademark program of the Vaughn Gross Center for Reading and Language Arts at The University of Texas at Austin, Austin, Texas.

[313] The Three-Tier Reading Model is a progressive reading intervention program researched by Sharon Vaughn, Ph.D., The University of Texas at Austin.

[314] The Texas Legislature, 2007 session, (Texas House of Representatives, 79th Session. Session Law Chapter: Acts 2006, 79th 3rd C.S., Ch. 5.) passed a new graduation requirement for all Texas high schools. This new requirement is known as the '4 x 4 plan' and requires all students (graduating in 2012) to document 4 years of study and to pass all 4 required core courses (Language Arts, Mathematics, Science, and Social Studies/Economics). The freshman class of 2008 will be the first class to graduate under this new state law for graduation.

[315] Grosso De Leon, A. "The school leadership crisis: Have school principals been left behind?" pg. 32-33.

[316] Ibid, pg. 32-33.

[317] Ibid, pg. 34.

[318] Ibid, pg. 34.

[319] Ibid., pgs. 40 – 86.

[320] Deming, W. E. 2000. *The New Economics for Industry, Government and Education.* 2nd Edition. Cambridge, MA: The MIT Press. Pgs. 58-91 and 143-153.

[321] Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

[322] Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

Grosso De Leon, A. "The school leadership crisis: Have school principals been left behind?" pg. 32-39.

[323] Coburn, C. E., Honig, M. I., & Stein, M. K. (in press). "What is the evidence on districts' use of evidence?"

Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." pg. 333–349.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*.

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

[324] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

[325] Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement.*

Wayman, J.C., Cho, V. and Johnston, M. T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. pg. 1-60.

Wayman, J. C., and Stringfield, S. 2006. "Technology-Supported Involvement of Entire Faculties of Examination of Student Data for Instructional Improvement." 549-71.

[326] Wayman, J., Cho, V., and Johnston, M. T. 2007. *The Data-Informed District: A district-wide evaluation of data use in the Natrona County School District*. pg. 19.

[327] Perie, M., S. Marion, B. Gong and J. Wurtzel. *The role of interim assessments in a comprehensive assessment system: A policy brief.* Dover, NH: The National Center for the Improvement of Educational Assessment, Inc. Policy brief sponsored by the Center for Assessment, Achieve, Inc. and The Aspen Institute. Available at http://nciea.org.

Perie, M., Marion, S., Gong. B. and Wurtzel, J. (2007). *Moving towards a comprehensive assessment system: A framework for considering interim assessments.* Dover, NH: The National Center for the Improvement of Educational Assessment, Inc. Available at http://nciea.org.

[328] Black, P and Wiliam, D. (1998). “Inside the black box: Raising standards through classroom assessment.” Pg. 139-148.

# Appendix A

## *Texas Campus Administrator Survey©*

## *Data-Informed Decision Making*

Instructions to Participants

The purpose of this study is to examine the impact of educational policy, professional development and the process of data-informed decision-making specific to science education in Texas elementary schools.

This survey is part of my dissertation entitled “The Integration of Science Education, Professional Development, and Accountability Requirements from ‘No Child Left Behind Act of 2001’: Decision-Making in Texas Elementary, Intermediate and Middle Schools” and your input is crucial.

<u>You are one of 480 elementary OR intermediate OR middle school campuses</u> that were randomly selected across Texas so your opinion matters as the representative of your campus, your district and your region.

There is at least one teacher at your campus who attended the Texas Regional Collaborative science education professional development program between 2003 and 2007.

If there is more than 1 campus administrator at your school, then EACH of you has received this survey and I need EACH individual to respond to the survey he or she received via email.

There are three reasons you were selected to participate in this survey:

- First, your knowledge and skills will contribute to a better understanding of *how* your role as “Instructional Leader” impacts science education programs at your school;
- Second, how your support, and sponsorship of one or more teacher(s) involved in a Texas Regional Collaborative, science education, professional development session between 2003 and 2007; and
- Third, how the use of data-informed decision making is utilized to determine science education programs for your elementary or intermediate school students. In this function your opinion, experience, and input are sought since your unique professional insights are extremely valuable for this research study.

  It is estimated that it will take no longer than 20 minutes of your time to complete the on-line questionnaire.

<u>For those who choose to participate and complete the survey completely</u>, please remember there is an incentive with a drawing at the end of the survey for a correctly submitted, completed survey.

The incentive is a drawing at the end of the survey period where four individuals will be randomly chosen to receive ONE of FOUR (4) individual, faceted gemstones, each between 2.97 carats and 1.5 carats, estimated retail value $50 or greater. The gemstones are white spinals, sky blue topaz, and lemon quartz. You may be one of the four winners to receive one of these beautiful gems! A certificate of authenticity will be included with each stone.
NOTE: IF YOU HAVE ANY PROBLEMS with accessing the web-site or submitting the data, please contact

your district technology divisions since those issues may be due to district level spam filter software.

WHEN YOU HAVE COMPLETED AND SUBMITTED THE SURVEY, you will see two events occur:

1) Your computer will immediately go to the web-page link of the Texas Regional Collaboratives. Here you will see the numerous science education professional development programs offered by the 50 TRC science locations through the state.

2) You will also receive in your email a copy of the entire survey WITH ALL OF YOUR RESPONSES. The subject line will say “CONFIRMATION – Texas Campus Administrator Survey™”

If you need to leave at any point, please scroll down to the end each section and click on the FINISH LATER button.  This allows you to return at a future time using the same link as above.

This study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu. IRB Approval No. 2007-03-0006.

Participants who complete this survey may receive an electronic copy of the results of this research by August 2009.

If you agree to participate, please click on the BEGIN SURVEY button at the bottom of this page.
Thank you.

Always,

Linda L.G. Brown, M.A., C.A.P.M.
Doctoral Candidate

Curriculum Studies / Science Education / Educational Policy Leadership
The University of Texas at Austin
Department of Curriculum and Instruction
Curriculum Studies Program

E-mail: <*deleted*>.

If you have questions about this email or choose to not participate in this study, please reply or contact Linda L.G. Brown at <*deleted*>. Please leave a detailed voicemail message if I am unable to answer your call.

IF YOU ARE EXPERIENCING TECHNICAL PROBLEMS, please contact the Technology Department of your district since these issues may be due to spam filter software utilized within your district.

**I. Demographic Information** (7 questions)

**I. Demographic Information (7 questions)**

1. Are you Male or Female?

 Male  Female

2. On your campus, are you the …

 Principal  Assistant Principal

 Curriculum Specialist  Other Administrator

3. As **campus administrator** at this school, have you sponsored or encouraged any the teacher(s) to attend a Texas Regional Collaboratives professional development for science teachers program?

 Yes  No

4. Please select the grade levels on your campus:

 Pre- Kindergarten through Second

 Kindergarten through Second

 Pre-Kindergarten through Fifth

 Kindergarten through Fifth

 Kindergarten through Sixth

 Third through Fifth

 Third through Sixth

 Fourth and Fifth

 Fourth through Sixth

 Fifth and Sixth

 Fifth only

 Sixth only

 Fifth through Seventh

 Fifth through Eighth

 Fifth through Eighth

 Fifth through Twelfth

 None of the above combinations are at this campus

5. Please indicate which grade levels that science is taught. CLICK on one box for each line.

| | YES | NO | Not Applicable |
|---|---|---|---|
| Kindergarten | □ | □ | □ |
| 1st | □ | □ | □ |
| 2nd | □ | □ | □ |
| 3rd | □ | □ | □ |
| 4th | □ | □ | □ |
| 5th | □ | □ | □ |
| 6th | □ | □ | □ |
| 7th | □ | □ | □ |
| 8th | □ | □ | □ |
| 9th | □ | □ | □ |
| 10th | □ | □ | □ |
| 11th | □ | □ | □ |
| 12th | □ | □ | □ |

6. Many teachers who attend the Texas Regional Collaborative programs obtain the level as a "Science Mentor Teacher" where they are able to become science educator leaders and mentors to other teachers at their school and in their district.

On your campus, do you have any teachers who have obtained this level as a TRC Science Mentor Teacher (SMT)?

□ Yes □ No

7. Which of the following is the performance rating given by the Texas Education Agency for your school for last year (2006-2007)? NOTE: you are not required to answer this question in order to continue.

□ **Exemplary** – meets 90% standard for each subject

□ **Recognized** – meets 75% standard for each subject OR meets 70% minimum and Required Improvement

□ **Academically Acceptable** – meets each standard (Reading / ELA: 65%; Writing: 65%; Social Studies: 65%; Mathematics: 45%; Science 40%: OR meets Required Improvement

□ **Academically Unacceptable** – a district with a campus rated

*Academically Unacceptable* cannot be rated *Recognized* or *Exemplary*

Please write any COMMENTS you may want to convey to the researcher here, there are 15 lines in the space available below:

| |
|---|
| |

**<u>SECTION II – Professional Development</u>** (8 questions)

This next section contains questions about your views and opinions regarding the professional development courses or training you have attended regarding data-driven decision making and science education. Remember, there are no "right" or "wrong" answers.

1. In any of your training within your **district** (e.g., internal to the school or district) as a campus administrator, have you attended any instruction regarding: CLICK on one box for each line.

| | | Yes | No |
|---|---|---|---|
| a | how to prepare your Faculty and Staff to use data for making decisions? | | |
| b | how use of data for improving teaching and learning? | | |
| c | the *"No Child Left Behind"* assessments of a *'highly qualified classroom teacher'*? | | |
| d | the selection of appropriate science education curriculum for elementary students? | | |
| e | training offered by the Texas Regional Collaboratives? | | |

2. In any of your training outside of your **district** (e.g., external from the school or district) as a campus administrator, have you have you attended any **COLLEGE-LEVEL** instruction regarding…

| | | Yes | No |
|---|---|---|---|
| a | how to prepare your Faculty and Staff to use data for decision-making? | | |
| b | how use of data for improving teaching and learning? | | |
| c | the *"No Child Left Behind"* assessments of a *'highly qualified classroom teacher'*? | | |
| d | the selection of appropriate science education curriculum for elementary students? | | |
| e | training offered by the Texas Regional Collaboratives? | | |

3. In your opinion, what percentage of teachers on your campus are currently teaching **science** to academic standards defined in the *No Child Left Behind Act of 2001* for a *'highly qualified classroom teacher'*?

□□□ Percent

4. How would you describe a *'Highly Qualified **Science** Classroom Teacher'*? Please write your views below, there are 15 lines in the space below:

5. **PRIOR TO HAVING YOUR TEACHER OR TEACHERS ATTEND** the Texas Regional Collaboratives professional development program for science education, how well prepared did you believe they were able to teach science? CLICK on 1 box for each line.

| | | **Very well prepared** | **Well prepared** | **Somewhat prepared** | **Not at all prepared** |
|---|---|---|---|---|---|
| a | Handle a range of classroom management for science laboratory instruction? | | | | |
| b | Use a variety of science instructional methods? | | | | |
| c | Have a knowledgeable background to teach science? | | | | |
| d | Use computers in classroom for collecting science data? | | | | |
| e | Assess student learning of science concepts? | | | | |
| f | Select and adapt science curriculum and science instructional materials? | | | | |
| g | Discuss science concepts with parents? | | | | |
| h | Mentor or coach other teachers for improving science education at your campus? | | | | |

6. **AFTER YOUR TEACHER or TEACHERS ATTENDED** the Texas Regional Collaboratives professional development program for science education, how well informed do you believe the teacher(s) are now able to teach science? CLICK on 1 box on each line.

| | | **Very well prepared** | **Well prepared** | **Somewhat prepared** | **Not at all prepared** |
|---|---|---|---|---|---|
| a | Handle a range of classroom management for science laboratory instruction? | | | | |
| b | Use a variety of science instructional methods? | | | | |
| c | Have a knowledgeable background to teach science? | | | | |
| d | Use computers in classroom instruction for collecting science data? | | | | |
| e | Assess student learning of science concepts? | | | | |
| f | Select and adapt science curriculum and science instructional materials? | | | | |
| g | Discuss science concepts with parents? | | | | |
| j | Mentor or coach other teachers for improving science education at your campus? | | | | |

7. Do you promote the Texas Regional Collaborative professional development program for science education for OTHER teachers to attend from your campus?

☐ Yes ☐ No

8. When it comes to teaching science, how do teachers with TRC training compare with their colleagues who have not had this training? *Select only ONE box.*

| **Superior** – I want all my teachers to attend TRC training | **Well prepared** - Definitely above their colleagues | **Somewhat prepared** – teacher's abilities are below their colleagues | **Not at all prepared** - Very poor overall |
|---|---|---|---|
| **4** | **3** | **2** | **1** |

Please write any ADDITIONAL COMMENTS you may want to convey to the researcher here:

| |
|---|
| |

**SECTION III. Data-informed Decision Making**

This section of questions concerns the processes and procedures that YOU utilize regarding data-informed decision making. (6 questions)

1. Which of the following agencies or person(s) have an impact on YOUR decisions regarding the selection for science curriculum in the classrooms at this school? *Mark (X) in ONE box on each line.*

| | | **Major Influence** | **Moderate Influence** | **Minor Influence** | **No Influence** |
|---|---|---|---|---|---|
| a | U.S. Department of Education – *No Child Left Behind* | | | | |
| b | Texas Education Agency – *TAKS* results | | | | |
| c | Local school board | | | | |
| d | Superintendent | | | | |
| e | School district administration / staff / curriculum or instructional specialists | | | | |
| f | Teachers input | | | | |
| g | Parents / Parent associations | | | | |
| h | Texas Regional Collaborative (TRC) | | | | |
| i | Educational Service Centers (ESC) | | | | |

2. Which of the following are used as data for determining classroom science teaching assignments?

| | | **Major Influence** | **Modest Influence** | **Small Influence** | **No Influence** |
|---|---|---|---|---|---|
| a | Tenure | | | | |
| b | Total Years of Teaching Experience | | | | |
| c | Certification(s) | | | | |
| d | Professional Development experience<br>(*Texas Regional Collaboratives, college courses, etc.)* | | | | |
| e | Parental input | | | | |
| f | TAKS 5$^{th}$ grade science test scores | | | | |
| g | Leadership roles in school | | | | |

3. Are you able to use data to determine either of the following:

| | | **Yes** | **No** |
|---|---|---|---|
| a | To determine the impact of teachers' lessons on student learning of TEKS science standards? | | |
| b | To determine if teachers' are adjusting lessons or re-teaching lessons based on benchmark assessments that students have scored poorly on? | | |

4. Are you able to access individual **STUDENT** data through any of these formats?

| | | **Yes** | **No** |
|---|---|---|---|
| a | Student Information Systems (SIS) *(i.e. day-to-day transactional information primary to schools; discipline, schedules, attendance, expulsions, etc.)* | | |
| b | Assessment Systems *(i.e. mainly benchmark data)* | | |
| c | Data Warehouse *(i.e. a commercial computer system that brings multiple types of other information – SIS, Assessment, teacher lesson plans, possibly state standards) Examples: E-Scholar – TetraData DASH – SchoolNet – Executive Intelligence* | | |
| d | District-generated Data Warehouse *(i.e. specific information ONLY for your school district)* | | |

5. Are you able to access individual **TEACHER** data through any of these formats?

| | | **Yes** | **No** |
|---|---|---|---|
| a | Student Information Systems (SIS) *(i.e. day-to-day transactional information primary to schools; discipline, schedules, attendance, expulsions, etc.)* | | |
| b | Assessment Systems *(i.e. mainly benchmark data)* | | |
| c | Data Warehouse *(i.e. a commercial computer system that brings multiple types of other information – SIS, Assessment, teacher lesson plans, possibly state standards) Examples: E-Scholar – TetraData DASH – SchoolNet – Executive Intelligence* | | |
| d | District-generated Data Warehouse *(e.g. specific information ONLY for your school district)* | | |

6. Do you use any of the following to assess data to monitor this school's progress?

| | | **Yes** | **No** |
|---|---|---|---|
| a | Nationally-normed tests *(i.e. ITBS – an assessment where an individual student's performance is compared to a national sample representing a wide and diverse cross-section of students.)* | | |
| b | State mandated test assessments *(i.e. TAKS)* | | |
| c | Parent survey's | | |
| e | Curriculum-Embedded Assessment / Benchmark Tests | | |
| f | Formative Assessment | | |
| g | Criterion-Referenced Tests *(i.e. student performance compared to specific TEKS standards)* | | |

Please write any COMMENTS you may want to convey to the researcher here:

| |
|---|
| |

**NOW, please click on the "CONTINUE" button below so you will be able to submit the survey to the research study. Then, click on the "END OF SURVEY" button. THESE ARE TWO VERY IMPORTANT STEPS SO YOUR SURVEY ANSWERS WILL BE RECORDED! Additionally, by completing these steps will ensure your survey is entered in the incentive drawing for one of the four faceted gemstones!**

## Appendix B

***Texas Elementary, Intermediate or Middle School Teacher Survey™***

***Data-Informed Decision Making***

### Instructions to Participants

This survey is the data necessary for my dissertation, entitled "The Integration of Science Education, Professional Development, and Accountability Requirements from 'No Child Left Behind Act of 2001': Data-Informed Decision Making in Texas Elementary, Intermediate and Middle Schools" and your input is crucial.

<u>You are one of 480 elementary OR intermediate OR middle school campuses</u> that were randomly selected across Texas so your opinion matters as the representative of your campus, your district and your region.

At some point between 2003 and 2007, you attended a series of Texas Regional Collaborative science education professional development training sessions in your region, which is how you were randomly selected as a survey participant.

<u>**REMEMBER!! For those who choose to participate and complete the survey completely**</u>, there is an incentive drawing at the end of the survey period for correctly submitted and completed survey.

The incentive being offered is that six individuals will be randomly drawn to receive ONE of SIX (6) individual, faceted gemstones, each between 2.97 carats and 1.5 carats with an estimated retail value $40 or greater. The gemstones are white spinal, a pair of matching smoky topaz, citrine, sky blue topaz, 3 amethyst, and lemon quartz. You may be one of the six winners to receive one of these beautiful gems! A certificate of authenticity will be included with each stone.

**NOTE: IF YOU HAVE ANY PROBLEMS with accessing the web-site or submitting the data**, please contact your district technology divisions since those problems are due to district level spam filters.

If you need to leave at any point, please scroll down to the end each section and click on the FINISH LATER button. This allows you to return at a future time using the same link as above.

Once more, your time, input, and personal attention in participating is truly appreciated in this important research study. You were selected as a Texas elementary, intermediate or middle school teacher for three reasons:

- First, your **experience** and **opinions** will contribute to a better understanding of *how* your role as an elementary or intermediate teacher impacts science education programs at your school;

- Second, how **your participation** in a Texas Regional Collaborative science education professional development session may have contributed to improving your school's TAKS science test scores; and

- Third, how data-based decision making is utilized in determining the science education programs for your school. In this function **your opinion, experience, and input are being sought because your unique professional insights are extremely valuable for this research study**.

<u>**WHEN YOU HAVE COMPLETED AND SUBMITTED THE SURVEY**</u>, you will see two events happen without delay:

1) Your computer monitor screen will immediately switch to the web-page link of the Texas Regional Collaboratives. Here you will see the numerous programs of the state-wide network.

**2)** You will also receive in your email a copy of the entire survey WITH ALL OF YOUR RESPONSES. The subject line will say "**CONFIRMATION – Texas Elementary-Intermediate-Middle School Teacher Survey.**"

This study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu. IRB Approval No. 2007-03-0006.

Participants who complete this survey may receive an electronic copy of the results of this research by August 2009.

If you agree to participate, please click on the BEGIN SURVEY button at the bottom of this page.

Thank you.

Always,

Linda L.G. Brown, M.A., C.A.P.M., A.B.D.
Doctoral Candidate

Curriculum Studies / Science Education / Educational Policy Leadership
The University of Texas at Austin
Department of Curriculum and Instruction
Curriculum Studies Program

E-mail: <*deleted*>

If you have questions about this email or choose to not participate in this study, please reply or contact Linda L.G. Brown at <*deleted*>. Please leave a detailed voicemail message if I am unable to answer your call.

If you need assistance or have questions while taking this survey, please contact the Principal Investigator, Linda L.G. Brown.

Linda L.G. Brown

**I. Demographic Information** (5 questions)

1. Are you Male or Female?

☐ Male ☐ Female

2. Are you a Science Teacher Mentor (STM)?

☐ YES ☐ NO

3. Are you a Cadre Member (CM)?

☐ YES ☐ NO

4. What grade level(s) do you currently teach? Please CLICK on any or all grade levels that apply.

☐ Pre-Kindergarten ☐ Kindergarten

☐ 1st grade ☐ 2nd grade

☐ 3rd grade ☐ 4th grade

☐ 5th grade ☐ 6th grade

☐ 7th grade ☐ 8th grade

☐ 9th grade ☐ 10th grade

☐ 11th grade ☐ 12th grade

☐ I am no longer a classroom teacher.

5. Do you currently teach science? NOTE: even if you do not teach science, please continue with this survey since other sections ask questions regarding data-informed decisions.

☐ YES ☐ NO

**II. Professional Development** (9 questions)

This next section contains questions about your views and opinions regarding the professional development courses or training you have attended regarding data-driven decision making and science education. Remember, there are no “right” or “wrong” answers.

1. In any of your training as a teacher, have you attended any instruction for working with: CLICK on ONE box for each line.

| | | **Yes** | **No** |
|---|---|---|---|
| a | Your colleagues and / or campus administrator in using data for making decisions for improving your teaching? | | |
| b | Using data for improving overall teaching to enhance student learning in your classes? | | |

| | | | |
|---|---|---|---|
| c | Any assessments of being designated a Highly Qualified Classroom Teacher according to requirements under *No Child Left Behind*? | | |
| d | Selection or modifications for science education curriculum so it is appropriate for ALL students? | | |
| e | the Texas Regional Collaboratives in your region for further professional development in science education? | | |

2. Which of the following do you THINK are used as data for determining classroom teaching assignments at your campus? CLICK on one box for each line.

| | | **Major Influence** | **Modest Influence** | **Small Influence** | **No Influence** |
|---|---|---|---|---|---|
| a | Tenure | | | | |
| b | Total years of teaching experience | | | | |
| c | Certification(s) | | | | |
| d | Professional development experience (i.e., Texas Reg. Collaboratives, college courses, etc.) | | | | |
| e | Parental input | | | | |
| f | TAKS science test scores | | | | |
| g | Leadership role in school | | | | |

3. How would you describe a *'Highly Qualified Classroom* **SCIENCE** *Teacher'?* You have 15 lines available in the COMMENT box below.

| |
|---|
| |

4. Do you promote the Texas Regional Collaborative professional development program for OTHER teachers to attend from your campus?

☐ YES ☐ NO

5. Have you continued attending a Texas Regional Collaborative professional development program for science education?

☐ YES ☐ NO

6. If you selected “YES” on Question #5 (above), please select NONE (at the bottom of the list below. If you selected “NO” on Question #5 (above), please select ALL that apply from the list below. If No, why not? *(select all that apply)*

 I changed school assignments within the same district.

 I changed teaching assignments within the same district.

 Science is not part of the grade level curriculum I am currently teaching.

 I moved or changed school districts.

 I am no longer interested in teaching science.

 My principal changed my teaching assignment.

 The school goal this year is based entirely on “passing the TAKS” for reading and math.

 There is no time for teaching science in my school day or week.

 My job assignments or duties at school have changed.

 My family and / or my personal commitments have changed.

 OTHER (please describe in the COMMENT box provided below).

 NONE OF THE ABOVE.

7. **PRIOR TO ATTENDING** the Texas Regional Collaboratives professional development program for science education, how well prepared do you believe were you able to: CLICK on one box for each line.

| | | **Very well prepared** | **Well prepared** | **Somewhat prepared** | **Not at all prepared** |
|---|---|---|---|---|---|
| a | Handle a range of classroom management for science laboratory instruction? | | | | |
| b | Use a variety of science instructional methods? | | | | |
| c | Have a knowledgeable background to teach science? | | | | |
| d | Use computers in classroom for collecting science data? | | | | |
| e | Assess student learning of science concepts? | | | | |

| | | | | | |
|---|---|---|---|---|---|
| f | Select and adapt science curriculum and science instructional materials? | | | | |
| g | Discuss science concepts with parents? | | | | |
| h | Mentor or coach other teachers for improving science education at your campus? | | | | |

8. **AFTER ATTENDING THE** Texas Regional Collaboratives professional development program for science education, how well prepared do you believe you are now able to: CLICK on one box for each line.

| | | **Very well prepared** | **Well prepared** | **Somewhat prepared** | **Not at all prepared** |
|---|---|---|---|---|---|
| a | Handle a range of classroom management for science laboratory instruction? | | | | |
| b | Use a variety of science instructional methods? | | | | |
| c | Have a knowledgeable background to teach science? | | | | |
| d | Use computers in classroom for collecting science data? | | | | |
| e | Assess student learning of science concepts? | | | | |
| f | Select and adapt science curriculum and science instructional materials? | | | | |
| g | Discuss science concepts that you are teaching with parents? | | | | |
| h | Mentor or coach other teachers for improving science education at your campus? | | | | |

9. When it comes to teaching science, how do you believe that your TRC science education professional development training compares with your colleagues who have not had this training? CLICK on only one box.

| **Superior –** I want all my colleagues to attend TRC | **Well prepared** -Definitely above my colleagues | **Somewhat prepared –** my abilities are still below my colleagues | **Not at all prepared –** I am still unsure about teaching science |
|---|---|---|---|
| | | | |

Feel free to write any ADDITIONAL COMMENTS you may wish to convey to the researcher. There are 15 lines available in the space below.

| |
|---|
| |

**Section III. Data-informed Decision Making** (5 questions)

This section will ask you questions regarding the processes and procedures utilized for data-informed decision making on your campus.

1. Which of the following agencies or person(s) have an impact on decisions regarding the selection for science curriculum in your classroom? Please CLICK on one box for each line

| | | **Major Influence** | **Moderate Influence** | **Minor Influence** | **No Influence** |
|---|---|---|---|---|---|
| a | U.S. Department of Education – *No Child Left Behind* | | | | |
| b | Texas Education Agency – *TAKS* results | | | | |
| c | Local school board | | | | |
| d | Superintendent | | | | |
| e | School district administration / staff / curriculum or instructional specialists | | | | |
| f | Teachers input | | | | |
| g | Parents / Parent associations | | | | |
| h | Texas Regional Collaborative (TRC) | | | | |
| i | Education Service Centers (ESC) | | | | |

2. Which of the following do you THINK are used as data for determining classroom teaching assignments at your campus?

| | | **Major Influence** | **Modest Influence** | **Small Influence** | **No Influence** |
|---|---|---|---|---|---|
| a | Tenure | | | | |
| b | Total Years of Teaching Experience | | | | |
| c | Certification(s) | | | | |
| d | Professional Development experience<br><br>(*Texas Regional Collaboratives, college* | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | *courses, etc.)* | | | | |
| e | Parental input | | | | |
| f | TAKS $5^{th}$ grade science test scores | | | | |
| g | Leadership role in school | | | | |

3. Are you, as a classroom teacher, able to access and use data to determine either of the following: (Please select YES or NO for each line).

| | | **YES** | **NO** |
|---|---|---|---|
| a | The impact of your lessons and/or teaching for your students' learning as it applies to the TEKS (Texas Essential Knowledge and Skills) science standards? | | |
| b | Use data to adjust or re-teach lessons based on TEKS science benchmark assessments that students' have scored poorly on? | | |
| c | Determine how your instructional strategies are meeting the learning needs for EACH individual student? | | |

4. Are you able to access your students' data through any of these formats? Please select YES or NO for each item.

| | | **YES** | **NO** |
|---|---|---|---|
| a | Student Information Systems (SIS) *(i.e. day-to-day transactional information primary to schools; discipline, schedules, attendance, expulsions, etc.)* | | |
| b | Assessment Systems *(i.e. Benchmark data)* | | |
| c | Data Warehouse *(i.e. a computer system that brings multiple types of other information – SIS, Teacher lesson plans, state standards). Some e examples of Data Warehouse Systems are: E-Scholar; TetraData DASH; SchoolNet; Executive Intelligence; etc.)* | | |
| d | District-generated Data Warehouse *(i.e. this would be a system of information created by and specific only for your school district)* | | |

5. As a teacher, do you use any of the following DATA to assess your students' learning and progress throughout the school year? Please select YES or NO for each item.

| | | **YES** | **NO** |
|---|---|---|---|
| a | Nationally-normed tests *(i.e. ITBS – an assessment where an individual student's performance is compared to a national sample representing a wide and diverse cross-section of students.)* | | |

| | | | |
|---|---|---|---|
| b | State mandated test assessments *(i.e. TAKS)* | | |
| c | Parent surveys | | |
| e | Curriculum-Embedded Assessment / Benchmark and Benchmark Tests | | |
| f | Formative Assessment | | |
| g | Criterion-Referenced Tests *(i.e. student performance compared to specific TEKS standards)* | | |

Feel free to write any ADDITIONAL COMMENTS you may wish to convey to the researcher. There are 15 lines available in the space below.

| |
|---|
| |

NOW, please click on the "CONTINUE" button below so you will be able to submit the survey to the research study. Then, click on the "END OF SURVEY" button. THESE ARE TWO VERY IMPORTANT STEPS SO YOUR SURVEY ANSWERS WILL BE RECORDED! Completing these steps will ensure that your survey is correctly submitted so you will be included in the incentive drawing for ONE of SIX faceted gemstones at the end of the survey time period.

**Appendix C**

***ACRONYMS USED***

**CHAPTER 1**

NCLB (No Child Left Behind)

AYP (ANNUAL YEARLY PROGRESS)

PD (Professional Development)

TRC (Texas Regional Collaboratives)

TAKS (Texas Assessment of Knowledge and Skills)

HQT (Highly qualified teacher)

IT (Information technology)

TEA (Texas Education Agency)

OD (Organizational development)

SBOE (State Board of Education)

TEKS (Texas Essential Knowledge and Skills)

ESC (Education Service Centers)

**CHAPTER 2**

CIL (Campus Instructional Leaders)

STEM (science-technology-engineering-mathematics)

HQCT (highly qualified classroom teachers)

HQesCT (highly qualified elementary science classroom teachers)

AYP (Annual Yearly Progress)

USDE (US Department of Education)

LEAs (Local Education Agencies)

EOC (end-of-course)

NAESP (National Association of Elementary and Secondary Principals)

NSTA (National Science Education Association)

NAESP (National Association of Elementary and Secondary Principals)

NASSP (National Association of Secondary School Principals)

NSELA (National Science Education Leadership Association)

SBM (Site-Based Management)

SDM (Shared-Decision Making)

STM (Science Teacher Mentors)

DDM (Data-Driven Management)

CLT (Campus Leadership Teams)

SES (Social Economic Status)

BSCS (Biological Sciences Curriculum Studies)

**CHAPTER 3**

ITMs (Instructional Team Members)

CMs (Cadre Members)

SPSS (Statistical Processing Software)

NCES (National Center for Education Statistics)

SASS (Schools and Staffing Survey)

IRB (Internal Review Board)

**CHAPTER 4**

DIDM (Data-informed decision making)

SIS (Student Information Systems)

**CHAPTER 5**

**Appendix D – TAKS scores per district / school**

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Adams-Farwell CISD | Amco Middle School | Gr 5-8 | 64% | 79% | 55% | 61% | 45% | 56% |
| Advanced Technologies ISD | Anteros Elementary | Gr K-6 | n/a | 44% | 33% | 62% | 77% | 82% |
| Advanced Technologies ISD | Ricker Elem | Gr K-6 | 97% | 99% | 98% | 99% | 97% | 100% |
| Advanced Technologies ISD | Rocket Lane Elem | Gr K-6 | 71% | 60% | 74% | 79% | 86% | 89% |
| Alsace CISD | Alsace Elem | Gr K-5 | 74% | 97% | 85% | 91% | 95% | 94% |
| Amalgamated ISD | Electrical Elem. | Gr K-5 | 74% | 77% | 58% | 67% | 74% | 89% |
| Amalgamated ISD | Western America Elem. | Gr K-5 | 84% | 56% | 61% | 81% | 76% | 79% |
| Amalgamated ISD | Beautiful Elem. | Gr K-5 | 85% | 82% | 80% | 84% | 85% | 96% |
| Ames-Voiturette ISD | Ames Elem | Gr K-8 | 85% | 85% | 81% | 83% | 95% | 63% |
| Amplex CISD | Waltham Elem. | Gr K-5 | 92% | 62% | 73% | 81% | 94% | 94% |
| Amplex ISD | Amplex Elem | Gr K-5 | 93% | 93% | 65% | 100% | 97% | 95% |
| Anahuac CISD | Ames Elem. | Gr K-12 | 100 % | 92% | 70% | 88% | 78% | 63% |
| Anchor Buggy ISD | Anchor Lane Elem. | Gr K-5 | 74% | 80% | 55% | 69% | 89% | 82% |
| Anderson CISD | Annie Oakley Elem | Gr K-5 | 80% | 83% | 77% | 81% | 87% | 97% |
| Anderson CISD | Apollo Elem | Gr K-5 | 56% | 45% | 56% | 55% | 47% | 70% |
| Ardsley ISD | Argonne Middle | Gr 5-8 | 75% | 71% | 57% | 96% | 95% | 92% |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exemption removed | 2006 Hurr. Katrina - Hurr.Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Argo Electric ISD | Argo Elem | Gr K-5 | 83% | 86% | 76% | 76% | 92% | 83% |
| Argo Hills ISD | Arrow Creek Intermediate School | Gr 5 only | 72% | 77% | 63% | 88% | 88% | 89% |
| Argonne ISD | Apple Elem. | Gr K-5 | 52% | 31% | 41% | 69% | 64% | 60% |
| Astra ISD | Balzer Elem. | Gr K-5 | 39% | 57% | 59% | 39% | 43% | 63% |
| Astra ISD | Dragon El. | Gr K-5 | 78% | 68% | 59% | 73% | 71% | 72% |
| Avanti ISD | Commuter Elem. | Gr K-5 | 88% | 78% | 76% | 100% | 100% | 94% |
| Avanti ISD | Formula 1 Street Elem. | Gr K-5 | 71% | 69% | 74% | 81% | 88% | 86% |
| Avanti ISD | Fisker Elem. | Gr K-5 | 63% | 78% | 34% | 65% | 66% | 88% |
| Avanti ISD | Idaho Springs Elem. | Gr K-5 | 69% | 84% | 73% | 90% | 85% | 100% |
| Avanti ISD | Mosler Elem. | Gr K-5 | 90% | 75% | 60% | 67% | 76% | 68% |
| Avanti ISD | Panzo Elem | Gr K-5 | 94% | 95% | 96% | 99% | 100% | 100% |
| Babcock Car ISD | Babcock Car Elem | Gr K-5 | 77% | 52% | 51% | 61% | 47% | 94% |
| Badsey ISD | Hayden Intermediate School | Gr 4-6 | 64% | 63% | 66% | 93% | 73% | 71% |
| Baker-Cervantes ISD | Cervantes Elem | Gr K-6 | 60% | 47% | 45% | 74% | 89% | 95% |
| Bendix ISD | East Bendix Elem | Gr K-5 | 89% | 75% | 75% | 89% | 77% | 97% |
| Benham County CISD | Berg Elem | Gr K-6 | 86% | 89% | 77% | 92% | 85% | 93% |
| Berrien Buggy ISD | Blast Elem | Gr K-5 | 74% | 66% | 51% | 76% | 84% | 78% |
| Berwick Electric County ISD | Biesel Elem | Gr K-5 | 66% | 49% | 35% | 62% | 47% | 54% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exemption removed | 2006 Hurr. Katrina - Hurr.Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Binney-Burnham ISD | Binghamton Central Elem | Gr K-5 | 74% | 88% | 81% | 81% | 89% | 88% |
| Binney-Burnham ISD | Birmingham South Elem | Gr K-5 | 54% | 43% | 55% | 55% | 69% | 57% |
| Binney-Burnham ISD | Burnham Elem | Gr K-5 | 64% | 78% | 71% | 85% | 70% | 78% |
| Binney-Burnham ISD | Binney Elem | Gr 3-5 | 82% | 73% | 67% | 70% | 59% | 85% |
| Black Crow ISD | Black Crow Elem | Gr K-5 | 84% | 86% | 74% | 100% | 91% | 99% |
| Britannia ISD | Excalibur School | Gr K-12 | 38% | 35% | 46% | 59% | 66% | 81% |
| Brush Country ISD | Deer Lane Middle School | Gr 4-5 | 83% | 71% | 52% | 75% | 79% | 73% |
| Callaway ISD | Buick Elem | Gr K-5 | 90% | 79% | 81% | 93% | 94% | 95% |
| Cartercar ISD | Chevrolet Intermediate | Gr 5-6 | 67% | 67% | 61% | 72% | 71% | 78% |
| Cartercar ISD | Elmore Intermediate | Gr 5-6 | 70% | 71% | 61% | 75% | 80% | 85% |
| Cartercar ISD | Hummingbird Intermediate | Gr 5-6 | n/a | 76% | 67% | 81% | 79% | 77% |
| Cartercar ISD | Hummer Intermediate | Gr 5-6 | 64% | 60% | 46% | 57% | 58% | 67% |
| Cartercar ISD | Pontiac Intermediate | Gr 5-6 | 52% | 53% | 55% | 62% | 65% | 73% |
| Case ISD | Case Elem | Gr K-12 | 63% | 87% | 87% | 67% | 60% | 81% |
| Castillo ISD | Vargas Elem | Gr K-5 | 52% | 49% | 61% | 60% | 67% | 76% |
| Castillo ISD | Ortega Elem | Gr K-6 | 84% | 65% | 59% | 82% | 86% | 81% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exemption removed | 2006 Hurr. Katrina - Hurr.Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Cavac ISD | Carter Case Elem | Gr K-5 | 88% | 86% | 87% | 96% | 91% | 90% |
| Cavac ISD | Cavac Elem | Gr K-5 | 71% | 79% | 89% | 92% | 92% | 91% |
| Cavac ISD | Carhartt Elem | Gr K-5 | n/a | n/a | 63% | 92% | 74% | 80% |
| Cavac ISD | Century Elem | Gr K-5 | n/a | 78% | 75% | 73% | 70% | 57% |
| Chalmers-Detroit ISD | Ellen Elem. | Gr K-5 | 75% | 64% | 78% | 89% | 81% | 82% |
| Chalmers-Detroit ISD | Chalmers Elem. | Gr K-5 | 58% | 75% | 38% | 87% | 76% | 80% |
| Chandler-Nation CISD | Chandler Scott Middle School | Gr 5-8 | 39% | 70% | 70% | 53% | 71% | 60% |
| Chrysler ISD | Argonaut Elem | Gr K-5 | 56% | 16% | 34% | 73% | 77% | 83% |
| Chrysler ISD | Ariel Elem | Gr K-5 | 50% | 33% | 44% | 59% | 53% | 89% |
| Chrysler ISD | Armstrong Elem | Gr K-5 | 57% | 53% | 20% | 61% | 53% | 89% |
| Chrysler ISD | Arrow Street Elem | Gr K-5 | 65% | 79% | 23% | 60% | 60% | 70% |
| Chrysler ISD | Asardo Elem | Gr K-5 | 98% | 91% | 12% | 70% | 92% | 85% |
| Chrysler ISD | Maxwell Elementary | Gr K-5 | 22% | 86% | 40% | 53% | 58% | 81% |
| Chrysler ISD | Ortega Middle School | Gr 6-8 | n/a | n/a | n/a | n/a | n/a | n/a |
| Chrysler ISD | DeSoto Elementary | Gr K-5 | 63% | 45% | 40% | 69% | 72% | 78% |
| Chrysler ISD | River Valley Elem | Gr K-5 | 67% | 52% | 36% | 67% | 47% | 73% |
| Chrysler ISD | Balzer Elem | Gr K-5 | 61% | 48% | 39% | 54% | 60% | 71% |
| Coats ISD | Coats Elem | Gr K-3 | 53% | 40% | 43% | 65% | 70% | 84% |
| Crow-Reyes ISD | Dile  Elem | Gr K-5 | n/a | n/a | n/a | n/a | n/a | 51% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Crow-Reyes ISD | Armandarez Elem | Gr K-5 | 67% | 55% | 46% | 64% | 69% | 82% |
| Crow-Reyes ISD | De Vaux Elem | Gr K-5 | n/a | n/a | 33% | 45% | 55% | 78% |
| Crow-Reyes ISD | Montega Elem | Gr K-5 | 66% | 48% | 61% | 73% | 76% | 83% |
| Crow-Reyes ISD | Elkhart Elem | Gr K-5 | 47% | 75% | 63% | 77% | 86% | 93% |
| Crow's Nest ISD | Crow Elem. | Gr K-5 | n/a | n/a | n/a | n/a | n/a | n/a |
| Detroit-Electric ISD | Ansted Elem. | Gr K-5 | 68% | no longer has 5th grade | - | - | - | - |
| DeWitt CISD | DeWitt Elem | Gr K-5 | 91% | 72% | 61% | 97% | 96% | 97% |
| Diamond T Country ISD | Detroiter Intermediate School | Gr 5-8 | 59% | 42% | 57% | 76% | 77% | 85% |
| Diaz-Gomez ISD | Gomez Elem | Gr K-6 | 70% | 38% | 42% | 40% | 75% | 58% |
| Dixie Flyer ISD | Dixie Intermediate School | Gr 6-8 | n/a | n/a | n/a | n/a | n/a | n/a |
| Doble ISD | Dolson Elem | Gr K-5 | 75% | 63% | 64% | 71% | 76% | 75% |
| Doble ISD | Dort Elem | Gr K-5 | 42% | 51% | 62% | 64% | 56% | 62% |
| Dodge ISD | Eagle Elem. | Gr K-5 | 97% | 94% | 91% | 85% | 96% | 96% |
| Dodge ISD | Jeep Elem. | Gr K-5 | 75% | 68% | 74% | 73% | 76% | 82% |
| Dodge ISD | Plymoth Elem. | Gr K-5 | 76% | 67% | 57% | 67% | 71% | 84% |
| Dodge ISD | Valiant Elem | Gr K-5 | 60% | 59% | 51% | 70% | 55% | 67% |
| Dodge ISD | Continential Elem. | Gr K-5 | 59% | 59% | 50% | 72% | 54% | 66% |
| Dodge ISD | America West Elem. | Gr K-5 | 75% | 55% | 55% | 89% | 70% | 63% |
| Dodge ISD | America East Elem. | Gr K-5 | 94% | 94% | 83% | 98% | 85% | 91% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Dorris ISD | Dodson Middle School | Gr 6-8 | n/a | n/a | n/a | n/a | n/a | n/a |
| Downing-Detroit ISD | Arnolt Elem. | Gr K-5 | n/a | 71% | 62% | 63% | 72% | 81% |
| Dragon ISD | Princess Diana Elem | Gr K-5 | 89% | 86% | 82% | 96% | 96% | 96% |
| Dragon ISD | Excalibur Charter Academy | Gr K-5 | 99% | 98% | 88% | 98% | 100% | 99% |
| Dragon ISD | Quinby Wood Elem | Gr 6-8 | n/a | n/a | n/a | n/a | n/a | n/a |
| Dragon ISD | Pratt Elem | Gr K-5 | 89% | 93% | 82% | 88% | 87% | 96% |
| Dragon ISD | Forest North Elem. | Gr K-5 | 88% | 89% | 87% | 93% | 96% | 95% |
| Dragon ISD | Jollyville Elem. | Gr K-5 | 80% | 84% | 84% | 91% | 90% | 85% |
| Dragon ISD | Queen Elem. | Gr K-5 | n/a | n/a | n/a | n/a | 96% | 93% |
| Dragon ISD | Pullman Elem | Gr K-5 | 97% | 95% | 95% | 98% | 99% | 95% |
| Dragon ISD | Pungs Finch Elem | Gr K-5 | 94% | 85% | 79% | 86% | 80% | 92% |
| Dragon ISD | Rambling Rose Elem | Gr K-5 | 94% | 87% | 85% | 87% | 84% | 87% |
| Dragon ISD | Rayfield Lane Elem | Gr K-5 | 92% | 90% | 82% | 94% | 93% | 98% |
| Dragon ISD | Rambler Path Elem | Gr K-5 | 85% | 75% | 70% | 81% | 74% | 80% |
| Dual-Ghia ISD | Drexel Intermediate | Gr K-5 | 89% | 72% | 65% | 78% | 82% | 83% |
| Dudly Bug ISD | Bug Elem | Gr K-6 | 64% | 52% | 56% | 70% | 82% | 88% |
| DuPont ISD | Earl Elem. | Gr K-5 | 86% | 88% | 88% | 94% | 92% | 97% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Durant ISD | Dymaxion Elem. | Gr K-6 | 74% | 75% | 66% | 75% | 87% | 81% |
| Earl County CISD | Carriage Intermediate | Gr K-5 | 70% | 75% | 41% | 70% | 83% | 84% |
| East Stewart Island CISD | Stewart Elem | Gr K-5 | n/a | 40% | 46% | 44% | 57% | 59% |
| Eisenhuth ISD | Morris Elem. | Gr K-5 | 68% | 73% | 76% | 64% | 93% | 91% |
| Emerson ISD | Elcar Elem. | Gr K-6 | 74% | 46% | 51% | 88% | 68% | 68% |
| Emerson ISD | Eastman Elem. | Gr K-5 | 71% | 50% | 64% | 63% | 51% | 78% |
| Empire Steamer ISD | Steamer Elem. | Gr K-6 | 99% | 97% | 91% | 86% | 79% | 76% |
| Engler River ISD | Eureka Elem. | Gr K-5 | 86% | 77% | 82% | 71% | 84% | 91% |
| Engler River ISD | Engler Elem. | Gr K-5 | 89% | 91% | 79% | 97% | 97% | 97% |
| Engler River ISD | River Elem. | Gr K-5 | 89% | 86% | 68% | 93% | 94% | 94% |
| Engler River ISD | Everitt Elem. | Gr K-5 | 89% | 87% | 74% | 87% | 91% | 94% |
| Erskine ISD | Eureka Intermediate | Gr 4-6 | n/a | 50% | 51% | 47% | 62% | 82% |
| Erskine ISD | Beaver Pond Elem. | K-3 | n/a | n/a | n/a | n/a | n/a | n/a |
| Escobar ISD | Guzman Elem | Gr K-6 | 71% | 65% | 65% | 84% | 61% | 64% |
| Escobar ISD | Galapagos Elem | Gr K-6 | 54% | 67% | 46% | 63% | 75% | 84% |
| Escobar ISD | St. Louis Elem | Gr K-6 | 62% | 60% | 64% | 86% | 69% | 75% |
| Escobar ISD | Selden Elem | Gr K-6 | 47% | 56% | 59% | 68% | 56% | 69% |
| Escobar ISD | Sears Elem | Gr K-6 | 57% | 50% | 40% | 59% | 62% | 74% |
| Escobar ISD | Simplex Elem | Gr K-6 | 50% | 43% | 44% | 80% | 69% | 84% |
| Escobar ISD | Royal Tourist Elem | Gr K-5 | 62% | 77% | 69% | 59% | 90% | 70% |
| Etnyre ISD | Etnyre Elem. | Gr K-5 | 60% | 64% | 61% | 63% | 52% | 66% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Excellent ISD | Eshelman Memorial Elem. | Gr K-5 | 63% | 68% | 60% | 69% | 79% | 69% |
| F.D. Roosevelt ISD | Elkland Elem | Gr K-6 | 74% | 96% | 78% | 84% | 88% | 92% |
| F.D. Roosevelt ISD | Roamer Elem | Gr K-6 | 71% | 65% | 58% | 97% | 70% | 89% |
| Falcon-Knight CISD | Falcon Middle School | Gr 4-5 | 81% | 78% | 74% | 70% | 86% | 78% |
| Firestone-Columbus ISD | Firestone Elem | Gr L-5 | 77% | 85% | 34% | 81% | 47% | 52% |
| Flint ISD | Blue Jay Road Elem | Gr K-5 | n/a | n/a | n/a | 75% | 85% | 86% |
| Flint ISD | Melendez Elem | Gr K-5 | 80% | 69% | 48% | 80% | 82% | 87% |
| Flint ISD | Guzman Elem | Gr K-5 | 77% | 54% | 60% | 73% | 88% | 81% |
| Ford ISD | Ace Elem. | Gr K-5 | 68% | 39% | 27% | 48% | 57% | 52% |
| Ford ISD | Acme Elem. | Gr K-5 | 76% | 44% | 33% | 62% | 52% | 54% |
| Ford ISD | Adria Elem. | Gr K-6 | 62% | 51% | 46% | 51% | 59% | 54% |
| Ford ISD | Aerocar Elem. | Gr K-5 | 71% | 62% | 37% | 46% | 56% | 54% |
| Ford ISD | Airway Elem. | Gr K-5 | 53% | 40% | 42% | 37% | 52% | 79% |
| Ford ISD | Ajax Elem. | Gr K-5 | 54% | 40% | 54% | 52% | 54% | 59% |
| Ford ISD | Albany Elem. | Gr K-5 | 65% | 49% | 41% | 47% | 59% | 58% |
| Ford ISD | Alco Elem. | Gr K-5 | 67% | 44% | 49% | 52% | 70% | 52% |
| Ford ISD | Mercury Elem. | Gr K-5 | 69% | 45% | 50% | 40% | 49% | 56% |
| Foster ISD | Soto Elem | Gr K-12 | 88% | 88% | 56% | 79% | 86% | 89% |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| Fostoria ISD | Fischer Middle School | Gr 3-6 | 46% | 18% | 40% | no longer has 5th grade | - | - |
| Fostoria ISD | Foster Elem | Gr K-6 | 55% | 14% | 80% | 53% | 100% | 65% |
| Fostoria ISD | Fostoria Elem | Gr K-6 | 75% | 65% | 56% | 71% | 84% | 93% |
| Franklin ISD | Franklin ISD | Gr K-12 | 72% | 57% | 76% | 86% | 74% | 68% |
| Frontenac ISD | Gadabout Elem | Gr K-5 | 87% | 86% | 79% | 77% | 85% | 84% |
| Frontenac ISD | Friendville Elem | Gr K-5 | 79% | 71% | 51% | 70% | 70% | 68% |
| Frontenac ISD | Graystone Elem | Gr K-5 | 77% | 74% | 60% | 79% | 78% | 77% |
| Frontenac ISD | Eagleton Elem | Gr K-5 | 81% | 63% | 62% | 70% | 62% | 77% |
| Frontenac ISD | Grant Road Elem | Gr K-5 | 76% | 75% | 74% | 85% | 90% | 83% |
| Gaeth_Gale ISD | Gaeth Elem | Gr K-5 | 64% | 82% | 71% | 81% | 100% | 92% |
| Gaylord ISD | Gaylord Elem | Gr K-5 | 78% | 77% | 61% | no longer has 5th Gr. | - | - |
| General Motors ISD | Apollo Elem. | Gr K-5 | 67% | 73% | 63% | 63% | 79% | 83% |
| General Motors ISD | Marquette Elem. | Gr K-5 | 66% | 58% | 70% | 58% | 74% | 79% |
| General Motors ISD | Apperson Elem. | Gr K-5 | 54% | 18% | 45% | 64% | 86% | 81% |
| General Motors ISD | ArBenz Elem. | Gr K-5 | 75% | 58% | 74% | 78% | 80% | 86% |
| General Motors ISD | Peachtree Drive Elem. | Gr K-5 | 49% | 37% | 38% | 46% | 52% | 72% |
| General Motors ISD | Ariel Elem. | Gr K-5 | 85% | 76% | 75% | 84% | 86% | 85% |
| Glasspar CISD | Delgado Elem | Gr K-5 | n/a | n/a | n/a | 95% | 95% | 94% |

| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
|---|---|---|---|---|---|---|---|---|
| GMC ISD | Ewing Elementary | Gr K-5 | 59% | 44% | 20% | 57% | 73% | 47% |
| Guerrero ISD | Florez-Pena Elem | Gr K-5 | 46% | 31% | 35% | 58% | 57% | 57% |
| Hamilton-Burr ISD | Reyes-Ramos Elem | Gr K-5 | n/a | n/a | 57% | 64% | 63% | 69% |
| Harvard ISD | Harvard View Charter Elem | Gr 5 only | 80% | 66% | 65% | 78% | 79% | 79% |
| Hatfield ISD | McCoy Elem | Gr K-5 | 91% | 75% | 75% | 100% | 88% | 100% |
| Havers ISD | Havers Stream Middle School | Gr 5-8 | 90% | 83% | 72% | 90% | 90% | 93% |
| Haynes-Apperson ISD | Harrison Elem. | Gr K-5 | 35% | 40% | 50% | 63% | 76% | 81% |
| Holy Family Charter | Holy Family Charter | Gr K-5 | 68% | 67% | 46% | 87% | 95% | 91% |
| Imperial ISD | Lincoln Elem. | Gr K-5 | 76% | 57% | 43% | 71% | 71% | 68% |
| Isenhuoth CISD | Eldredge Elem. | Gr 5-6 | 35% | 51% | 56% | 64% | 65% | 68% |
| Island Cove ISD | Moline Elem | Gr K-8 | n/a | n/a | 47% | 72% | 78% | 100% |
| Island Cove ISD | Murray Middle School | Gr K-5 | 45% | 39% | 30% | 51% | 68% | 85% |
| Island Cove ISD | Knight-Mo Elem | Gr K-5 | 71% | 77% | 65% | 70% | 83% | 73% |
| Jersey City ISD | Shoreline Elem | Gr K-5 | 80% | 75% | 91% | 82% | 79% | 100% |
| Jordan-Chavez CISD | Jordan River Elem | Gr K-6 | 82% | 77% | 68% | 71% | 73% | 85% |
| Jordan-Chavez CISD | Chavez Elem | Gr K-6 | 76% | 67% | 48% | 62% | 70% | 69% |
| Kauffman Military Academy | Kauffman Military Academy | Gr K-12 | 62% | 72% | 50% | 73% | 94% | 69% |
| King-Remick ISD | Remick Lane Elem | Gr K-5 | 75% | 58% | 62% | 76% | 82% | 77% |

| **Districts** | **Campus** | **Grade** | **2003** | **2004** | **2005 - Special Ed. exempt. removed** | **2006 Hurr. Katrina - Hurr. Rita (tested)** | **2007** | **2008 - Hurr. Ike** |
|---|---|---|---|---|---|---|---|---|
| **Kingston ISD** | **Allan Elem** | **Gr K-5** | **66%** | **79%** | **69%** | **91%** | **90%** | **94%** |
| **LaFayette ISD** | **Laurel Tree Elem** | **Gr K-8** | **71%** | **45%** | **29%** | **69%** | **83%** | **93%** |
| **Laraki County ISD** | **Nasr Road Elem** | **Gr 4-5** | **64%** | **67%** | **79%** | **75%** | **74%** | **83%** |
| **Lenawee ISD** | **Lenawee Elem** | **Gr K-5** | **81%** | **63%** | **62%** | **70%** | **62%** | **77%** |
| **Lexington ISD** | **Lambert Elem** | **Gr K-5** | **86%** | **80%** | **73%** | **97%** | **87%** | **84%** |
| **Lexington ISD** | **Light Trail Elem** | **Gr K-5** | **57%** | **63%** | **63%** | **57%** | **82%** | **91%** |
| **Lexington ISD** | **Dingfelder Elem** | **Gr K-5** | **68%** | **53%** | **35%** | **56%** | **59%** | **74%** |
| **Lincoln-Ford ISD** | **Edsel Elementary** | **Gr K-5** | **82%** | **61%** | **77%** | **86%** | **82%** | **90%** |
| **Little Fox ISD** | **Little Fox Elem** | **Gr K-5** | **65%** | **54%** | **57%** | **55%** | **63%** | **68%** |
| **Lone Star ISD** | **Lone Star Elem** | **Gr K-5** | **89%** | **79%** | **87%** | **83%** | **82%** | **87%** |
| **Margareta Valley ISD** | **Aleo Vera Int. School** | **Gr 5-8** | **81%** | **76%** | **82%** | **91%** | **80%** | **69%** |
| **Marion ISD** | **Marion Intermediate School** | **Gr 4-5** | **86%** | **78%** | **83%** | **67%** | **88%** | **89%** |
| **Marion-Handley ISD** | **Marion Hill Elem** | **Gr K-5** | **73%** | **74%** | **56%** | **74%** | **80%** | **73%** |
| **Maya ISD** | **Arianna Cruz Elem** | **Gr K-5** | **54%** | **46%** | **43%** | **67%** | **76%** | **76%** |
| **Maya ISD** | **Bluebell Lake Elem** | **Gr K-5** | **52%** | **45%** | **46%** | **33%** | **44%** | **50%** |
| **Mercer Bluff ISD** | **Metz Intermediate School** | **Gr 4-5** | **78%** | **64%** | **66%** | **81%** | **83%** | **69%** |
| **Michigan ISD** | **McIntyre Elem** | **Gr K-6** | **70%** | **75%** | **71%** | **82%** | **70%** | **78%** |
| **Michigan ISD** | **Rios Valdez Elem** | **Gr K-6** | **75%** | **75%** | **58%** | **65%** | **70%** | **82%** |
| **Michigan ISD** | **Paul Mercer** | **Gr K-5** | **71%** | **61%** | **53%** | **60%** | **56%** | **58%** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Elem | | | | | | | |
| Michigan ISD | Meccai Elem | Gr K-5 | 100 | 95% | 80% | 92% | 86% | 89% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Michigan ISD | Menominee Elem | Gr K-5 | 71% | 54% | 59% | 77% | 76% | 73% |
| Michigan ISD | Michigan Elem | Gr K-5 | 87% | 86% | 79% | 77% | 85% | 84% |
| Miller Pond ISD | Pond Drive Elem | Gr 5-6 | 53% | 60% | 60% | 65% | 66% | closed |
| Mitchell ISD | Munson Elem | unknown | n/a | n/a | n/a | n/a | n/a | n/a |
| Mitchell ISD | Monroe Elem | Gr K-5 | n/a | 58% | 50% | 88% | 71% | 85% |
| Mitchell ISD | V M Adams Elem. | Gr K-5 | n/a | 52% | 62% | 65% | 62% | 67% |
| Model ISD | Mohs Intermediate School | Gr 5-8 | 81% | 74% | 73% | 95% | 83% | 77% |
| Nash-Healey ISD | Nash Intermediate | Gr 5-8 | 87% | 89% | 89% | 74% | 82% | 87% |
| Nelson Rockefeller ISD | Rockefeller Elem | Gr K-5 | 81% | 77% | 56% | 79% | 83% | 76% |
| Niagara Falls ISD | Lone Star Trail Elem | Gr K-5 | 49% | 47% | 31% | 54% | 50% | 56% |
| Niagara Falls ISD | Cattle Trail Elem | Gr K-5 | n/a | 64% | 48% | 49% | 54% | 64% |
| Niagara Falls ISD | Northway Trail Elem | Gr K-5 | 85% | 56% | 77% | 85% | 95% | 91% |
| Niagara Falls ISD | Nielson Park Elem | Gr K-5 | 52% | 30% | 49% | 55% | 61% | 67% |
| Niagara Falls ISD | National Trail Elem | Gr K-5 | 86% | 97% | 85% | 49% | 59% | 49% |
| Niagara Falls ISD | Northern Trail Elem | Gr K-5 | 70% | 55% | 39% | 53% | 52% | 67% |
| Niagara Falls | Longhorn Trail | Gr K-5 | 86% | 77% | 70% | 88% | 82% | 84% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ISD | Elem | | | | | | | |
| Niagara Falls ISD | Orlo River Elem | Gr K-5 | 62% | 43% | 51% | 69% | 68% | 67% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Niagara Falls ISD | Noma Elem | Gr K-5 | 76% | 67% | 48% | 62% | 70% | 69% |
| Niagara Falls ISD | Macaw Elem | Gr K-5 | 62% | 45% | 25% | 64% | 63% | 37% |
| Niagara Falls ISD | Murray Trail Elem | Gr K-5 | 63% | 44% | 46% | 40% | 59% | 72% |
| Niagara Falls ISD | Mercedes Elem | Gr K-5 | 66% | 54% | 30% | 43% | 59% | 72% |
| Niagara Falls ISD | Murray Road South Elem | Gr K-5 | 73% | 74% | 63% | 69% | 71% | 70% |
| Niagara Falls ISD | Owen's Pond Elem | Gr K-5 | 66% | 49% | 51% | 76% | 55% | 48% |
| Niagara Falls ISD | New Parry Lake Elem | Gr K-5 | 44% | 51% | 38% | 52% | 41% | 65% |
| Niagara Falls ISD | East Nyber River Elem | Gr K-5 | 84% | 48% | 27% | 61% | 57% | 46% |
| Niagara Falls ISD | Overland Trail Elem | Gr K-5 | 69% | 59% | 64% | 69% | 64% | 78% |
| Oak Leaf Wilt ISD | Wilt Middle School | Gr 5-6 | 79% | 83% | 73% | 86% | 83% | 78% |
| Oka ISD | Oka Middle School | Gr 5-8 | 61% | 80% | 74% | 86% | 90% | 82% |
| Old Towne ISD | Tincher Pond Elem | Gr K-6 | 87% | 81% | 72% | 79% | 87% | 88% |
| Oldsmobile ISD | Viking Intermediate | Gr 5-6 | n/a | n/a | n/a | n/a | n/a | n/a |
| Olympian ISD | Orient Intermediate School | Gr 4-5 | 79% | 73% | 58% | 76% | 81% | 81% |
| Overland Trails | Overland Elem | Gr K-4 | n/a | n/a | n/a | n/a | n/a | n/a |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ISD | | | | | | | | |
| Paige ISD | South Pack River Elem | Gr K-5 | 71% | 56% | 56% | 63% | 57% | 65% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Paige-Detroit ISD | McClearney Elem | Gr K-5 | 90% | 86% | 76% | 82% | 89% | 80% |
| Premier ISD | Gen. Powell Elem | Gr K-5 | 80% | 85% | 69% | 86% | 80% | 67% |
| Ramses ISD | Ivory Coast Elementary | Gr K-5 | 57% | 41% | 44% | 33% | 74% | 52% |
| Rauch Lang ISD | Rauch Elem | Gr K-5 | n/a | 67% | 71% | 66% | 80% | 87% |
| Reliable Dayton ISD | Dayton Intermediate School | Gr 5-6 | 73% | 64% | 57% | 75% | 70% | 73% |
| Reo Republic ISD | Daniel Boone Elem | Gr K-6 | 92% | 91% | 83% | 85% | 95% | 90% |
| Reo Republic ISD | ReVere Elem | Gr K-6 | n/a | n/a | 69% | 83% | 89% | 93% |
| Reo Republic ISD | Texas Republic Elem | Gr K-6 | 84% | 80% | 85% | 90% | 88% | 89% |
| Reo Republic ISD | Reliable Elem | Gr K-6 | 45% | 60% | 61% | 61% | 72% | 76% |
| Rickenbacher ISD | J. K. Ross Elem | Gr K-7 | 64% | 68% | 55% | 76% | 73% | 73% |
| Rio Cruz ISD | Ramirez Elem | Gr K-5 | 60% | 47% | 49% | 58% | 79% | 77% |
| Rio Cruz ISD | Seagull Elem | Gr K-5 | 73% | 62% | 53% | 68% | 53% | 77% |
| Rio Grande Valley ISD | Lime Grove Elem | Gr K-5 | 58% | 49% | 64% | 88% | 73% | 81% |
| Rio Grande Valley ISD | Greenleaf Elem | Gr K-5 | 86% | 76% | 60% | 89% | 81% | 89% |
| Rio Grande Valley ISD | Lemontree Elem | Gr K-5 | 55% | 65% | 69% | 81% | 89% | 85% |
| Rio Grande | Grapefruit Elem | Gr K-5 | 72% | 67% | 50% | 74% | 75% | 86% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Valley ISD | | | | | | | | |
| Rio Grande Valley ISD | Griswold Elem | Gr K-5 | 70% | 64% | 37% | 69% | 90% | 92% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Rios Riotte ISD | Norma Florez Elem | Gr K-5 | 49% | 38% | 17% | 50% | 39% | 77% |
| Rivera ISD | Morales Intermediate School | Gr 4-6 | 61% | 54% | 44% | 73% | 73% | 70% |
| Roamer ISD | Richmond Elem | Gr 3-5 | 77% | 57% | 71% | 80% | 79% | 90% |
| Rockne ISD | Rockne Int. School | Gr 4-6 | 88% | 84% | 65% | 78% | 88% | 88% |
| Rockwell ISD | White Deer Elem | Gr K-5 | 75% | 61% | 77% | 88% | 87% | 90% |
| Rollin-Ross CISD | Rose Petal Elem | Gr K-5 | 84% | 80% | 85% | 90% | 88% | 89% |
| Rutenber ISD | Ruxton Elem | Gr K-5 | 85% | 73% | 73% | 70% | 81% | 89% |
| Saint George ISD | Expedition Elem | Gr K-5 | 61% | 64% | 50% | 56% | 73% | 67% |
| Sanchez Grande ISD | Moreno Elem | Gr 4-6 | 65% | 69% | 36% | 34% | 49% | 68% |
| Santa Cruz ISD | Altham Elem | Gr K-5 | n/a | n/a | n/a | 79% | 77% | 90% |
| Santa Cruz ISD | J. C. Hernandez Elem | Gr K-5 | n/a | n/a | 34% | 50% | 44% | 60% |
| Santa Cruz ISD | Steamer Elem | Gr K-5 | 81% | 68% | 50% | 71% | 78% | 85% |
| Santa Cruz ISD | Atlas Drive Elem | Gr K-5 | 73% | 64% | 60% | 61% | 73% | 68% |
| Santa Cruz ISD | Bantam Elem | Gr K-5 | 77% | 64% | 51% | 64% | 84% | 94% |
| Santa Cruz ISD | Tomanek Elem | Gr K-5 | n/a | n/a | n/a | 77% | 75% | 78% |
| Santa Cruz ISD | Fernandez Elem | Gr K-5 | 65% | 66% | 58% | 87% | 67% | 80% |
| Santa Cruz ISD | Moreno-Medina Elem | Gr K-5 | n/a | 47% | 62% | 45% | 61% | 66% |
| Santa Cruz ISD | Rodriguez Elem | Gr K-5 | n/a | 77% | 65% | 76% | 73% | 87% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Santa Cruz ISD | Propulsion Elem | Gr K-5 | 64% | 56% | 49% | 54% | 81% | 65% |
| Santa Cruz ISD | Elijah-Savannah Elem | Gr K-5 | 39% | 31% | 47% | 82% | 69% | 84% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Santa Cruz ISD | Barley Elem | Gr K-5 | 53% | 50% | 53% | 61% | 73% | 72% |
| Santa Cruz ISD | M. E. Alvarez Elem | Gr K-5 | 62% | 55% | 61% | 72% | 77% | 71% |
| Santa Cruz ISD | CoCo Chanel Elem | Gr K-5 | 70% | 48% | 38% | 57% | 52% | 78% |
| Santa Cruz ISD | Asardos Elem | Gr K-5 | n/a | n/a | 23% | 53% | 46% | 83% |
| Santa Cruz ISD | Jimenez Elem | Gr K-5 | 60% | 49% | 56% | 64% | 52% | 59% |
| Santa Cruz ISD | Jórge Pena Elem | Gr K-5 | 65% | 74% | 58% | 62% | 67% | 66% |
| Santa Cruz ISD | Brooktrout Elem | Gr K-5 | 77% | 74% | 68% | 86% | 98% | 96% |
| Santa Cruz ISD | Aurora Drive Elem | Gr K-5 | 77% | 66% | 41% | 40% | 86% | 86% |
| Santa Cruz ISD | Red Bug MS | Gr 6-8 | n/a | n/a | n/a | n/a | n/a | n/a |
| Santa y Rios ISD | Reliance Elem | Gr K-5 | 64% | 60% | 54% | 56% | 53% | 74% |
| Santiago CISD | Ortiz Elem | Gr K-5 | 96% | 96% | 88% | 95% | 94% | 99% |
| Saxon ISD | Wall Elem | Gr K-5 | 52% | 49% | 61% | 60% | 67% | 76% |
| Scripps Booth ISD | Sheridan Elem | Gr 5-8 | 91% | 87% | 69% | 83% | 85% | 85% |
| Skene ISD | Skene ISD | Gr K-6 | 68% | 63% | 50% | 81% | 84% | 94% |
| Smith Flyer ISD | Smith Intermediate | Gr 5-6 | 64% | 64% | 68% | 75% | 76% | 69% |
| Sommer ISD | Sommer Intermediate School | Gr 4-5 | 49% | 54% | 12% | 57% | 65% | 77% |
| South Delgado ISD | Del Castillo Elem | Gr K-5 | 88% | 88% | 79% | 89% | 91% | 89% |
| South Speedwell ISD | Speedwell Elem | Gr K-5 | 85% | 76% | 64% | 75% | 82% | 74% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| South Speedwell ISD | South Oak Elem | Gr K-5 | 72% | 59% | 65% | 74% | 83% | 67% |
| S. Speedwell ISD | Callaway Elem | Gr K-5 | 59% | 65% | 61% | 71% | 70% | 80% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| South Speedwell ISD | Oka Spring Elem | Gr K-5 | 99% | 54% | 81% | 83% | 73% | 94% |
| Southern Star Religious Academy | Southern Star Academy | unknown | n/a | n/a | n/a | n/a | n/a | n/a |
| Standards CISD | Standard Elem | Gr 3-5 | 75% | 74% | 57% | 78% | 64% | 79% |
| Stanwood ISD | Stanley Steamer Intermediate School | Gr 3-5 | n/a | 73% | 82% | 87% | 90% | 86% |
| Staver ISD | O. L. Stanley Elem | Gr K-6 | 100 % | 67% | 62% | 62% | 56% | 70% |
| Stearns-Knight ISD | Steammobile Elem | Gr K-5 | 47% | 41% | 37% | 54% | 61% | 78% |
| Stephens-Duryea ISD | Stephens Elem | Gr K-5 | 64% | 71% | 71% | 93% | 91% | 87% |
| Stephens-Duryea ISD | Duryea Elem | Gr K-5 | n/a | n/a | 40% | 69% | 61% | 77% |
| Stephens-Duryea ISD | Stoddard Road Elem | Gr K-5 | 83% | 68% | 72% | 76% | 85% | 83% |
| Stoddard-Dayton ISD | Stoddard Elem | Gr K-5 | 47% | 44% | 44% | 55% | 50% | 53% |
| Stout-Scarab ISD | Scarab Elem | Gr 4-5 | 66% | 56% | 53% | 57% | 64% | 79% |
| Studebaker ISD | Stutz Elem | Gr K-5 | 71% | 83% | 96% | 88% | 98% | 94% |
| Studebaker ISD | Sultan Elem | Gr K-5 | 59% | 58% | 77% | 69% | 74% | 77% |
| Sutton-Essex ISD | Endurance Elem. | Gr K-6 | 73% | 68% | 92% | 76% | 95% | 100% |
| Tesla ISD | Vector Elem. | Gr K-5 | 98% | 96% | 79% | 92% | 86% | 88% |
| Texas University Charter | Texas University Charter | Gr K-5 | n/a | n/a | n/a | n/a | n/a | 85% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Academy | Academy | | | | | | | |
| Thomas Templar ISD | Garford Elem | Gr K-5 | 69% | 64% | 56% | 65% | 73% | 83% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exempt. removed | 2006 Hurr. Katrina - Hurr. Rita (tested) | 2007 | 2008 - Hurr. Ike |
| Tincher ISD | Totem Elem | Gr K-6 | 72% | 51% | 57% | 77% | 88% | 78% |
| Tincher ISD | Indian Paintbrush Elem | Gr K-6 | 58% | 66% | 65% | 83% | 62% | 82% |
| Tri-Car ISD | Steamer Intermediate | Gr 5-6 | 66% | 51% | 44% | 60% | 60% | 66% |
| Trihawk ISD | Tucker Road Elem | Gr K-5 | 97% | 95% | 84% | 98% | 96% | 100% |
| Trihawk ISD | Twombly Plains Elem | Gr K-5 | 96% | 96% | 89% | 95% | 99% | 94% |
| Union Creek CISD | Union Creek Intermediate | Gr 4-6 | 77% | 70% | 73% | 69% | 81% | 74% |
| Universe ISD | Saturn Elem. | Gr 5-6 | 64% | 50% | 47% | 63% | 60% | 70% |
| Van Wagonner ISD | Velie Elem | Gr K-5 | 66% | 48% | 30% | 53% | 83% | 63% |
| Van Wagonner ISD | Virginian Elem | Gr K-5 | n/a | n/a | 64% | 64% | 77% | 74% |
| Van Wagonner ISD | Vulcan Elem | Gr K-5 | n/a | 51% | 26% | 69% | 54% | 57% |
| Wagenhals ISD | Steam Ridge Elem | Gr K-5 | 49% | 13% | 12% | 44% | 69% | 36% |
| Wagenhals ISD | Z. B. Warren Elem | Gr K-5 | 42% | 60% | 14% | 37% | 62% | 32% |
| Wagenhals ISD | Sioux South Elem | Gr K-5 | 47% | 53% | 49% | 43% | 55% | 46% |
| Wagenhals ISD | Willys Lake Elem | Gr K-5 | 51% | 79% | 49% | 49% | 55% | 56% |
| Washington CISD | Belize Elementary | Gr K-5 | 63% | 53% | 50% | 71% | 52% | 55% |
| Water ISD | Oceanic Middle | Gr 5-8 | 81% | 72% | 73% | 96% | 78% | 91% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | School | | | | | | | |
| Waverly Electric ISD | Wayne Elem | Gr K-5 | 67% | 48% | 29% | 74% | 66% | 58% |
| Waverly Electric ISD | Electric Elem | Gr K-5 | 88% | 79% | 81% | 82% | 75% | 80% |
| Welch ISD | Grape Elem. | Gr K-5 | 81% | 77% | 70% | 74% | 85% | 76% |
| Welch-Detroit ISD | Gulf Flyer Elem | Gr K-5 | 57% | 60% | 70% | 81% | 51% | 72% |
| Welch-Detroit ISD | Hackett Hall Elem | Gr K-5 | 92% | 89% | 93% | 76% | 78% | 74% |
| Welch-Detroit ISD | Greene Elem | Gr K-5 | 72% | 59% | 65% | 74% | 83% | 67% |
| Welch-Detroit ISD | Southern Elem | Gr K-5 | 70% | 64% | 37% | 69% | 90% | 92% |
| Districts | Campus | Grade | 2003 | 2004 | 2005 - Special Ed. exemption removed | 2006 Hurr. Katrina - Hurr.Rita (tested) | 2007 | 2008 - Hurr. Ike |
| West Terra ISD | Wolverine Elem | Gr K-5 | 80% | 79% | 68% | 96% | 88% | 96% |
| West Terra ISD | Terra Elem | Gr K-5 | 77% | 63% | 68% | 86% | 87% | 89% |
| West Terra ISD | Success Academy Elem | Gr K-5 | 88% | 95% | 82% | 94% | 97% | 98% |
| West Terra ISD | South Stutz Road Elem | Gr K-5 | 60% | 60% | 42% | 71% | 72% | 82% |
| West Terra ISD | Studebaker Elem | Gr K-5 | 58% | 81% | 73% | 86% | 95% | 97% |
| Wills Sainte Claire CISD | Sainte Claire Middle School | Gr 4- 5 | n/a | n/a | n/a | 74% | 77% | 78% |
| Wilson ISD | Zipperman Elem. | Gr 4-5 | n/a | n/a | 45% | 73% | 78% | 69% |
| Winston ISD | Zip Elem. | Gr K-6 | 56% | 74% | 63% | 75% | 63% | 77% |
| Winston ISD | Windsor Elem. | Gr K-5 | 51% | 49% | 41% | 48% | 44% | 57% |
| Winston ISD | Woodill Elem. | Gr K-5 | 75% | 80% | 63% | 89% | 84% | 93% |
| Woods-Zimmerman ISD | Zoe Brown Elem. | Gr K-5 | 95% | 94% | 86% | 84% | 90% | 95% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Xavier-Diego CISD** | **Xavier Middle School** | **Gr K-6** | **80%** | **73%** | **68%** | **84%** | **83%** | **94%** |
| **Xenia ISD** | **Xenia Elem** | **Gr K-5** | **92%** | **85%** | **87%** | **93%** | **94%** | **93%** |
| **Zent ISD** | **Zena Elem.** | **Gr K-6** | **71%** | **69%** | **64%** | **76%** | **80%** | **69%** |

**Appendix E**
**U.S. Dept. of Education NCES Letter**

U.S. DEPARTMENT OF EDUCATION
INSTITUTE OF EDUCATION SCIENCES

NATIONAL CENTER FOR EDUCATION STATISTICS

July 13, 2007

Ms. Linda L. G. Brown
8805 Coastal Drive
Austin, TX 78749-4922

Re: Use and modification of the 2003-04
Schools and Staffing Survey questionnaires

Dear Ms. Brown,

Please feel free to use portions of any of the questionnaires that are part of the 2003-04 Schools and Staffing Survey 2003-04. You are also free to modify any of the items you chose to use. These questionnaires were developed by the Department of Education and are not copyrighted in any way.

Good luck with your research.

Sincerely,

Kathryn A. Chandler, Director
Sample Survey Studies Program
Elementary, Secondary and Library Studies Division
National Center for Education Statistics
Institute of Education Sciences
U.S. Department of Education
1990 K Street, NW, Room 9017
Washington, DC 20006
(202) 502-7486
Kathryn.Chandler@ed.gov

WASHINGTON, D.C. 20006-

**Appendix F**
**IRB approval**

OFFICE OF RESEARCH SUPPORT & COMPLIANCE

THE UNIVERSITY OF TEXAS AT AUSTIN

*P.O. Box 7426, Austin, Texas 78713 (512) 471-8871 - FAX (512 471-8873)*
*North Office Building A, Suite 5.200 (Mail code A3200)*

FWA# 2030

Date: **09/11/07**

PI(s): **Linda L Brown** Department & Mail Code: **VAUGHN GROSS CENTER** **D4900**

Dear: **Linda L Brown**

IRB APPROVAL – IRB Protocol # **2007-03-0006**

Title: **Decision-Making in Texas Elementary Schools**

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board has reviewed the exempt status assessment of the above referenced protocol and found that it meets exempt approval under the category designated below for the following period: **09/11/2007 - 09/09/2008**

Any research involving surveys, interviews, or observation of children is not eligible for exempt review, unless it consists only of observational research where the investigator(s) do not participate in the activities being observed. Research that is FDA regulated cannot be granted an exemption except for category 6. (Research is FDA-regulated when it involves the use of a drug or medical device, other than the use of an approved drug or medical device in the course of medical practice, or when the results are to be submitted to or held for inspection by the FDA.) Unless otherwise required by Department or Agency heads, exempt research must fall within one of the following categories:

___1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as:

(i) research on regular and special education instructional strategies, or
(ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
(iii). The research is not FDA-regulated

___2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:

(i.) Information obtained is recorded in such a manner that human subjects can be identified, directly or through

identifiers linked to the subjects: and
(ii.) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subject's financial standing, employability, or reputation; or
(iii.) The research involves surveys, interviews, or observation of children (where the investigator does not participate in the activities being observed);
(iv.) The research is not FDA-regulated

_x_3. Research involving the use of educational tests, survey or interview procedures, or observing public behavior that is not exempt under number 2 above, if the subjects are public officials or candidates for public office or a federal statute requires that the confidentiality of personally identifiable information will be maintained throughout the research and thereafter. The research is not FDA-regulated

___4. Research involving the collection or study of existing data, documents, records, pathological or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, either directly or through identifiers linked to the subjects. To qualify for exemption, the data, documents, records or specimens must be in existence before the project begins. The research is not FDA-regulated

___5. Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate; or otherwise examine:

i. Public benefit or service programs;
ii. Procedures for obtaining benefits or services under those programs;
iii. Possible changes in-or alternatives to those programs or procedures; or
iv. Possible changes in methods or levels of payment for benefits or services under those programs.
v. The program under study must deliver a public benefit (e.g., financial or medical benefits as provided under the Social Security Act or service (e.g., social, supportive, or nutrition services as provided under the Older Americans Act).
vi. The research or demonstration project must be conducted pursuant to specific federal statutory authority;
vii. There must be no statutory requirement that an IRB review the project;
viii. The project must not involve significant physical invasions or intrusions upon the privacy of participants;
ix. The funding agency must authorize or concur with this exemption.
x. The research is not FDA-regulated

___6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

---

_x_ Please use the attached approved consent forms

____Waiver of Documentation of Consent

____Waiver of Informed Consent

**RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:**

(1) Report immediately to the IRB any unanticipated problems.
(2) Proposed changes in approved research during the period for which IRB approval cannot be initiated without IRB review and approval, except when necessary to eliminate apparent immediate hazards to participant. Changes in approved research initiated without IRB review and approval to eliminate apparent immediate hazards to the participant must be promptly reported to the IRB, and reviewed under the unanticipated problems policy to determine whether the change was consistent with ensuring the participants continued welfare.
(3) Report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part.
(4) Insure that only persons formally approved by the DRC enroll subjects.
(5) If relevant to your study, please use only a currently approved consent form (remember approval periods are for 12 months or less).
(6) Protect the privacy and confidentiality of all persons and personally identifiable data, and train your staff and collaborators on policies and procedures for ensuring the privacy and confidentiality of participants and information.
(7) Submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change.
(8) Please note that this office will send out a reminder prior to the end of your approval period (typically at the end of the 12 months). At this time we will ask you to give us an update on whether the study is still in progress and/or has had any changes that need to be reviewed for approval.
(9) Notify the IRB and the DRC when the study has been completed and complete the Final Report Form.
(10) Please help us help you by including the above protocol number on all future correspondence relating to this protocol.

Thank you for your help in this matter.

Sincerely,

Jody L. Jensen

Jody L. Jensen, Ph.D., IRB Chair
Department of Kinesiology & Health Education
University of Texas Austin
Phone: 512-232-2685
Fax: 512-471-8914
E-Mail: JLJ@mail.utexas.edu

## References


American Association for the Advancement of Science (AAAS). 1993. *Benchmarks for Science Literacy: Project 2061*: Oxford University Press. www.aaas.org/

Atkin, J. M., and Black, P. 2003. *Inside science education reform: A history of curricular and policy change*. New York City, NY: Teachers College Press, Columbia University.

Austin Independent School District, News Release *"Austin ISD Will Proceed with Proposal to 'Repurpose' Johnston Campus."* June 3, 2008.

Azzam, A. M., Perkins-Gough, D., and Thiers, N. 2006. "The impact of NCLB." *Educational Leadership* 64(3): 94-96.

Ballantine, J. 1993.*The Sociology of Education: a Systematic Analysis*. New York, NY: Prentice Hall College Div. Pgs. 37, 88-99, 122, 227, 384-385.

Barth, R. 1991. I*mproving schools from within.* San Francisco, CA: Jossey-Bass.

Barufaldi, J. 2008. *Professional Development in Science Education: How do we know if it Works?* The Twelfth Consultation of the International Consortium for Research in Science and Mathematics Education, Universidad Tecnological Equinoccial, Quito, Ecuador, May 15, 2008.

Barufaldi, J. and Brown, L.L.G. (in press). A System's Perspective for Professional Development in Science and Mathematics Education: The Texas Regional Collaboratives. In R. Ravid and J. Slater, Eds. *Collaboration in Education*. Routledge Inc.

Barufaldi, J. P. and J. Reinhartz. 2001. "The dynamics of collaboration in a statewide professional development program for science teachers." *Models of science teacher preparation - Theory into practice*. D. R. Lavoie and W. Roth. Dordrecht, The Netherlands, Kluwer Academic Publishers: 89-104.

Becker, B. and M. Kennedy. 2006. "Teacher qualifications and the Quality of Teaching." Database http://www.msu.edu/user/mkennedy/TQQT/

Berliner, D. and Biddle, B. 1995. *The Manufactured Crisis: Myths, fraud, and the attack on America's public schools*. Massachusetts: Perseus Books.

Bernhardt, V. 2003. *Using data to improve student learning in elementary schools*. Larchmont, NY: Eye on Education.

Bessen, J. 2002. The skills of the unskilled in the American Industrial Revolution. Research on Innovation, Feb. 2002. Accessed online January 2009 at http://www.researchoninnovation.org/skills.pdf. pg. 2.

Besvinick, S. L. (1988). "Twenty years later: Reviving the reforms of the '60s." *Educational Leadership, 46*(1): 52.

Biological Sciences Curriculum Study (BSCS). 1989. *New Designs for Elementary School Science and Health*. Boulder, Colorado: BSCS.

Black, P., and Wiliam, D. 2006. “Inside the Black Box: Raising standards through classroom,” *Phi Delta Kappan, 80*.

Booher-Jennings, J. 2005. “Below the Bubble: ‘Educational Triage’ and the Texas Accountability System.” *American Education Research Journal* 42: Pg. 231-268.

Borman, G. D., Hewes, G. M., Overman, L. T., and Brown, S. 2002. *Comprehensive school reform and student achievement: A meta-analysis* (Federal Report No. 59): Office of Educational Research and Improvement).

Bordeaux, A. V. 2001. *Science education reform for the 21st century: Analyzing policy imperatives for effective teaching through recruitment, renewal, and retention*. Unpublished Dissertation, George Mason University: 1-258.

Borko, H. 2004. “Professional development and teacher learning: Mapping the terrain.” *Educational Researcher*, *33*(8), pg. 3-15.

Borman, G. D., G. M. Hewes, et al. 2002. *Comprehensive school reform and student achievement: A meta-analysis.* Center for Research on the Education of Students Places at Risk. Office of Educational Research and Improvement, U. S. Department of Education. Washington, DC.

Bradshaw, D. M., Johnson, T.E., Searcy, S. and Lott, A. 2006. “Using electronic surveys on line.” Accessed Dec. 2007. http://pareonline.net/htm/v8n1.htm

Brooks, J. G. and Brooks, M. G. 1999. *The Case for Constructivist Classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

Brown, L. L.G. “Review of No Child Left Behind Act of 2001”, unpublished document written for graduate course, “Curriculum Policy Analysis”, Dr. O. L. Davis, Jr., a doctoral graduate seminar course at The University of Texas at Austin. The University of Texas at Austin, October 5, 2004.

Brown, L. L.G. 2005. Personal class notes transcribed Fall Semester 2005, *Curriculum Policy Analysis*, Dr. O. L. Davis, Jr., a doctoral graduate seminar course at The University of Texas at Austin.

Brown, L. L.G. 2008. Personal class notes transcribed Spring Semester 2008, *Advanced Topics: Professional Development for Science and Mathematics Teachers,* Dr. James Barufaldi, a doctoral graduate seminar course at The University of Texas at Austin.

Brown, L.G.L. 2005. “Dr. Addison Lee and the BSCS Laboratory Block.” Paper presented at the annual conference of the Midwest Educational History Society Conference. Chicago, Illinois, October 20, 2005.

Bracey, G. W. 2000. *Thinking about tests and testing: A short primer in "Assessment Literacy"* (Report). Washington, DC: American Youth Policy Forum: National Conference of State Legislature.

Bruner, J. S. 1977. *The Process of Education, Revised Edition*, Cambridge, MA: Harvard University Press.

Burbules, N. C. 2004. "Ways of thinking about educational quality." *Educational Researcher, 4*(10).

Bybee, R. (Ed.) and Biological Sciences Curriculum Studies. 1996. *National standards and the science curriculum*. Dubuque, IA: Kendall / Hunt Publishing Company.

Bybee, R. 1997. "The Sputnik Era: Why is this educational reform different from all other reforms?" Symposium Paper, Center for Science, Mathematics, and Engineering Education, National Research Council. The National Academies, http://www.nas.edu/ pg. 1

Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Carlson-Powell, P., Westbrook, A. and Landes, N. 2006. *The BSCS 5E Instructional Model: Origins and effectiveness.* A report prepared for the Office of Science Education, National Institutes of Health. June 12, 2006.

Cavanagh, S. 2008. "Guidance by Principals Emerging as Crucial in Science Education." *Education Week,* September 3, 2008, Focus on: Leadership and Management. Pg. 8.

Cawelti, G. 2006. "The side effects of NCLB." *Educational Leadership, 64*(3): 64-68.

Chambers, M. "Native Language Programs Running Afoul of No Child Left Behind," *Associated Press and Local Wire*, January 24, 2004.

Charmaz, K. 2006. *Constructing Grounded Theory: A practical guide through qualitative analysis*. Thousand Oaks, CA: Sage Publications.

Christensen, C., S. Aaron, et al. 2005. "Can schools improve?" *Phi Delta Kappan* 86(7): 545-550.

Cook, T., Habib, F. N., Phillips, Settersten, M. R., Shagle, S. and Degirmencioglu, S. 2000. "Comer's School development program in Prince George's County, Maryland: A Theory-Based evaluation." *American Educational Research Journal, 36*(3), pg. 543-597.

CNN World News, "States redefine student progress: Education Department to allow changes in performance measurement" Available: http://cnn.worldnews.com. Nov. 18, 2005.

Conant, J. B. 1963. *The education of American teachers*. New York City: McGraw-Hill Book Company, Inc.

Cohn, C. A. 2005. "N C L B implementation challenges: The local superintendent's view." *Peabody Journal of Education 80*(2): 156-169.

Coburn, C. E., Honig, M. I. and Stein, M. K. (in print). “What is the evidence on districts’ use of evidence?” In J. Bransford, L. Gomez, D. Lam, and N. Vye (Eds.) *Research and practice: Towards a reconciliation*. Cambridge, MA: Harvard Educational Press.

Conant, J. 1963. *The education of American teachers.* New York, NY: McGraw-Hill.

Cornbleth, C. [Ed.] 2000. *Curriculum Politics, Policy, Practice*: Cases in comparative contest. New York: NY.

Creswell, J. W. 2003. *Research Design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks: Sage Publications, Inc.

Crotty, M. 2003. *The foundations of social research*. Thousand Oaks, CA: Sage Publications.

Cummings, F. 2004. *What experience has taught us about collaboration: Facilitating mathematics and science reform*, National Network of Eisenhower Regional Consortia and Clearinghouse; Office of Elementary and Secondary Education; U.S. Department of Education: 1-25.

Darling-Hammond, L. and B. Berry 2006. "Highly qualified teachers for all."*Educational Leadership, 64*(3): 14-20.

Darling-Hammond, L. 2004. "Standards, accountability, and school reform." *Teachers College Record* 106(6): 1258-1287.

Darling-Hammond, L. 2004. "Inequality and the right to learn: Access to qualified teachers in California's public schools." *Teachers College Record* 106(10): 1936-1966.

Datnow, A. 2000. "Power and politics in the adoption of school reform models." *Educational Evaluation and Policy Analysis* 22(4): 357-374.

David, J. L. 1989. "Synthesis of research on school-based management." *Educational Leadership 46*(8): 45-53.

Davidson, J.W. and Lytle, M. H. 2001. *After the Fact: The Art of Historical Detection, 5$^{th}$ Edition. Vol. 1*. New York, NY: Alfred A. Knopf. pg. 24.

DeBray, E. H. 2005. "N C L B accountability collides with court-ordered desegregation: The case of Pinellas County, Florida." *Peabody Journal of Education* 80(2): 170-188.

Deming, W.D. 1982. *Out of the Crisis.* Cambridge, MA: Center for Advanced Engineering Study, Massachusetts Institute of Technology. pg..18-96, 248-275, 465-474.

Deming, W. E. 2000. *The New Economics for industry, government, education*. Cambridge: The MIT Press.

Dewey, J. 1897. “My pedagogic creed.” *School Journal*, vol. 54 (January 1897), pp. 77-80. Article 5: The School and Social Progress.

Donnellan, B. A. 2006. *A snapshot of school information support systems in Nassau and Suffolk Counties of New York State: To what degree are information support systems in place in these school districts*? Unpublished Dissertation. Hofstra University. New York: NY.

Dörner, D. 1996. *The Logic of Failure*. New York, NY: Metropolitan Books, English translation.

Earl, L., and Katz, S. 2002. "Leading schools in a data-rich world." In *Second International handbook of educational leadership and administration* Dordrecht, Germany; Boston, Mass.: Kluwer Academic. Pg 1003 – 1022.

*Education Week*. 2007. "Revising Teacher Quality and School Finance." January 5, 2007.

Elmore, R. F. 2002. "Testing trap." *Harvard Magazine* 105(1): 35-40.

England, C. 2003. *None of Our Business: Why business models don't work in schools.* Portsmouth, NH: Heineman. pg. 4-20.

Ferris, J. M. 1992. "School-based decision making: A Principal-Agent perspective." *Educational Evaluation and Policy Analysis* 14(4): 333-346.

Ferrandino, V. L. 2007. "Leading in an era of challenges and inspiration." *Principal*, 86, No. 5, May/June 2007: Pg. 64.

Fields, C. V. 2005. "Opportunity and excellence: A new vision for New York City's schools." *New York Amsterdam News* 96(36): 13.

Flake, M. A., Benefield, T. C., et al. 2006. "A firsthand look at NCLB " *Educational Leadership* 64(3): 48-52.

Fletcher, C. 2004. *What science instruction improves student learning?* Texas Regional Collaboratives; The University of Texas at Austin, Science Education Center.

Fletcher, C., J. Meyer, et al. 2004. *The Science Classroom Profile: Design, development & use*, Vancouver Canada, March 2004.

Fletcher, C. 2006. *Texas Regional Collaboratives for Excellence in Science Teaching: Program Summary, 2004-2005.* Report to the Texas Education Agency. Texas Regional Collaboratives. The University of Texas at Austin, Austin, TX.

Fletcher, C. 2006. Texas Regional Collaboratives - database information, 2004-2005.

Flinders D.J. and Thornton, S. J. 2004. *The Curriculum Studies Reader, 2nd Edition*. Routledge Falmer: New York.

*The Fordham Foundation. (*2000). *Selected readings on school reform*. 2000. Washington, D.C.: The Thomas B. Fordham Foundation.

*From the Hill* - U.S. Congress. 2000/2001. "Bid to improve math and science education programs fails." *Issues in Science & Technology* 17(2): 30.

Foshay, A. W. (2000). *The Curriculum: Purpose, substance, practice*. New York City: Teachers College Press, Columbia University.

Fox News, "*Parents and Teachers Protest Possible AISD School Closures.*" Saturday, 31 May 2008.

Gall, M. D., Gall, J. P., & Borg, W. R. 2003. *Educational Research: An introduction* (7th ed.). Boston: Pearson Education, Inc.

Gall, J. P., Gall, M. D., & Borg, W. R. 1999. *Applying educational research: A practical guide*. New York City, NY: Addison Wesley Longman, Inc.

Garet, M. S., A. C. Porter, et al. 2001. "What makes professional development effective? Results from a national sample of teachers." *American Educational Research Journal* 38(4): 915-945.

George Mason University web site, http://gse.gmu.edu/programs/science/academics/sci_ed/

Ginsberg, R. and Plank, D. [Eds.] 1995. *Commissions, Reports, Reforms, and Educational Policy*. Westport, Conn. Praeger Publisher.

Goldratt, E. M., & Cox, J. 1984. *The Goal: A process of ongoing improvement.* Great Barrington, MA: North River Press.

Goldratt, E. 1997. *Critical Chain: A business novel*. New York: North River Press.

Goldratt, E. 1994. *It's not luck*. New York: North River Press.

Gross, P. R. (Cartographer). 2005. *Less than proficient: A review of the draft science framework for the 2009 National Assessment of Educational Progress*. Washington, D.C., Thomas B. Fordham Foundation: Document review of the new draft 2009 version of NAEP.

Grosso De Leon, A. Fall 2006. "The school leadership crisis: Have school principals been left behind?" *The Carnegie Reporter, The Carnegie Corporation of New York, 4*(1), 32 - 39.

Guilfoyle, C. 2006. "NCLB: Is there life beyond testing?" *Educational Leadership* 64(3): 8-13.

Guskey, T. R. 2003. "What makes professional development effective?" *Phi Delta Kappan* 84(10): 748-750.

Guskey, T. 2000. *Evaluating Professional Development.* Corwin Press, Inc.: California. pg. 37-39.

Guskey, T. R. 1997. "Research needs to link professional development and student learning." *Journal of Staff Development* 18(2).

Harrison, S. 2006. "Report card on American education: A state by state analysis." *U.S. Newswire*. Accessed Feb. 23, 2006 at http://www.usnewswire.com/services.html

Harrison, C. R., J. P. Killion, et al. 1989. "Site-based management: The realities of implementation." *Educational Leadership* 46(8): 55-59.

Hart, C. 1998. *Doing a Literature Review: Releasing the social science research imagination*. Thousand Oaks, CA: Sage Publications.

Heck, Ronald H. 2004. *Studying educational and social policy*. Lawrence Erlbaum Assoc., Publishers: New Jersey. pg. 6-10,15-17, 31, 60, 136, 140.

Hock, D. 1999. *Birth of the Chaordic Age*. San Francisco, CA: Berrett-Koehler Publishers, Inc.

Hoerr, T. R. 2008. "What is Instructional Leadership?" *Educational Leadership*, 65, No 4, Dec. 2007-Jan. 2008, Alexandria, VA. Association for Supervision and Curriculum Development. pg. 84.

Henry, M. N. 2004. "No Child Left Behind? Educational malpractice litigation for the 21st century." *California Law Review* 92(4): 1119-1171.

Hook, J. "No Politics Left Behind in Education Debate: Bush's reforms have drawn heat even within the GOP, but the White House isn't yielding," *LA Times*, January 25, 2004. Available: http://www.latimes.com/news/politics/.

Hynes, J. 2006. NCLB critique on "The Wire". *Salon*. Accessed on Sept. 20, 2006 at http://www.salon.com/mwt/feature/2006/09/20/the_wire/print.html

Ingram, D., Louis, K. S., and Schroeder, R. G. 2004. "Accountability policies and teacher decision making: Barriers to the use of data to improve practice." *Teachers College Record* 106(6): 1258-1287.

Knapp, M.S., Swinnerton, J.A., Copland, M.A. and Monpas-Huber, J. 2006. *Data-informed leadership in education*. Seattle, WA: Center for the Study of Teaching and Policy, University of Washington. Pgs. 3-8, 10-20.

King, D. A. (2005). *A qualitative analysis of major donor decisions in higher education* Temple University: Pennsylvania

Kirst, M. W. 1995. "Who's in Charge? Federal, State, and Local Control." In D. Ravitch and M.A. Vinavskis (Eds.) *Learning from the Past: What history teaches us about school reform*. Baltimore, MD: The Johns Hopkins University Press. pg. 29 – 56.

Koballa, J. T. R. and D. J. Tippins. 2001. "Portraits of professional development models in science teacher education: A synthesis of perspectives and issues." *Models of science teacher preparation - Theory into practice*. D. R. Lavoie and W. Roth. Dordrecht, The Netherlands, Kluwer Academic Publishers: 213-224.

KXAN News, "*TEA orders Johnston High School's closure*." Wednesday, June 4, 2008.

KXAN News, "*Johnston H.S. makes gains on TAKS; future remains unclear.*" Friday, May 30, 2008.

Lachat, M.A. and Smith, S. 2005. "Practices that support data use in urban high schools." *Journal of Education for Students Placed At Risk, 10*(3), 333–349.

Laws, P. W. and N. B. Hastings. 2002. "Reforming science and mathematics teaching." *Change* 34(5): 28-35.

Leithwood, K. A. and D. J. Montgomery. 1982. "The role of the elementary school principal in program improvement." *Review of Educational Research* 52(3): 309-339.

Lewis, A. E. 2000. "School governance for a new century." *Phi Delta Kappan* 81(6): 419-420.

Lincoln, Y. and Guba, E. 1985. *Naturalistic Inquiry*. San Francisco: CA, Sage Publications, Inc.

Lloyd, K., Ramsey, D., and Bell, T. H. 1997. *Reclaiming our Nation At Risk. Lessons Learned: Reforming our public schools*. Washington DC: Knowledge Network for Education Reform.

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S., & Hewson, P. W. 2003. *Designing professional development for teachers of science and mathematics*. Thousand Oaks: Corwin Press, Inc., Sage Publications Company.

Lynn R. "Feds coming to Utah to discuss No Child Left Behind," *The Salt Lake Tribune*, February 3, 2004. Available: http://www.sltrib.com/2004/Feb/02032004/utah/135238.asp.

Manasse, A. L. 1985. "Improving conditions for principal effectiveness: Policy implications of research." *The Elementary School Journal 85*(3), Special Issue: Policy Implications of Effective Schools Research: 439-463.

Mauchly, J. W. 1940. "Significance Test for Sphericity of a Normal n-Variate Distribution". *The Annals of Mathematical Statistics* **11** (2): 204–209. June 1940.

McNeil, L. M. 2000. "Sameness, bureaucracy, and the myth of educational equity: The TAAS system of testing in Texas public schools." *Hispanic Journal of Behavioral Sciences* 22(4): 508-524.

Meneses-Trejo, M. J. 2002. *A comparison of effective leadership characteristics and policy implementation: The role of educational leaders in developing and maintaining an environment that improves efficiency in schools*, Unpublished Dissertation, California State University at Fresno and University of California at Davis: 1-98.

Merck Institute for Science Education, http://www.mise.org/mise/index.jsp?p=about_us

*Merriam-Webster Online Dictionary*, http://www.merriam-webster.com,

Meyer, J., Barufaldi, J., Fletcher, C., Tinoca, L. and Lee, E. 2004.. *The role of sustained professional in renewing science teachers*. National Association of Research in Science Teaching Conference, Vancouver, Canada, March 2004.

Meyer, J. and J. Barufaldi. 2003. "The 4 W's of sustained professional development for science teachers." Annual International Meeting of the Association for the Education of Teachers of Science Conference, St. Louis, Missouri.

Mink, O., Shultz, J., and Mink, B. (1979) *Open Organizations*. Learning Concepts: Texas.

Morgan, G. 1997. *Images of Organization, 2nd Edition.* Sage Publications: CA.

"N C L B implementation challenges: The local superintendent's view." *Peabody Journal of Education*, *80*(2), pg. 156-169.

National Academy of Science (NAS). 1997. *Adviser, teacher, role model, friend: on being a mentor to students in science and engineering*. Washington, D.C.: National Academies Press.

National Center for Educational Statistics. 2003. *National Center for Education Statistics: Handbook of survey methods; Technical report*. Washington DC: U.S. Department of Education.

National Center for Educational Statistics. (2002). *Principal Questionnaire: Schools and staffing survey, 2003-2004 school year*. Retrieved from http://nces.ed.gov/surveys/sass/

National Center for Educational Statistics. (2002). *Public School Questionnaire: Schools and staffing survey, 2003-2004 school year*. Retrieved November 2006 from http://nces.ed.gov/surveys/sass/

National Center for Educational Statistics. (2002). *School District Questionnaire: Schools and staffing survey, 2003-2004 school year*. Retrieved from http://nces.ed.gov/surveys/sass/

National Center for Educational Statistics. (2002). *Teacher Questionnaire: Schools and staffing survey, 2003-2004 school year.* Retrieved from http://nces.ed.gov/surveys/sass/

National Council of State Legislatures, published in *The Washington Post*, February 19, 2004.

National Research Council. www.nationalacademies.org/nrc/

National Science Education Leadership Association web site, http://www.nsela.org/

National Science Resources Center, www.nsrconline.org/

National Science Teachers Association (NSTA). (2005). *Strategy 2005 - Goals*: National Science Teachers Association. Accessed on March 10, 2006 at www.nsta.org

National Science Teachers Association. *Strategy 2005 – Goals*. 1-22.

Nelson, S. W., Meno, L.R. and Slater, C. L. 2007. "Fulfilling the Promise of Educational Accountability." *Phi Delta Kappan*: pg. 702-709.

Neustadt, R. E., & May, E. R. 1986. *Thinking in time: The uses of history for decision makers*. New York City: The Free Press.

Ortiz, F. I. and R. Ogawa, T. 2000. "Site-based decision-making leadership in American public schools." *Journal of Educational Administration* 38(5): 486-499.

Perie, M., S. Marion, B. Gong and J. Wurtzel. *The role of interim assessments in a comprehensive assessment system: A policy brief.* Dover, NH: The National Center for the Improvement of Educational Assessment, Inc. Policy brief sponsored by the Center for Assessment, Achieve, Inc. and The Aspen Institute. Available at http://nciea.org.

Perie, M., Marion, S., Gong. B. and Wurtzel, J. (2007). *Moving towards a comprehensive assessment system: A framework for considering interim assessments.* Dover, NH: The National Center for the Improvement of Educational Assessment, Inc. Available at http://nciea.org.

Peterson, R. F. and D. F. Treagust 2001. A problem-based learning approach to science teacher preparation. *Models of science teacher preparation - Theory into practice*. D. R. Lavoie and W. Roth. Dordrecht, The Netherlands, Kluwer Academic Publishers: 49-66.

Pinar, W. Ed. 1975. *Curriculum Theorizing: The reconceptualists*. Berkley, CA: McCutchan Publishing Corp. Pg.384-395.

Pinar, W. F. 2004. *What is curriculum theory?* Mahwah, NJ: Lawrence Erlbaum Associates.

Porter, A. C., M. D. Chester, et al. 2004. "Framework for an effective assessment and accountability program: The Philadelphia Example." *Teachers College Record* 106(6): 1358-1400.

Public Education Visioning Institute. 2008. *Creating a new vision for public education in Texas*. A report by Superintendent Participants in the Public Education Visioning Institute. Published by the Texas Association of School Administrators. May 2008.

Randolph, W. A. 2000. "Re-thinking empowerment: Why is it so hard to achieve?" *Organizational Dynamics* 29(2): 94-107.

Ravitch, D. 2000. *Left Back: A century of battles over school reform*. New York: Simon and Schuster.

Ravitch, D. and Vinovskis, M. A. (Eds.). 1995. *Learning from the Past*. Baltimore, MD. The Johns Hopkins University Press. pg.171

Reid, W.A. 1999. *Curriculum as Institution and Practice*. Lawrence Erlbaum Associates, Publishers: New Jersey.

Rennie, L. 2001. "Gender equity and science teacher preparation." *Models of science teacher preparation - Theory into practice*. D. R. Lavoie and W. Roth. Dordrecht, The Netherlands, Kluwer Academic Publishers: 127-147.

Rogelberg, S. G. (Editor) 2002. *Handbook of research methods in industrial and organizational psychology*. Malden, MA: Blackwell Publishers.

Roth, W.-M., & Barton, A. C. 2004. *Rethinking scientific literacy*. New York City, NY: RoutledgeFalmer.

Rudolph, J. 2002. *Scientists in the Classroom: The Cold War reconstruction of American science education.* PALGRAVE™, St. Martin's Press, LCC.

Salpeter, J. 2004. "Data: Mining with a mission." [Electronic Version]. *techLearning*. Accessed on Nov. 3, 2006, at http://www.techlearning.com

Scherer, M. 2006. "The NCLB issues." *Educational Leadership* 64(3): 7.

Schwab, J. J. 1978. *Science, Curriculum and Liberal Education: Selected Essays.* Chicago: The University of Chicago Press. Pg. 287-290.

*Selected readings on school reform*. 2000. Washington, D.C.: The Thomas B. Fordham Foundation. Winter 2000, Vol. 4, No. 1.

Senate Bill 1, 74th Texas Legislature, Regular Session, 1995.

Sen. J. Brademas, 1987. *Politics of Education: Conflict and Consensus on Capitol Hill.* Oklahoma City, OK: University of Oklahoma Press.

Sen. Nevers, Louisiana Senate, Regular Session 2009. SCR No. 66. Date June 1, 2009.

Senator Lamar Alexander web-site, "PROPOSES LEGISLATION TO GIVE STATES MORE FLEXIBILITY UNDER "NO CHILD LEFT BEHIND" http://alexander.senate.gov/index.cfm?FuseAction=PressReleases.DetailandPressRelease_id=1318andMonth=11andYear=2007

Senge, P. 1990. *Fifth Discipline*: New York, NY: Doubleday.

Shannon, D. M. and Bradshaw, C. C. 2002. A comparison of response rate, speed and costs of mail and electronic surveys.*"* *Journal of Experimental Education*, 70(2).

Smith, S. 2007. Personal Communication with Linda Brown via email, dated Feb. 1, 2007. Austin, TX.

Smith, W. F. and Andrews, R. L. 1989. "Instructional Leadership: How principals make a difference," *Association for Supervision and Curriculum Development*. Out-of-print, now available and accessed online at http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1f/cb/a9.pdf

Smylie, M. A., V. Lazarus, et al. 1996. "Instructional outcomes of school-based participative decision making." *Educational Evaluation and Policy Analysis* 18(3): 181-198.

Spady, W. G. 1988. "Organizing for results: The basis of authentic restructuring and reform." *Educational Leadership* 46(2): 4-8.

Sparks, D. and S. Hirsh. 2006. *A national plan for improving professional development.* National Staff Development Center, 1-19 Accessed on July 20, 2006 at http://www.nsdc.org/library/

Strong, R.W., Silver, H.F., and Perini, M. J. 2001. *Teaching What Matters Most; Standards and Strategies for Raising Student Achievement.* Association for Supervision and Curriculum, pg. 110-114.

Supovitz, J.A. and Klein, V. 2003. *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*. Philadelphia, PA: Consortium for Policy Research in Education, University of Pennsylvania.

Texas Accountability Code. 19 TAC RULE §228.2. Accessed January 18, 2009. http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=Randapp=9andp_dir=andp_rloc =andp_tloc=andp_ploc=andpg=1andp_tac=andti=19andpt=7andch=228andrl=2

Texas Accountability Code. 19 TAC RULE §228.2. Accessed January 18, 2009. http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=Randapp=9andp_dir=andp_rloc =andp_tloc=andp_ploc=andpg=1andp_tac=andti=19andpt=7andch=228andr l=2

Texas Education Agency.2009. Texas Assessment of Knowledge and Skills. www.tea.state.tx.us/TAKS

Texas Education Agency. TAKS –*Assessment System.* http://ritter.tea.state.tx.us/student.assessment/reporting/taksagg/

Texas Education Agency, TAKS Aggregate Reporting. Available at http://www.tea.state.tx.us/index3.aspx?id=3631andmenu_id3=793

Texas Education Agency. Texas Essential Knowledge and Skills (TEKS), 1986, Appendix 6 contains the state of Texas standards for science and mathematics education for K-12 public schools. http://www.tea.state.tx.us

Texas Education Agency. 2001. *Learning Standards for Texas Students: A guide for Texas parents.* Texas Education Agency, Austin, Texas.

Texas Elementary and Secondary Principals Association web site, http:// www.tespa.org.

Texas Regional Collaborative. 2005. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education*. Austin: The University of Texas at Austin, Center for Science and Mathematics Education, Texas Regional Collaborative. http://www.thetrc.org/trc/

Texas Regional Collaboratives. 2008. *Dynamic Partnerships for Twenty-First Century Science and Mathematics Education.* Center for Science and Mathematics Education, College of Education. The University of Texas at Austin. Pgs. 1-25.

Texas State Board for Educator Certification, An Inventory of State Board for Educator Certification Records at the Texas State Archives, 1996-1998. Accessed on November 15, 2007 at: http://www.lib.utexas.edu/taro/tslac/30141/tsl-30141.html

*The American Heritage College Dictionary, 3rd edition*. (1993). Houghton Mifflin Company: New York.

The National Commission on Excellence in Education. *(1984). A Nation At Risk: The Full Account.* USA Research, Inc.: Oregon

The State Board for Educator Certification approved, TEXAS Alternative Certification Program http://www.texasacp.com/.

The Texas Legislature, 2007 session, (Texas House of Representatives, 79th Session. Session Law Chapter: Acts 2006, 79th 3rd C.S., Ch. 5.)

Thomas, S. J. 2004. *Using web and paper questionnaires for data-based decision making: From design to interpretation of the results*. Thousand Oaks, California: Corwin Press, A Sage Publications Company.

Tinoca, L. 2004. *From professional development for science teachers to student learning in science.* Unpublished Dissertation. The University of Texas at Austin. Austin: TX.

Tinoca, L., Lee, E., Fletcher, C., Barufaldi, J. and Meyer, J. 2004. "From professional development for science teachers to student learning in science." *National Academy of Research in Science Teaching Conference,* Vancouver, Canada, March 2004.

Tolley, K. 2003. *The science education of American girls.* New York: NY. Routledge Falmer.

Traub, J. 1999. *Better by design? A consumer's guide to school wide reform*. Washington, D.C.: The Thomas B. Fordham Foundation.

Trochim, W. M. K. 2001. *Research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog Publishing.

Tuerk, P. W. 2005. "Research in the high-stakes era: Achievement, resources, and No Child Left Behind." *Psychological Science* 16(6): 419-425.

Tyack, D., and Cuban, L. 1995. *Tinkering toward utopia - A century of public school reform*. Cambridge: Harvard University Press.

Tyler, R. W. 1949. *Basic principles of curriculum and instruction*. Chicago: The University of Chicago Press.

U. S. Congress (2002). 115 STAT. 2090 PUBLIC LAW 107–110—JAN. 8, 2002.

U.S. Department of Education. 2002."*No Child Left Behind,"* Public Law 107-10, §9101(23).

U.S. Department of Education, *Press Release.* 2007. Prepared Opening Statement for U.S. Secretary of Education Margaret Spellings Before the U.S. House of Representatives Appropriations Subcommittee on Labor, HHS, and Education. Retrieved June 15, 2007, from http://www.ed.gov/print/news/speeches/2007/03/03122007.html

U.S. Department of Education, Press Release. “Key policy letters signed by the Educational Secretary Margaret Spellings.” Available: http://www.ed.gov, Oct. 11, 2005.

U.S. Department of Education, *Press Release* 2007. Secretary Spellings' Remarks on the Fifth Anniversary of the No Child Left Behind Act. Retrieved Feb. 17, 2007, from http://www.ed.gov/print/news/speeches/2007/01/01082007.html

U.S. Department of Education *NCLB Making a Difference in Texas*. 2006. Retrieved January 21, 2007. Accessed from http://www.ed.gov/nclb/overview/importance/difference/texas.pdf

U.S. Department of Education *State Plan for Meeting the Highly Qualified Teacher Goal*. 2006. Retrieved January 20, 2007. Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Department of Education *Texas Cover Letter #1 - May 12, 2006*. 2006. Retrieved January 20, 2007, Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Department of Education *Texas Cover Letter #2 - August 15, 2006*. 2006. Retrieved January 20, 2007, Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Department of Education *Texas Cover Letter #3 - December 16, 2006*. 2006. Retrieved January 20, 2007, Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Department of Education *Texas plan for equitable distribution of highly qualified teachers*. 2006. Retrieved January 20, 2007, Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Department of Education *Texas Review of Highly Qualified Teacher Plan – Sept. 29, 2006*. 2006. Retrieved January 20, 2007. Accessed from http://www.ed.gov/programs/teacherqual/hqtplans/index.html#tx

U.S. Dept. of Education - *New No Child Left Behind flexibility: Highly qualified teachers*, U.S. Dept. of Education, 2004: 2.

U.S. Department of Health and Human Services. *Head Start*. Accessed November 2008, http://www.acf.hhs.gov/programs/ohs/

Wagstaff, J. G. 1995. "Site-based management, shared decision making, and science and mathematics education: A tale of two districts." *Theory Into Practice* 34(1): 66-73.

Warshauer, H. K. 2008. *Analysis and Critique of a Dynamic Professional Development System Model.* Unpublished paper submitted to James P. Barufaldi, Ph.D., Advanced Topics-EDC 385G, Research on Professional Development in Science and Mathematics Education.

Watson, K. 2005. "Seven precepts for leadership research." Management in Education 19(5): 19-21.

Wayman, J.C., Cho, V., and Johnston, M.T. 2007. *The data-informed district: A district-wide evaluation of data use in the Natrona County School District.* Austin: The University of Texas.

Wayman, J., & Stringfield, S. 2006. "Technology-supported involvement of entire faculties in examination of student data for instructional improvement." *American Journal of Education, 112*, 549 - 571.

Wellman, B., and Lipton, L. 2004. *Data-driven dialogue: A facilitator's guide to collaborative inquiry*. Sherman, CT: MiraVia, LLC.

Weiss, C. H. and J. Cambone 1994. "Principals, shared decision making, and school reform." *Educational Evaluation and Policy Analysis* 16(3): 287-301.

Whitaker, K. S. 1996. "Exploring causes of principal burnout." *Journal of Educational Administration* 34(1): 60-71.

Yager, R. E. 1988. "Achieving useful science: Reforming the reforms of the '60s." *Educational Leadership* 46(1): 53-54.

Zhao, Y. 2006. "Are we fixing the wrong things?" *Educational Leadership* 63(8): 28-31.

Zubay, B. 2006. "Can independent schools sustain high standards of teaching?" *Independent School* 65(4): 36-40.

# VITA

Linda L.G. Brown earned a Bachelor of Science degree in psychology in 1977 from the Colorado State University and a Master of Arts degree in 1988 from the University of Northern Colorado in Middle School Education, with a specialization in curriculum and science education. She was certified as an elementary and middle school professional educator in Colorado when she moved to Austin, Texas in 1986. In 2003, she began pursuing her Ph.D. focus with a cross-discipline degree program in curriculum studies (Department of Curriculum & Instruction), science education (Department of Science & Mathematics Education) and educational policy (Department of Education Administration) at The University of Texas at Austin, Texas. Her career spans business, classroom teacher, corporate industry management, state government policy, consulting, higher education academia, and research.

In 2008, Brown's doctoral dissertation work was selected by the Curriculum and Instruction Department in the College of Education at The University of Texas at Austin as one of three dissertations worthy of the prestigious University Continuing Fellowship Award. Prior to this award, her research has been recognized at The University of Texas at Austin in previous years. Throughout her career, Brown was selected for numerous recognitions in each of her career ventures: Motorola CEO "Volunteer of the Year Award", Teacher Research Associate Fellow with Idaho National Engineering Laboratory through the U.S. Department of Energy; Astronomy Fellow and Geology Fellow through National Science Foundation programs; and as a Christa McAuliffe Fellow through the U.S. Department of Education for her ground-breaking work with middle school science education – *Kealing Space Center* – that transformed middle school science education within the state of Texas. She has served on multiple local, state, and national boards in addition to being awarded numerous recognitions for her exemplary work in science curriculum development and research, and leadership throughout the Texas education community.

As an educational consultant, Brown's visionary and creative thinking skills enhanced, improved and provided visualization for improvement of the Texas State Environmental Conservation Organization's (SECO) alternative energy web-site, *Infinite Power*, by restructuring and redesigning the curriculum and lesson plans for elementary and middle school educators into a more "teacher–friendly" site. She has consulted with major science textbook publishers for biology and earth science. Her work with the Texas Mining and Reclamation Association and Phillips Coal Company as the professional development consultant for the *Black Gold Lignite Mine* materials for middle school earth science launched program initiatives to utilize business and industry support for educators.

Permanent Address: Austin, Texas

This manuscript was typed by the author.