


2010

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Recommended Citation

Byrd, Jimmy K. and Eddy, Colleen (2010) "An Investigation of Principals' Use of Data in Data-Driven Decision-Making and the Impact on Student Achievement," *School Leadership Review*. Vol. 5 : Iss. 2 , Article 4.

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An Investigation of Principals' Use of Data in Data-Driven Decision-Making and the Impact on Student Achievement

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The passage and implementation of the No Child Left Behind Act (NCLB, 2001) ushered in a new era of educational accountability and school improvement. Schools are held accountable to meet adequate yearly progress that requires educators to closely monitor student performance on high-stake assessments. Further, NCLB significantly increases the pressure on states, districts and schools to collect, analyze and report data. Accountability demands are increasingly forcing school leaders to explore student-level data and to complete more sophisticated analyses. Data-driven decision-making (DDDM) has become an emerging field of practice for school leadership (Streifer, 2002) and a central focus of education policy and practice (Mandinach, Honey, & Light, 2006). Nationwide standards-based control and outcome-based funding have brought DDDM to the top of every principal's agenda (Leithwood, Aitken, & Jantzi, 2001).

The extensive use of DDDM in policy and practice at schools reveals a strong need for research on the current realities of DDDM practices and how those practices impact student achievement. DDDM is a critical issue in both practice and research, yet surprisingly little empirical research has actually been conducted on these issues, especially from the principal's perspective (Luo, 2008). In addition, university preparation programs are facing increased scrutiny as principals are facing new roles and heightened expectations, requiring new forms of training. In particular, the demand that principals have a positive impact on student achievement challenges traditional assumptions, practices, and structures in leadership preparation programs (Lashway, 2003). In fact, there is little evidence that current coursework in traditional preparation programs directly connects practices to principals' on-the-job performance or to

student achievement (Browne-Ferrigno & Muth, 2004). A recent survey of principals supports this notion. Butler (2008) found that two-thirds of 500 principals surveyed believed that typical graduate leadership programs “are out of touch” with today’s realities. Butler’s finding is alarming as we are in an era of high-stakes exam where principals are required to use data analysis in DDDM, yet many have to learn these skills on the job. To exacerbate the dilemma, data analysis skills are not taught to future principals in many pre-service preparation programs even at this late date.

Theoretical Framework

Dervin’s (1983; 1992) Sense-Making Theory provides a useful theoretical framework for this study. Dervin’s model views information behavior in terms of a situation, a gap and an outcome, with information being used to bridge the gap and achieve the outcome. This framework, with its recognition of the importance of understanding how the information helps the user “make sense” of a situation, highlights the role of information use.

However, in subsequent discussions of Dervin’s work (e.g., Choo 1993; Wilson 1999), it is often the classification and articulation of information needs (i.e., the nature of the gap) that is emphasized. While need and use are clearly linked since information is needed to fulfill a use, there is a shift in perspective and emphasis depending on whether the focus is on needs or uses. Discussion of need tends to highlight the purpose for which the information is sought – the goal or objective – but does not usually extend to including exactly how the information is applied to achieving the goal. Shifting the focus to use can highlight the latter.

Sense-making theorists argue that the meaning of information is not self-evident; rather, individuals need to construct their understanding of the meaning and implications of the evidence at hand. Theorists do this by fitting new information into their pre-existing

understandings or cognitive frameworks (Porac, Thomas, & Baden-Fuller, 1989; Weick, 1995). Kennedy (1982) calls these frameworks *working knowledge*, or, “the organized body of knowledge that [school] administrators and policymakers use spontaneously and routinely in the context of their work. It includes the entire array of beliefs, assumptions, interests, and experiences that influence the behavior of individuals at work” (p. 1-2). Thus, interpretation of evidence is mediated by an individual’s beliefs and experiences.

In addressing the areas of principals’ DDDM practice, the Educational Leadership Constituent Council (ELCC, 2002) standards were used as the framework for this study, through which high school principals’ DDDM was examined in the context of improving student achievement. The National Policy Board for Educational Administration published the revised Standards for Advanced Programs in Educational Leadership in 2002, which were developed and revised by the ELCC (2002) and adopted by the National Council for the Accreditation of Teacher Education (NCATE, 2002). The ELCC standards serve as school leadership preparation program standards and can be used as a cornerstone for the professional development of existing school administrators (Murphy & Shipman, 1998; Murphy, Yff, & Shipman, 2000). Compared to the old standards, the revised standards have more emphasis placed on school administrators’ ability and knowledge in using data where DDDM is integral to school administrators’ skills in all the area standards (Lou, 2008). While state and national standards recommend principals practice DDDM, it is not clear how principals use data to improve student achievement. Therefore, the purpose of this study was to determine how principals’ use of data in the DDDM process affects student achievement.

Review of Literature

In an effort to address the needs of an ever increasing diverse student population, school leaders are compelled "to have enough information at hand to know where problems exist and how to best solve them" (E-lead, 2009, p. 4). DDDM in the context of schools involves a process of collecting, disaggregating and analyzing student data. This collection of student data, according to Cradler (2009), serves "to inform decisions related to planning and implementing instructional strategies at the district, school, classroom, and individual student levels" (p. 1). This process is "more than an accountability tool; it is a diagnostic tool (Doyle, 2003, p. 1) that requires school leaders to be data and data analysis literate.

Processing of information is a vital aspect of human behavior and is a critical input to the decision process (Taylor, 1986). Dervin (1992) posited that making sense of the data (sense-making) is an active two-way process of fitting data into a frame (mental model) and fitting a frame around the data. Neither data nor frame comes first; data evoke frames and frames select and connect data.

Data analysis skills related to principals' education background and training experience seem to be a critical element influencing principals' information behaviors of DDDM (Choppin, 2002; Mason, 2002). If principals are to "incorporate the information into their cognitive maps or repertoire of strategies, they must attend to it and have sufficient knowledge and ability to interpret it" (O'Day, 2002, p. 299). While school leaders may fear or even loathe quantitative or qualitative analysis, DDDM based on rigorous statistical measures requires an understanding of the statistical principles that underlie the decisions being made (Earl & Katz, 2006). Thus, it is the priority of DDDM for principals to have a basic understanding of applied statistics, data analysis skills, and other necessary computer skills (Thornton & Perreault, 2002). The

importance of principals' having these skills is further underscored by Hoyle, English, and Steffy (1994) who submitted that successful school leaders are skillful at interpreting and conducting research, evaluating programs, and planning for the future.

DDDM is an interactive, multifaceted, and contextual practice within the school organization. Decision makers, the uses of data, and the context within which decision makers make choices are interrelated. The situational context of information acquisition and use through which decisions are made are critical in understanding organizational decision making (Dervin, 1992).

To develop schools organizationally, effective leadership requires local educators to use data effectively to influence decisions based on particular sets of needs and circumstances (Leithwood, Begley, & Cousins, 1994). Without such local discretion, school improvement would probably be frustrated, and school performance would suffer (Hallinger & Heck, 1998; Leithwood, 1994; Marks & Printy, 2003; Mohrman, Wohlstetter, & Associates, 1994). Because data abound, principals must become data savvy in using student-level data in making informed decisions. Maxwell (2004) submits that collecting data and analyzing the data is the linchpin of both district and campus improvement initiatives, and part of the reason that exemplars of "best practices" are using data to manage a wide range of school functions, especially those directly related to student achievement.

The quest for quality education during the past five years has resulted in a number of initiatives, which have made significant demands on principals in public sector schools, amongst which is the practice of accountability. Hence, school leadership in the context of accountability requires a paradigm shift, moving from the traditional concentration on maintenance and hierarchy, to change, collegiality, teamwork, and instructional improvement at the classroom

level. More succinctly, principals must understand how to establish a shared vision and design professional development opportunities that involves everyone to ensure that decisions are aligned with the shared vision and all decisions are indeed data-driven.

Shared Vision

Across mainstream educational leadership literature, the term vision has had two primary definitions: (a) a leader's image of the future and (b) change goals. Translating vision into practice has become increasingly difficult (Ylimaki, 2006). An important aspect of vision is the notion of "shared vision." Studies have shown that it is the presence of personal vision on the part of a leader, shared with members of the organization that may differentiate true leaders from mere managers (Manasse, 1986). Therefore, a leader's vision needs to be shared by those who will be involved in the realization of the vision.

Regarding teachers' use of data for instructional planning and feedback, Young (2006) found that school leadership interacts with the normative work arrangements within teachers' grade-level teams. Young demonstrated how shared leadership focused on data use affected teachers' motivation for using data and "correspondingly loosens or tightens the connections between data-driven rhetoric and teachers' data practices" (p. 532). Young defined leadership as agenda setting, a term she chooses to mean articulating general reasons for using data and specific expectations for particular data, modeling data use, scaffolding teachers' learning about data use, and structuring collaborative time for data use. Young also suggested that both depth of activity and breadth of collaboration are important developmental considerations that school leaders can influence. Particularly in the important early stages of any new implementation, leaders of schools can "structure team interactions with instructionally relevant activities"

(Young, 2006, p. 543) so that teachers practice new strategies even as they forge new collaborative norms to attain the shared vision.

Professional Development

Student achievement data point out professional development needs for individual schools and teachers. However, if data are to provide meaningful guidance in the process of continuous improvement, teachers and administrators require professional development regarding data analysis, designing assessment instruments, implementing various forms of assessment, and understanding which assessment to use to provide the desired information. It takes time for teachers and principals to learn new skills and behaviors. One-shot workshops will not accomplish the goal, no matter how good the workshops are. People need to focus their efforts over time until new behaviors become internalized. Individual teacher growth can improve student learning, but whole school professional development holds promise for raising the achievement levels of all students (Walker, 2007). Because the pre-service preparation of principals in assessment and data analysis has been weak or nonexistent, educators must have generous opportunities to acquire knowledge and skills related to formative classroom assessment, data collection, data analysis, and data-driven planning and evaluation (NSDC, 2009). According to Dervin's Sense-Making Theory, DDDM requires information and the proper interpretation of the results to bridge the gap and achieve the intended outcome. While on-the-job internships offer pre-service administrators a glimpse of the requirements for the position, they do not offer ample time to learn everything about the job prior to practicing, including how to use data to design professional development opportunities around the use of data (Peterson, 2002). In a comparison of three urban school systems, Firestone, Mangin, Martinez, and Polovsky (2005) suggested that district offices can influence teaching through

professional development. District and campus leaders can structure their programs to provide coherent and content-focused professional development. However, given the many demands placed on the principal, it is not clear how principals use data to determine professional development opportunities for teachers to improve student achievement.

As states have grown more influential by developing standards for curriculum, student performance and assessment, school districts and schools have had to yield considerable autonomy, becoming accountable to the state for a range of student outcomes (Conley, 2003; Fuhrman & Elmore, 2004). Failure to meet state and national academic assessments can subject districts to takeover and schools to reconstitution. Intensifying the pressures of this high-stakes environment, local stakeholders, such as parents and businesses, have also demanded improved student performance. In response, community and school boards often establish their own sets of goals for schools (Firestone & Shipp, 2003).

Principals Use of Data

Although NCLB requirements involve the use of data to make decisions to assist teachers to impact behavioral change to ensure students graduate college and workforce ready and reach intended goals, studies have shown that principals lack the knowledge to properly analyze data. Reeves and Burt (2006) found that principals were concerned about the use of data analysis due to lack of training among both principals and teachers. In addition to the frustrations of principals that are not sure exactly what data to use or how to use it, the frustrations of teachers' abilities to use the data abound as well. Many principals that are inadequate at collecting, analyzing and using data themselves have even more difficulty in leading their teachers through the DDDM processes necessary to affect behavioral change in the schools (Reeves & Burt, 2006).

Data use essentially sets a course of action and keeps a staff on that course to school improvement and student success. Further, the wealth of data from assessments of student achievement, as well as information available from other evaluations of student and school performance, can create a divide or gap between what is currently being done and what needs to be practiced to improve student performance. While the elements of Dervin's theory are common place in schools (a situation, a gap and an outcome, with information being used to bridge the gap and achieve the outcome), the interpretation and use of data among principals to improve student achievement is uncertain. This is further exacerbated by the fact that most university principal preparation programs do not place a strong emphasis on ensuring that principals have data analysis skills. The expanding nature of information accessibility requires school and district leaders and teachers to analyze and interpret multiple forms of data that theoretically result in substantive changes.

While there has been much rhetoric surrounding the quality of principal preparation programs (Browne-Ferrigno et al, 2002; Levine, 2005; Maxwell, 2008; Tirozzi, 2001), and given the increasing demands placed on school leaders by NCLB to improve student achievement, the question of how principals use data to improve student achievement once they are in the field has taken on heightened significance (Browne-Ferrigno & Muth, 2004; Butler, 2008). Therefore, the purpose of the current study was two-fold: 1) to determine how principals use data; and 2) to determine the impact of principals' data use on student achievement.

Method

The participants in the current study included 375 principals from 8 large urban districts across the state of Texas with an average enrollment of 81, 254 students. Among the 375 participants, 265 (70.7%) were female, while 110 (29.3%) were male. Regarding race, 57

(15.2%) were African-American, 135 (36.0%) Anglo, 141 (37.6%) Latino, 2 (0.5%) Native American, while 40 participants (10.6%) were classified as other.

The majority of participants (n =249, 66.4%) were employed in elementary campuses, while 56 (14.9%) were employed as principals in middle schools and 70 (18.7%) were principals in high schools. Average tenure among participants in the current position ranged from 3.43 years (SD = 3.23) among junior high principals to 4.32 years (SD = 4.66) among elementary principals. In addition, the average experience as a principal among the total participants was 8.39 (SD = 6.49), while average length of tenure at the current campus was 4.17 (SD = 4.37).

Table 1

Average Tenure as Principal of Current Campus and Years as Principal by Campus Type

Campus Type	Tenure as Principal at Current Campus			Years as Certified Principal		
	N	Mean (Years)	Std. Deviation	N	Mean (Years)	Std. Deviation
Elementary School	249	4.32	4.66	249	8.43	6.70
Middle School	56	3.43	3.23	56	7.89	6.12
High School	70	4.20	4.07	70	8.63	6.06
Total	375	4.17	4.37	375	8.39	6.49

Regarding the highest degree obtained, 343 respondents (91.4%) held a Master's degree while 32 (8.6%) held a doctorate degree. The majority of participants were trained in traditional university certification programs (n = 352, 93.8%) while the remaining 23 participants (6.2%) were trained through alternative certification programs. Note alternative certification programs included both private providers and regional educational service centers throughout Texas.

Data collection for this study included an online survey designed to determine how principals use data and student achievement data (campus-level), which was obtained from the Texas Education Agency. In addition, two focus group sessions were conducted in each of the

eight districts with one focus group comprised of a random sample of 15 teachers and the other comprised of 15 principals that were representative of the campuses participating in the study.

Initially, permission to conduct the study was obtained by the superintendent of each participating district. Subsequently, a cover letter describing the project with the survey link embedded in the letter was sent to 500 principals seeking their participation in the study. After two weeks elapsed, 276 principals responded with a response rate of 55.2%. A follow-up letter with the survey link included in the letter was sent to participants that did not respond in the initial two-week period. The follow-up letter yielded an additional 125 respondents with only 99 complete and useable surveys. The final total included 375 participants with an overall response rate of 75%.

Instrumentation and Variables

The Principal Data Use instrument utilized in the current study was derived from a thorough review of the literature and the ELCC/NCATE (2002) leadership program standards. The instrument asked participants to rate their use of data in three key areas that included: (1) how they use data to improve student achievement, (2) how they use data to shape the vision, and (3) how they use data to design professional development for teachers. It was assumed that all participants defined data similarly in their responses. Participants rated the frequency of their use of data based on a corresponding 4 choice scale that included 1 = *rarely or never*, 2 = *sometimes*, 3 = *often*, and 4 = *always*.

Content Validity

Initially, the Principal Data Use instrument was comprised of 20 questions. A review panel consisting of 25 practicing principals, 3 university professors in educational leadership, and 2 professors in educational psychology reviewed the instrument. After a thorough review, two

questions were deemed inappropriate for the survey based on the questions' content, and three were determined to be redundant. After deleting the five questions that were concerns to the panel and tweaking the wording based on the panel's recommendation, the final Principal Data Use instrument included a total of 15 items.

Construct Validity

To determine the underlying structure of the instrument, principal component analysis was conducted utilizing a Varimax orthogonal rotation. Based on the principal component analysis and the results of the Parallel analysis (O'Connor, 2001), it was determined that the instrument was indeed measuring three underlying constructs. Construct 1 included four items measuring principals' use of data to improve student achievement (ELCC, 2002; Standard 2 and 4), Construct two included eight items measuring principals' use of data to shape vision (ELCC, 2002; Standard 1 and 6), and construct three included three items measuring principals' use of data to design teacher professional development (ELCC, 2002; Standard 2 and 3). Reliability for the total instrument (as measured by Cronbach's alpha) was .908. Regarding reliability of each construct, reliability for construct 1 = .78, construct 2 = .89, and construct 3 = .80.

Outcome Variable

In the current study, student achievement was measured by two indicators which included the percentage of students passing the Texas Assessment of Knowledge and Skills (TAKS) reading and mathematics assessments at the campus level. The TAKS is a comprehensive testing program for public school students in grades 3-11. The TAKS is designed to measure to what extent a student has learned, understood, and is able to apply the concepts and skills expected at each tested grade level. Each test is linked directly to the Texas Essential Knowledge and Skills

(TEKS) curriculum. The TEKS is the state-mandated curriculum for Texas public school students (TEA, 2008).

Procedures/Data Analysis

Initially, descriptive analysis was conducted among the survey items. Subsequently, structural equation modeling (SEM) was conducted to determine how principals' use of data affects student achievement. AMOS (version 18) was used for all analysis.

SEM is primarily aimed at studying the relationships among sets of variables, which can be either observed or unobserved. Further, SEM is used as a confirmatory more than an exploratory modeling method, and thus allows researchers to test hypothesized models and modify them subsequently according to theory and sample-based evidence. As a confirmatory technique, SEM requires a substantive theory underlying the hypothesized model and a representative sample for data analysis. When the model fit is not satisfactory, theoretical justifications are needed to revise the model, in addition to the mere statistical modification indices (Hancock & Mueller, 2006).

Results

The descriptive statistics of overall mean scores and standard deviations for each of the three constructs of the Principal Data Use instrument are displayed in Table 2. In addition, reliability of each construct is provided in parentheses.

The overall mean scores indicated that principals frequently use data to improve student achievement, shape the vision, and design teacher professional development. The largest mean was associated with principals' use of data to design professional development for teachers ($M = 3.29$, $SD = .592$). In comparison, the lowest mean was associated with principals' use of data to improve student achievement (Mean = 3.20, $SD = .79$). While there were nominal

differences between subscale scores, the results of the Factorial Analysis of Variance (ANOVA)

revealed no statistically significant differences in frequency of principals' use of data across campus levels (i.e., elementary, middle or high school).

Table 2

Means and Standard Deviations of the Principal Data Use Constructs and Individual Items

Item	M'	SD'
Principal Uses Data to Improve Student Achievement ($\alpha = .78$)	3.20	.709
1. I involve school staff, students, and school community to determine how differing audiences interpret the data.	3.05	.634
2. I conduct focus groups to dig deeper into the data analysis results.	3.05	.753
3. Student-level data is analyzed in core subject areas regularly (3-5 times a year).	3.48	.712
4. Cohort-level data is analyzed in core subject areas regularly (3-5 times a year).	3.22	.737
Principal Uses Data to Shape Vision ($\alpha = .89$)	3.25	.641
5. I examine academic achievement at different grade levels over multiple time points when analyzing data.	3.38	.604
6. Principals and campus-level staff have developed campus-wide interim/formative assessments aligned to standards, administered at least 2 times per year in core subjects.	3.26	.720
7. I examine "lagging indicators," such as results of annual TAKS, to study past instructional practices.	3.35	.589
8. I examine "leading indicators," such as results of interim/formative assessments to inform immediate instructional decisions.	3.32	.637
9. I gather data in the classroom and hold data-driven meetings to better understand students' progress toward student achievement goals.	3.21	.672
10. I have communicated clear and defined student achievement goals for each subject area.	3.33	.648
11. I create explicit expectations and norms, by stating explicitly that data use is non-negotiable and models appropriate behavior.	3.17	.643
12. I use data to shape the vision of my campus.	3.01	.616
Principal Uses Data to Design Teacher Professional Development ($\alpha = .80$)	3.29	.592
13. I ensure that teachers have regular opportunities to access and use data individually and in teams to review and gauge student learning and alter their instruction accordingly.	3.26	.597
14. Data analysis has helped to identify professional development needs in my school.	3.26	.587
15. Data analysis helped me to identify areas of teaching/learning that need to be addressed in my school.	3.35	.593

* α = Cronbach's alpha, M = Mean, SD = Standard Deviation

Student Achievement

Table 3 displays the results of the percentage of students passing the TAKS mathematics and reading assessments at the campus level. The greatest percentage of students passing TAKS math and reading was associated with the elementary schools. In contrast, the lowest percentage of students passing both state-mandated assessments was associated with high schools. The results mirror the state averages where high schools tend to have a lower percentage of students passing each of the TAKS assessments, while elementary campuses continually have a larger percentage of students passing each of the state-mandated assessments.

Table 3

Means and Standard Deviations of the Percentage of Regular Education Students Passing Reading and Mathematics TAKS

Campus Level	Math			Reading	
	N	M	SD	M	SD
Elem. School	249	83.10	9.279	87.04	7.932
Middle School	56	72.61	11.287	87.93	5.353
High School	70	54.46	17.690	79.86	10.822
Total	375	76.18	15.989	85.83	8.709

Structural Equation Model

The analysis employed a fully recursive SEM model, which tested principal data use constructs (latent variables of the three subscales of the Principal Data Use instrument) on student achievement. By estimating the most likely relationships between variables, the model was also modified by adding paths of statistical significance between the variables that made theoretical sense in order to improve the fit until a final best model was obtained. Model fit indices, including the comparative fit index (CFI) and the root means square error of approximation (RMSEA), were examined to determine how well the model fit the data. The results revealed a RMSEA of .048, while the CFI value was .97.

The RMSEA is a measure of the approximate fit in the population and is concerned with the discrepancy due to approximation (Steiger, 1990). The RMSEA is bound below by zero. According to Steiger (1990) and Browne and Cudeck (1993), a "close fit" is a RMSEA value less than or equal to .05. Further, Browne and Cudeck consider RMSEA values < .05 a good fit, values between .05 and .08 as an adequate fit, and values between .08 and .10 as a mediocre fit, whereas values > .10 were not acceptable. Although there is general agreement in the field that

the value of RMSEA good model fit should be .05 or less, Hu and Bentler (1999) suggested an RMSEA cutoff value of less than .06 as an indication of good fit of the model to the data.

The CFI ranges from zero to one with higher values indicating better fit. A rule of thumb for the CFI index is that .97 or greater is indicative of good fit relative to the independence model, while values greater than .95 may be interpreted as an acceptable fit (Hu & Bentler, 1999).

The results of the final SEM model displayed in Figure 1 revealed that principals' use of data to design teacher professional development had a statistically significant positive impact on student achievement (17.288, $p < .01$). Note: path parameter estimates measure the degree of effect produced by one variable on the arrow-pointed variable. In contrast, principals that use data to shape the vision had a statistically significant negative impact on student achievement (-11,879, $p < .01$). Interestingly, principals' direct use of data in isolation without teacher collaboration to improve student achievement had no effect on the outcome variable (5.362, NS), net the effect of the remaining variables. Note that campus level and campus socio-economic status was negatively associated with student achievement. However, principals' use of data to improve student achievement had a positive statistically significant impact on principals' use of data to design teacher professional development, which indirectly impacted student achievement (.83, $p < .01$). The results indicate that principals using data to monitor student achievement in collaborations with teachers to design professional development is associated with increased student achievement. While the focus group discussions and evidence provided by principals regarding how principals use data were not clearly aligned with improving student achievement (i.e., using data that was a year behind and using formative assessments that were not psychometrically sound), the finding does support Young's (2006) notion that shared leadership

focused on data use affects teachers' motivation for using data and "correspondingly loosens or tightens the connections between data-driven rhetoric and teachers" (p. ?) data practices. Teacher focus groups revealed that teachers on campuses where principals regularly analyzed data and discussed the results with teachers were more likely to teach the required content. While the data being analyzed by the principals may not have been statistically sound, the fact that teachers were aware that their results were monitored increased teacher urgency to ensure that students were learning. This awareness appeared to have a greater impact on teachers work in the classroom than did the application of the results derived from the principals' analyses to the classroom setting.

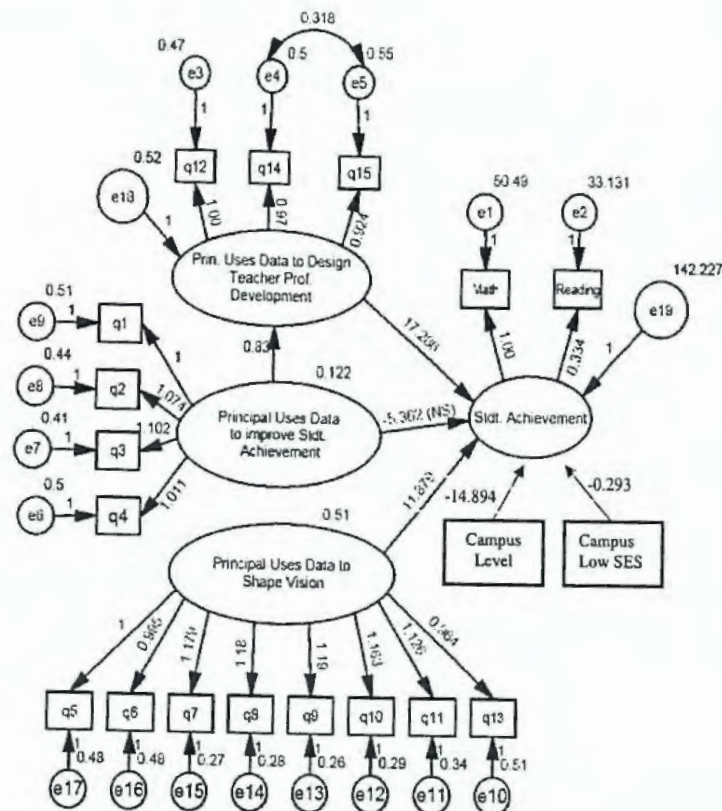


Figure 1. Principal's Use of Data and the Impact on Student Achievement (sample size =375; chi-square =101.025; degrees of freedom = 114; probability level =.196; RMSEA =.048; CFI =.97; Estimator = WLSMV)
 NOTE: RMSEA =root mean square error of approximation; CFI =comparative fit index; WLSMV= weighted least squares mean and variance adjusted; NS = not statistically significant; e = error; q = question (see Table 2).

In summary, teacher awareness that the principal is regularly monitoring classroom performance was positively associated with increased student achievement. However, the results of the principal focus groups and the SEM analysis revealed that principals do not have the requisite skills to properly analyze data and apply the results to the classroom. While one-shot professional development opportunities for principals are plentiful, which are often taught by

individuals that generally do not have the requisite skills, the only logical place to ensure that principals are proficient in analyzing data and applying the results to the classroom setting is during the training program. In the era of accountability, university preparation programs must rethink how they are currently preparing principals and include data analysis courses that are taught by experts in the field. Proper data analysis and application of results coupled with teacher awareness could be a very powerful combination.

Discussion

The results of the current study indicated that principals often use data to improve student achievement, shape the vision of the campus, and design teacher professional development. However, the SEM analysis results revealed that the path from principals using data to shape the vision to student achievement was negative (-11.879, $p < .01$). A plausible explanation for the finding could be attributed to the fact that translating vision into reality can be difficult (Simaki, 2006). This is especially true if the vision is not developed in collaboration with stakeholders as Young (2006) clearly points out.

Focus groups conducted in each of the districts with a randomly selected group of teachers representing the participating campuses further revealed that the vision was largely ignored by teachers on campuses where the vision was not developed in collaboration with stakeholders. Further, focus group members from these same campuses voiced concerns that the principal was disconnected with the actual work taking place in the classroom and basing decisions on data that was not an accurate representation of actual student learning. In each of the participating districts, formative assessments were developed at the district level and administered at least 3 times per year. However, the formative assessments were not taken seriously by teachers. Teachers indicated that the assessments were poorly designed

accurate reflection of what was taught during the interim between assessments. Yet, principals continually used the data derived from the assessments to make instructional decisions. According to Dervin's Sense-Making Theory, information is used to bridge the gap between the situation and an outcome. However, the information used to bridge the gap in such a high-stakes environment should be accurate.

The results regarding principals' using data to improve student achievement did not have a statistically significant direct effect on student achievement. Focus groups conducted among principals in each participating district revealed that principals were primarily reviewing prior-year test results, which can be considered "autopsy-type reports" and formative assessment results during the year with little or no teacher input. While reviewing past-year data is not necessarily wrong, it can lead to erroneous decisions given that the tests are normed at the grade-level and not linked from year-to-year. Further, after in-depth probing, it was determined that the formative assessments were not producing accurate results. More succinctly, the tests were not taken seriously by teachers or students due to the inadequacies of the formative assessments discussed earlier. Interestingly, principals were aware of the inadequacies of the formative assessments, but continued their use of the results of the assessments nonetheless. In short, principals were making decisions based on inaccurate data. As O'Day (2002) submits, "If principals are to "incorporate the information into their cognitive maps or repertoire of strategies, they must attend to it to ensure quality data and must have sufficient knowledge and ability to interpret it" (p. 299). The finding was consistent across campus principals from each district.

While principals' using data to improve student achievement did not have a direct impact on student achievement, it did have an indirect affect on student achievement when practiced in conjunction with principals using data collaboratively to design teacher professional

development (.83, $p < .01$). In addition, principals' using data to design teacher professional development in collaboration with teachers had a positive statistically significant direct impact on student achievement (17.286, $p < .01$). Both teacher and principal focus groups from campuses that were led by principals who were collaborative in their leadership style and indicated a greater focus on data use affected teachers' motivation for using data from multiple sources correspondingly loosened or tightened the connections between data-driven rhetoric and teachers' data practices. The finding is in line with Young (2006) who suggested that both depth of activity and breadth of collaboration are important developmental considerations that school leaders can influence. It is apparent, based on the findings from the current study, that principals who make use of DDDM in a silo will have many challenges. The findings support the notion that DDDM must be practiced in collaboration with teachers and other stakeholders to have a positive impact on improving student achievement.

While Dervin's (1992) Sense-Making Theory is relevant in the context of schools, the data that is used to bridge the gap between the situation and the outcome must be accurate and come from multiple sources. The qualitative (focus groups) and quantitative findings from the current study are important for educational leadership programs. Because the pre-service preparation of principals in assessment and data analysis has been weak or nonexistent, educational leadership programs must ensure that principals have the skills, preferably taught in the department of educational psychology, to construct assessments and analyze data prior to exiting the preparation program. Attempting to acquire the necessary skills after completing the preparation program in one-shot professional development sessions is no longer acceptable. This is especially important in the context of high-stakes testing and the requirements of NCLB (2001).

Based on the results of this study and reports calling for reform, the field of educational administration must rethink what we do to ensure that the work contributes to, rather than detracts from, quality preparation that is connected to practice. This endeavor will require that all levels within the field come together to seek a mutual and complex understanding of the context and the stakeholders that work within. Further, common ground must be found and shared goals developed around teaching principals to use scientifically-based research based on quality empirical data to change student academic behavior. Like many issues confronting our nation today, the challenges facing educational leadership are complex and interconnected. Challenges such as retooling our programs to ensure that principals have tools to properly analyze data must be approached in light of their complexities.

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**Professional Learning Communities:
Are Schools Ready to Collaborate to Educate?**

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Introduction

Every school in Texas has a common goal: students must pass the state-mandated test called the Texas Assessment of Knowledge and Skills (TAKS). With pressure from the state and federal government to raise achievement scores, schools are frantically searching for a program that will guarantee student success. Unfortunately, no program will be found because it is *people*, not programs, who make a difference in education.

The authors selected a rural, elementary school, located in a small East Texas community that serves approximately 350 students: 21% African American, 21% Hispanic, and 58% White (Texas Education Agency, Academic Excellence Indicator System (AEIS) report, 2007-2008). Since 2002, this elementary school has earned the rating of *Recognized* seven times. *Recognized* recognition is accomplished when 80% of the students master the standardized tests. Each year, teachers and students work diligently to raise the campus to the next level, *Exemplary*. *Exemplary* recognition is accomplished when 90% of the students master the standardized tests. Like many schools in Texas, new programs are initiated with hopes of helping all students succeed, yet these programs are discarded quickly as something new promises better results. In the past five years, the teachers at this school have witnessed several program changes. After spending two years developing the Craine curriculum document, that curriculum was promptly set aside to make room for C-Scope, another curriculum document designed to help educators teach students at a higher level, thereby giving students the tools to be successful on TAKS.