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A Systematic Examination of Data-Driven Decision-making within a School Division: The Relationships among Principal Beliefs, School Characteristics, and Accreditation Status

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A Systematic Examination of Data-Driven Decision-making within a School Division: The Relationships among Principal Beliefs, School Characteristics, and Accreditation Status

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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This non-experimental, census survey included the elementary, middle, and high school principals at the comprehensive schools within a large, suburban school division in Virginia. The focus of this study was the factors that influence building administrators in using data to make instructional decisions. The purpose was to discover if there is a difference in the perceptions of elementary, middle, and high school principals of data use to make instructional decisions within their buildings. McLeod's (2006) Statewide Data-Driven Readiness Study: Principal Survey was used to assess the principals' beliefs about the data-driven readiness of their individual schools. Each principal indicated the degree to which they agreed or disagreed with statements about acting upon data, data

support systems, and the data school culture. Twenty-two items aligned with four constructs identified by White (2008) in her study of elementary school principals in Florida. These four constructs or factors were used to determine if there was a significant difference in principal beliefs concerning teacher use of data to improve student achievement, principal beliefs regarding a data-driven culture within their building, the existence of systems for supporting data-driven decision-making, and collaboration among teachers to make data-driven decisions. For each of the survey items a majority of the responses (≥62%) were in agreement with the statements, indicating the principals agreed slightly, agreed moderately, or agreed strongly that data-driven decision-making by teachers to improve student achievement was occurring within the building, a data-driven culture and data supporting systems exists, and teachers are collaborating and using data to make decisions. Multiple analyses of variance showed significant differences in the means. Some of these differences in means were based on the principals' assignment levels. While both groups responded positively to the statement that collaboration among teachers to make data-driven decisions, the elementary principals agreed more strongly than the high school principals. When mediating variables were examined, significance was found in principals' beliefs concerning teacher use of data to improve student achievement depending on the years of experience as a principal. Principals with six or more years of experience had a mean response for Construct 1 of 4.84 while those with five or less years of experience had a mean of 4.38, suggesting that on average those principals with more experience had a stronger belief that teachers are using data to improve student achievement. There is significance

between the means of principals with three or fewer years versus those with more than three years in their current assignment on two of the constructs – a data-driven culture and collaboration among teachers. Principals with less time in their current position report a slightly higher agreement than their less experienced colleagues with statements about the data-driven culture within their school. Significant difference was also found between principals' beliefs about teacher collaboration to improve student achievement and their beliefs regarding collaboration among teachers using data-driven decision-making and the school's AYP status for 2008-2009. Principals assigned to schools that had made AYP for 2008-2009 moderately agreed that teachers were collaborating to make data-driven decisions. In comparison, principals assigned to schools that had not made AYP only slightly agreed that this level of collaboration was occurring in their schools.

This dissertation was created using Microsoft Word 2003.

CHAPTER 1

Introduction

"Now that we have all this useful information, it would be nice to be able to do something with it." (UNIX Programmer's Manual)

Public schools currently exist in a high-stakes accountability environment created by the *No Child Left Behind Act of 2001* (NCLB). Under NCLB, schools are working to close the achievement gap between subgroups of students to ensure that all students achieve academic proficiency by 2014. According to the Virginia Department of Education, the achievement gap is defined as an observed disparity on a number of educational measures between the performance of groups of students, especially groups defined by gender, race/ethnicity, ability, and socio-economic status (www.doe.virginia.gov). Examples of educational measures that show achievement gaps are standardized test scores, grade point averages, drop-out rates, and college enrollment and completion rates.

As 2014 approaches, schools are expected to make Adequate Yearly Progress (AYP). Every state determines the progress schools and divisions must make each year toward

the goal of 100% of students achieving the state's minimum academic standards in reading and mathematics by 2014. Thus, there are strong incentives for educators to systematically collect and use data to inform instructional decisions to these ends. If these data are to be used effectively, teachers and building administrators must be provided with professional development opportunities to learn how to analyze disaggregated data to assess student learning and to inform instructional decisions. Furthermore, teachers must learn how to work collaboratively to assess data once it has been collected.

The school division in this study, like most school divisions, currently has an information data system (IDS) for collecting and housing data from state-mandated testing, standardized tests, and county-mandated benchmark testing. Data is available within the schools and accessible through IDS to principals and teachers. Data availability, though, must be combined with consequential data use. The U. S. Department of Education (2008) reported that "among teachers with access to a data system, there were differences across teacher groups in the proportion using data to help determine how to pace instruction" and identify skill gaps. Killion and Bellamy (2000) stated:

> Understanding and using data about school and student performance are fundamental to improving schools. Without analyzing and discussing data, schools are unlikely to identify and solve the problems that need attention, identify appropriate interventions to solve those problems, to know how they are progressing toward achievement of their goals. Data are the fuel to reform. (p. 27)

Although teachers and administrators in the school division that is the focus of this study have access to data through an information data system (IDS), this research will only focus on the building principals. The principal is to be the instructional leader within

the school and is responsible for directing teachers, curricula, and professional development to improve classroom instruction (Glickman, 1990). When instruction does not improve, Glickman states the principal shoulders "the responsibility for not permitting teachers to be successful" (p. 5). Thus, this study will investigate the beliefs of principals regarding the use of data and data-driven decision-making.

Rationale for the Study

The most significant changes in testing and assessment have occurred within the last several decades; assessments are no longer used solely for diagnostic reasons or to measure student progress (Shepard, 2000). High-stakes assessments, in part, are used to determine the effectiveness of schools, school leaders, and individual classroom teachers. Assessments and accountability continue to be of immediate, urgent relevance to educators due to the 2001 reauthorization of the Elementary and Secondary Education Act of 1965, commonly known as the No Child Left Behind Act (NCLB). The use of data will prove to be vital in accountability measures and school improvement efforts (Culp, Honey, & Mandinach, 2003). Under NCLB schools are expected to make continuous improvement, and this requires ongoing assessment and analysis of student achievement. Continuous improvement is measured at the federal level as Adequate Yearly Progress and drives data collection and data use at the school level.

No Child Left Behind calls for every child to be tested throughout their academic career. The scores from these tests are to be disaggregated for various subgroups, presenting districts with an opportunity for data driven decision-making (DDDM)

(Hardy, 2003). The DDDM model is based on having reliable baseline data, measurable instructional goals, frequent formative assessments, professional learning communities, and focused instructional interventions to improve student achievement (McLeod, 2005). The federal government through NCLB and the local school division in this study expect teachers to use disaggregated data from formative assessments to alter teaching practices to increase student mastery over time. The NCLB legislation assumes that teachers and administrators know how to learn from student assessment results and that they have the time and support they need to do so (Sharkey & Murnane, 2003).

Overview of the Literature

The No Child Left Behind Act (NCLB), as a result of §§ 200.13 through 200.20 of the statutory provisions in section 1111(b)(2) requires each state to determine what constitutes Adequate Yearly Progress (AYP), "particularly the interrelationship among the timeline, starting points, intermediate goals, and annual measurable objectives that are part of AYP" (www.ed.gov, p. 71710); thus, the Virginia Board of Education has established yearly achievement benchmarks in reading and mathematics. These yearly achievement benchmarks are the Annual Measurable Objectives (AMOs) used to evaluate AYP. The state has defined incremental steps spanning from 2001 to 2014 as the goal reaches 100% of students passing these yearly assessments that determine AYP under NCLB. AYP requires an increasing percentage of students within designated subgroups, which include students who have disabilities, are economically disadvantaged, are members of major racial and ethnic groups, and are limited-English

proficient, to demonstrate proficiency on reading and mathematics tests until the NCLB goal of 100% proficiency is reached by 2014.

The expectation is for all students to pass the state assessments, which in Virginia are called the Standards of Learning (SOLs) tests. One hundred percent of students in the following six subgroups must demonstrate proficiency by 2014:

- Students with disabilities
- Limited English Proficient (LEP) students
- Economically disadvantaged students
- White students
- Black students
- Hispanic students

According to the Virginia Department of Education web site (www.doe.virginia.gov), a proxy percentage of 14% for reading and 16% for mathematics is added to the pass rates for the subgroup of students with disabilities if that is the only subgroup preventing a school from making AYP. This "proxy percentage is to represent the number of students with disabilities who would have demonstrated proficiency on modified reading and mathematics assessments" (http://www.doe.virginia.gov). This proxy has been applied each year through 2008-2009, but it is not guaranteed in future years.

In the past three years, Virginia's Annual Measurable Objectives (AMOs) for mathematics have increased from 67% to 79%. During this same time period, the AMOs for Reading and Language Arts have increased from 69% to 81%. While the AMOs keep climbing, how school leaders and teachers are using the available technology to analyze data as it relates to student progress is not totally understood (Sulser, 2006).

Data

Educational data are usually defined as factual information, such as measurement or statistics, used for calculations. Data can consist of such measurements as scores on nationally norm-referenced assessments, on statewide high-stakes testing, division benchmark testing, departmental common assessments, or teacher-generated assessments. Attendance rates, graduation rates, and discipline dispositions are additional forms of data collected in educational settings. These various types of data are often tied to student achievement. The availability of data itself, though, is not the answer to improved student achievement. Schools have countless sources of data, but the availability of data does not ensure that teachers are able to use student achievement data to assess their effectiveness or improve their instructional practices (Eaker, DuFour & DuFour, 2002).

Johnson (2004) states that administrators must recognize that as the need to improve student achievement increases, the need for access to data in real-time grows. Teachers need immediate access to student performance data to determine the growth of individual students and subgroups of students to help create site-driven school improvement plans if they are going to better prepare students for the 21st century. Teachers must continually make instructional adjustments within the classroom that have a direct impact on student achievement. If schools are going to be transformed into places where every student is meeting or exceeding the standards, teachers and administrators must shift their thinking to focus on the desired results (O'Neill & Consemius, 2006). In this context, teachers need to be able to change their instructional practices based on performance data from a variety of ongoing, formative assessments.

Black and Wiliam (2003) noted that: “From their earliest use it was clear that the terms ‘formative’ and ‘summative’ applied not to the assessments themselves, but to the functions they served” (p. 623). Formative assessments are ongoing assessments that provide feedback to individual students, and teachers use the feedback from formative assessments to inform instructional decisions. Examples of formative assessments are teacher-generated assessments, common assessments, benchmark tests, portfolios, projects, journal entries, warm-up exercises and exit passes accompanied by specific corrective feedback (Stiggins, 2005). While Black and Wiliam (1998b) found that the use of formative assessment resulted in gains for students of all ability levels, they found the effect size was significantly greater for lower-performing students.

Districts must support schools and teachers as they learn how to ask instructionally relevant questions of data and learn how to answer such questions using data (Sharkey & Murnane, 2003). Teachers also need to work collaboratively to improve student learning (Eaker, DuFour & DuFour, 2002). Newman, Smith, Allensworth and Bryk (2001) wrote that when teachers work alone to make sense of student assessment results, what they learn is unlikely to contribute to the creation of a coherent instructional program. While teachers are ultimately responsible for increasing student learning, changing the organizational conditions for improvement across schools is the main task of school administrators (Halverson, Grigg, Prichett & Thomas, 2005a).

The use of data is particularly important in reading and mathematics since student performance in these areas is tied to accreditation and making Adequate Yearly Progress (AYP). Many public schools are struggling to meet Virginia’s 2008-2009 expectations

that 79% of students pass the mathematics state assessment and 81% pass the reading state assessment across the board and within subgroups. Students with disabilities, ESOL students, and economically disadvantaged students are trailing their peers in mathematics and reading achievement (www.doe.virginia.gov). The schools that are making AYP with students with disabilities may be relying on the proxy percentages, 16 percentage points for mathematics and 14 percentage points for reading, that are added to the pass rates for this subgroup. As the pass rates for making AYP continue to climb annually toward 100% in 2014, it is important to know which schools and administrators, if any, are making data-driven decisions in an effort to improve student achievement.

Data-driven decision-making (DDDM) is, in part, using results from formative assessments to improve instruction to increase student achievement. This process of using data as evidence for implementing an appropriate instructional program is fundamental to NCLB and necessitates the need for timely and easy access to data. Many school divisions, as the one in this study, accomplish timely and easy access to data through the use of a data management or information data system.

Information Data Systems

Continuous school improvement involves ongoing assessment and analysis of student achievement. Likewise, NCLB (2002) requires all schools to implement plans for continuous school improvement. The tracking of school improvement relies on accurate and accessible student achievement data (Sulser, 2006). The use of a data management system provides schools the means to effectively manage assessment data. Schools and

districts need to use the data in the data management system effectively to adjust instructional practices to enhance the learning experience for all students (Hickey, 2002).

While a data management system is often referred to as a data warehouse, a data management system can be used for more than merely data storage. Some localities are administering benchmark assessments through, and housing the results in, their data warehouse. Data is immediately accessible to teachers, administrators, curriculum specialists, and central office personnel. Data is disaggregated by NCLB subgroups, and item analyses are just a click away. Data can be analyzed by school, teacher, class or individual student. It is possible to drill down to view information and ascertain the skills that individual students have or have not mastered. "Tools for disaggregating and grouping also make it possible to identify groups of students who need special interventions, draw conclusions about curriculum areas that are particularly strong or weak, and generally shape instructional programs based on achievement data" (Salpeter, 2004, ¶ 8).

The school system in this study uses a data management system known as IDS (Information Data System). As of December 2008, all administrators and core teachers have been trained on accessing information in IDS and may have received minimal training on using data to make instructional decisions to improve student performance. The information currently available to principals and teachers through IDS is limited to benchmark testing results. With limited access to the data and minimal training on using data, to what extent are teachers and principals using data to make instructional decisions in this school division? While the division mandates that schools give benchmark tests in

mathematics at pre-determined intervals throughout the academic year, schools are not required to administer benchmark tests in reading if the school's pass rate from the previous year indicate they are not a bubble school. The term bubble school refers to a school that would not meet this year's AYP pass rate given last year's test results. The required benchmark assessments are to be administered online so disaggregated results are available immediately through IDS. If these assessment results are not used by teachers and/or administrators to support learning, the benchmark tests become summative assessments rather than formative assessments and most likely have limited or no impact on instruction and learning.

Professional Development

The accountability movement, and NCLB specifically, encourages and supports the training of teachers and administrators to effectively integrate technology to collect, manage, analyze, and learn from a wide array of data to improve teaching and learning (Salpeter, 2004). The assumption of NCLB is that effective use of data leads to better decision-making, more appropriate school improvement efforts, and increased accountability (Salpeter, p. 202). The use of technology has transformed a time-consuming process and condensed it into mere seconds. For example, the Virginia Standards of Learning (SOLs) assessments can be given online and results can be almost instantaneous if the version of the assessment taken has already been equated by the state.

Living in a data rich world does not necessarily result in everyone using data. For example, some teachers do not see their role extending beyond teaching the curriculum to analyzing the available data. According to Ingram, Louis, and Schroeder (2004), until

recently teachers could choose to ignore outcome data, as "the notion that teachers should, collectively, take responsibility for student outcomes is both recent and controversial" (p. 1278). Ingram et al. found that about 40% of the teachers and administrators in their study described using systematic data for decision-making, while another 40% reported using anecdotal information, experience or intuition for making decisions. A smaller number, about 15%, indicated that they used both systematic and non-systematic data to make decisions. Teachers and administrators can learn how to use systematic and/or non-systematic data to drive decisions through participation in professional learning organizations.

Professional Learning Communities

The transformation of learning organizations into learning communities occurred in the latter part of the 1990s. Katzenbach (1998) helped establish frameworks on how learning organizations should be structured, and schools began to use this framework to establish learning groups for teachers. DuFour (2004) referred to learning groups of teachers as professional learning communities (PLCs). More specifically, a PLC is a grouping of teachers who meet collaboratively on an ongoing and regular basis to promote the sustained learning of the teachers for the collective purpose of enhancing learning (Bolam et al., 2005). The use of the term PLC and its meaning can vary from school to school (DuFour, DuFour & Eaker, 2008). A school may refer to the entire faculty as a PLC, yet it may label smaller units, such as departments or grade levels, within the school as PLCs. Regardless of the size, a professional learning community is

exemplified by an environment that promotes mutual cooperation, emotional support, personal growth, and a synergy of efforts (DuFour & Eaker, 1998).

Professional learning communities foster teacher learning that leads to increased student achievement (Mullen & Hutinger, 2008). Wood (2007) "suggests teacher learning communities offer the opportunity to recapture a Deweyan approach to teacher professionalism, one that involves systematic observations and analyses of classrooms and student work and ongoing collegial dialogue" (p. 281). PLCs build a culture of learning for teachers and students within the school. The supportive culture enables teachers to coordinate efforts to improve instruction and examine data through purposeful conversations (Strahan, 2003).

Data-Driven Decision-making

Data-driven decision-making (DDDM) is defined in an educational context by the U. S. Department of Education's Office of Planning, Evaluation and Policy Development (2008) as "the analysis of student data and information concerning educational resources and processes to inform planning, resource allocation, student placement, and curriculum and instruction. The practice entails regular data collection and ongoing implementation of a continuous improvement process" (p. 1). Educators need to be able to successfully analyze data from frequent, formative assessments to alter instructional practices for the purpose of achieving a variety of goals that are linked to program growth, improvement, and sustainability.

Frequent assessment throughout the school year more accurately indicates student understanding. As such, O'Shea (2005) believes benchmark testing should be an essential

component of a school's assessment program. The results from benchmark testing can be housed in a data management system where the data can be easily accessed by teachers and administrators. Instructional leaders need to analyze the data to identify the strengths and weaknesses of individual students and use this information to effectively improve instruction through direct modifications in classroom practices. Black and Wiliam (1998b) found that formative assessments can provide timely information on students' mastery of specific skills and the effectiveness of instructional interventions, contributing to effective school improvement strategies. While benchmark assessments can be considered both summative and formative assessments, they are only formative assessments if meaningful feedback is provided.

Salpeter (2004) and Sulser (2006) state that student learning needs to be assessed on a continuum – quarterly, monthly, weekly and even daily. While having a continuum of data available to examine student learning over the course of a school year, an important aspect of data-driven decision-making is to have longitudinal data. Longitudinal data allows schools to monitor trends. Student progress over time can provide key information as to the effectiveness of intervention strategies and curricula programs. Longitudinal data can be an asset to classroom teachers as they assess where their students are instructionally as well as show them where their students are in future years.

Data-Driven Decision-making (DDDM) and Adequate Yearly Progress (AYP) seem to provide a natural link to benchmark testing and the concept of formative assessment. Benchmark testing programs can assure instructional leaders that teachers are teaching and students are learning. Benchmark testing provides teachers with data about student

performance compared to curriculum standards (O'Shea, 2005). A series of benchmark tests can determine if students are retaining the skills and knowledge over time. English (2000) found when benchmark tests have been mapped to the state's framework and standards, they prepare students for the high-stakes state testing usually administered near the end of the school year.

For data to be meaningful, it needs to be used to improve teaching and support student learning. Using data to make decisions is the basis of DDDM. For DDDM to be effective, it is important that there is a culture within the school that supports data inquiry. According to Schein (1985), creating and maintaining the culture within an organization is the only thing of real importance that leaders do.

Research Questions

The purpose of this study is to discover if there is a difference in the perceptions that elementary, middle and high school principals have about the use of data within their schools. The researcher will survey the 61 school principals, spanning the elementary, middle and high school levels, within a large, suburban school division in Virginia. The questions that will be addressed include the following:

1. Is there a difference among elementary, middle and high school principals' beliefs about the use of data-driven decision-making by teachers to improve student achievement?
2. Is there a difference among elementary, middle and high school principals' beliefs regarding the data-driven culture within their schools?

3. Is there a difference among elementary, middle and high school principals' beliefs regarding the level of collaboration among teachers to support data-driven decision-making?

Designs and Methods

This non-experimental study employs a survey research design. The research uses a census approach to participant selection. An attempt will be made to obtain survey responses from the principal at each of the 61 comprehensive schools in the school division.

The survey instrument will be McLeod's (2006) Statewide Data-driven Readiness Study: Principal Survey. The survey is comprised of the following five categories of items:

Category 1: Assessments (19 items)

Category 2: Acting Upon Data (17 items)

Category 3: Support Systems (19 items)

Category 4: School Culture (21 items)

Category 5: Demographics and Free Response (11 items)

White (2008) has identified four constructs from within the first four categories of items, and these constructs are as follows:

1. Beliefs regarding use of data-driven decision-making by teachers to improve student achievement
2. Beliefs regarding a data-driven culture

3. Beliefs regarding data support systems
4. Beliefs regarding collaboration among teachers using data-driven decision-making

The first construct concerning principal beliefs in the use of data-driven decision-making by teachers to improve student achievement addresses the first research question. The second two constructs, principal beliefs regarding a data-driven culture and principal beliefs regarding data support systems, can be combined to address the second research question. The final construct regarding principal beliefs about collaboration among teachers using data-driven decision-making addresses the third research question.

Key Terms

For the purposes of this study, key terms have been defined as follows:

Data-driven decision-making (DDDM) – In education, DDDM refers to systematically collecting and analyzing a variety of data, including input, process, outcome and satisfaction data by teachers, administrators and district leaders to guide decisions within a school to help students achieve (Marsh, Pane & Hamilton, 2006, p. 1).

Professional development – This is the formal and informal training that teachers and administrators receive, and it can occur within the school day, outside the school day, and throughout the school year.

Professional learning communities (PLCs) – This is when the structure and culture of a school are focused on student learning outcomes, and teachers work collaboratively, engaging in collective inquiry focused on improving student achievement, and

interdependently to achieve their collective goal. (DuFour, DuFour, Eaker, & Karhanek, 2004)

Summary

This study will add to the current body of literature on the use of data-driven decision-making (DDDM) by principals. Although the literature on DDDM is becoming more prevalent, the current body of literature is limited (Marsh, Pane & Hamilton, 2006). The Rand research done by Marsh, Pane, and Hamilton was a compilation of four studies including "three statewide samples in one case, large districts in a second, small districts in a third, and a large educational management organization in the fourth" (p. 1). Several statewide studies were also completed by doctoral students and include the elementary principals in Florida (White, 2008) and high school mathematics teachers, principals, and district leaders throughout Montana (Sulser, 2006).

With the No Child Left Behind Act calling for all students to meet minimum competency levels on the Virginia Standards of Learning assessments, other school divisions within the state will be looking to these larger, often more affluent, school divisions to assess what strategies have yielded the best results. Using data to drive instructional decisions is likely to be the key to unlocking success for all students.

CHAPTER 2

Review of the Literature

The No Child Left Behind Act of 2001 (NCLB) has provided a framework for educational accountability. Through NCLB, each state has outlined the Adequate Yearly Progress (AYP) schools must make to ensure that all students meet minimum standards in mathematics and reading by 2014. Due to these mandates, there has been an increased need to collect, manage, analyze, and learn from a wide array of data. Some educators have been slow to embrace the use of data, often questioning the quality of the data provided through various venues, such as information data systems and data teams (Lachat & Smith, 2005). Others do not know how to transform data into information that can be used to improve teaching and learning (Feldman & Tung, 2001; Kerr, Marsh, Ikemoto, Darelik & Barney, 2006; Symonds, 2004; Wohlstetter, Datnow & Park, 2008). The research suggests teachers often worry the data will be used to evaluate them so the teachers are not comfortable discussing data with their colleagues or supervisors (Holcomb, 1999). Trusting the data can be another hindrance to using data to change and improve student achievement (Kerr et al.). The leadership within a school can impact many of these factors as schools move from teachers working in isolation to professional

learning communities using data-driven decision-making (Copland, 2003; Lachat & Smith 2005, Supovitz & Klein, 2003; Wayman & Stringfield, 2006).

The use of data to make decisions is not a new phenomenon. Businesses have been using data to make decisions for many decades. In contrast to the work culture in business, the work culture in education normally does not focus on data (Bernhardt, 2004). Schools have traditionally used data to make personnel decisions, as well as for identifying topics for future professional development opportunities (Bernhardt, 2003; Choppin, 2002; Feldman & Tung, 2001). Furthermore, school leaders use data to inform changes in school structures, policies and resources (Kerr, Marsh, Ikemoto, Darelik & Barney, 2006). It is only within the last decade that the mandates of No Child Left Behind Act of 2001 (U.S. Dept. of Ed., 2002) have brought data to the forefront of education. Data collection has become an integral part of the business of K-12 education and is being used to inform educational decision-making (Salpeter; 2004; Secada, 2001). Educational leaders and classroom teachers need to be able to organize and analyze data to make effective instructional changes (Lachat & Smith, 2005).

Accountability

The NCLB legislation has increased the awareness of accountability and data-driven decision-making within both the public and professional arenas. NCLB requires educators to understand and use data from a variety of sources to improve classroom practice and thereby student learning. Data must be disaggregated into subgroups.

According to the U.S. Department of Education (www.ed.gov):

> Disaggregate means to separate a whole into its parts. In education, this term means that test results are sorted into groups of students who are economically disadvantaged, from racial and ethnic minority groups, have disabilities, or have limited English fluency.

Overall, educators are looking at massive amounts of data in hopes of improving school and student achievement in mathematics and reading.

Data-driven decision-making is more than having a data system. The U. S. Department of Education (www.ed.gov) states:

> [Data-driven decision-making] is a set of expectations and practices around the ongoing examination of student data to ascertain the effectiveness of educational activities and subsequently to refine programs and practices to improve outcomes for students. In this rapidly changing field, little is known about the prevalence of data-driven decision-making activities nationally or about the supports and barriers for putting these practices into place.

Through the process of data-driven decision-making, schools will be able to analyze data that is available to build strong educational programs. Bernhardt (2004) states, "Data not only tell us where we have been, where we are right now, and where we are going; data inform us of the ways to get there, sensibly" (p. xi). Thus, data not only predict outcomes, they can be used to prevent undesirable ones. In recent years several studies have focused on using data to make decisions to continuously improve student learning and achievement.

Decision-Making Models

Data-based inquiry and decision-making (DBDM) requires schools to take a comprehensive look at the school and identify strengths and weaknesses using a variety

of data, then develop a plan to address the weaknesses. Feldman and Tung (2001) studied the experiences of six Massachusetts schools whose teachers were trained in data-based inquiry and decision-making. The study involved an in-depth case study of one school successfully implementing DBDM and analyses of qualitative data of this and the five other schools. Feldman and Tung found that DBDM was effectively implemented at only two of the six schools, and of these two schools, only one school was successful in raising achievement. They determined the principal was the key to success, for it was only when the principal had a vision, expected all teachers to participate in the use of data, and supported teachers through the process, that DBDM was truly effective.

Arnold (2007) conducted a quantitative study of 267 middle school principals in South Carolina. He designed his study to determine if a relationship exists between data-driven decision-making and student achievement gains. Arnold found a weak but significant correlation between a school's capacity to use data-driven decision-making and gains in student achievement as measured by report card grades and the 2006 Absolute and Improvement Indices. These indices are based on South Carolina's accountability measures.

Systemic Data Use

Bernhardt's (2007, 2004, 2003, and 2000) vision is that every classroom uses data for continuous school improvement. In order to create a complete picture of a school, Bernhardt (1998) identifies four domains of information that need to be collected and analyzed. The four domains are student demographics, perceptions, school processes, and

student learning. The interrelationships between these four domains are critical to improved student learning.

Teachers should begin each year by setting long-term goals and then assessing students to establish a benchmark. Bernhardt (2007) suggests ongoing assessments throughout the year to make timely course corrections, assuring that students are continually progressing toward the established goal. This extends to administrators monitoring these and other data on a continuous basis and knowing what data reports are needed for the teachers to "understand the impact of their processes on student learning" (Bernhardt, 2007, p. 2).

School processes "define what learning organizations, and those who work in them, are doing to help students learn: what they teach and how they group, teach, and assess students" (Bernhardt, 2007). According to Bernhardt, quantifiable process data can include walk-through assessments, classroom observations, course programs and interventions, and scheduling and use of time. The goal is to create a continuum of learning from kindergarten through the senior year of high school.

This continuum of learning requires an ongoing effort to improve student learning and to improve teacher effectiveness while using the data to maximize the cost effectiveness of programs. Only effective programs should continue to receive funding (Bernhardt, 2007). Bernhardt suggests that teachers, administrators, and central office personnel need to use data to analyze programs and tailor learning experiences to the individual needs of the students. Instructional leadership needs to undergo a metamorphosis if principals are going to successfully navigate in this new data-driven world.

Data-driven Instructional Systems

Data-Driven Instructional Systems (DDIS) is a theory presented by Halverson et al. (2005a) to help understand instructional leadership in a data-driven world. The DDIS conceptual framework arose from a study of four Midwest elementary and middle schools and provides an explanation of how school leaders develop an organizational capacity to use data to reculture and reshape school improvement efforts. School leaders are responsible for "changing the organizational conditions for improvement across schools," (p. 3). Schools need to be transformed from having a culture of internal accountability to having a culture of external accountability.

Teachers need to be able to alter instructional practices as new data are acquired. While this new data can come from a variety of assessments, summative assessments have traditionally been used for this purpose. Teachers need to transition from using summative assessments to using formative assessments to change instructional practices. DDIS has six functions which operate to translate summative data into formative data for improved teaching and learning in schools (Halverson et al., 2005a). The six components to DDIS are data acquisition, data reflection, program alignment, program design, formative feedback, and test preparation (p. 7). DDIS is about translating student achievement data into useful knowledge to inform teaching and learning.

Research has shown that data use varies within the school setting. Halverson et al. (2005b) found in their study of four Midwest elementary and middle schools that school leaders were instrumental in keeping school achievement the focus of all school discussions. Teachers also played a key role in using data to inform classroom practices.

Halverson et al. did find differences across subject matter in data use. Language arts teachers developed a strong professional learning community where data was the center of instructional decisions. This was not true with the mathematics teachers, as they did not come together in professional learning communities to share and analyze data. While special education teachers used the data to create individualized plans for their students, they did not meet collectively with other teachers to look for the systemic causes for poor student learning.

Data-informed Decision-making

Copland, Knapp and Swinnerton (2009) provide conceptual and practical definitions of "data-informed educational leadership" within an inquiry-focused framework on how data are related to the change process for instructional leaders. "Data-informed" incorporates more than data-driven in that instructional leaders need to consider more than the "bottom-line numbers" (p. 156). Core values and insights, as well as institutional contexts, are needed in making data-informed decisions. As Knapp, Swinnerton, Copland and Monpas-Huber (2006) state, "data by themselves are not evidence of anything, until users of the data bring concepts, criteria, theories of action, and interpretive frames of reference to the task of making sense of the data" (p. 10).

Copland et al. (2009) discuss Bodewell, the pseudonym for a school district in the state of Washington. The school district, while high performing, has reached a plateau. The school district demonstrated "specific and intentional efforts to link technology, curriculum and assessment, professional development, and student support in powerful ways" and used a variety of data at the school level to reflect on the past as well as

[envision] the future (p. 168). Copland et al. believe that data-informed leaders do not merely use data to drive decisions but use data on student performance to inform decisions in iterative cycles based on a culture of inquiry. Efforts to increase teaching and learning must be intentional.

Data-driven Decision-making

Several researchers have presented papers and proposed frameworks on the application of business models for knowledge management within education (Petrides & Guiney, 2002; Light, D., Wexler, D. H., & Heinze, J., 2005; Petrides & Nodine, 2006). Petrides and Guiney illustrated how knowledge management could be used by educators to assist in creating an effective learning environment (p. 1702). In education, like in business, the process of changing data into information then knowledge shapes how a school develops its plan and strategies for improvement. The framework that Petrides and Guiney proposed is referred to as an ecological framework, and it "weaves together the actions of building a vision, starting the school's mission, and engaging in reflective practice and inquiry, which are integral to growing a nurturing and well-founded environment that can sustain and meet midair adjustments" (p. 1710). Thus, an ecological framework involves all stakeholders, not just those within the school walls (Petrides & Guiney). The four steps that need to be taken to apply this ecological framework areas follows:

1. evaluate the current availability of information,
2. determine the information to support decision-making,

3. operate within the context and perspective of the school's organizational processes, and
4. assess the school's information culture and politics (p. 1711).

Within the process of gathering, synthesizing, and deciphering the meaning of information, knowledge management emerges. Within the context of schools, this means teachers using information as a tool to individualize planning and instruction for improved student achievement.

Light, Wexler, and Heinze (2005) conducted a three year study on data reporting systems. The study was conducted through the Grow Network for New York City's Department of Education and resulted in a framework for making raw data meaningful. The framework was a simplified version of Ackoff's (1989) conceptual framework that links data, information, and knowledge and encapsulates the process of educators "collecting and organizing data, along with summarizing, analyzing, and synthesizing information prior to acting" (Light, Wexler, & Heinze, p. 3). Underlying all decision-making is human action, so what the educator brings to the process is key.

Two additional studies were conducted by the Rand Corporation to answer the broad question about the different ways educators are using data to make decisions about teaching and learning (Ikemoto & Marsh, 2008, p. 105). Ikemoto and Marsh used previously collected data to look for patterns and develop a framework of data-driven decision-making (DDDM). Figure 1 illustrates Ikemoto and Marsh's framework that shows the progression of data to information to knowledge to action. The data process impacts the outcomes, but once the decision to act on data has been made and

implemented it leads "to a continuous cycle of collection, organization, and synthesis of data in support of decision-making" (Ikemoto & Marsh, p. 109). Ikemoto and Marsh state that educators at the different levels identified in the framework may encounter different obstacles, such as accuracy and accessibility of data, which hinder the process of turning data into valid information and actionable knowledge.

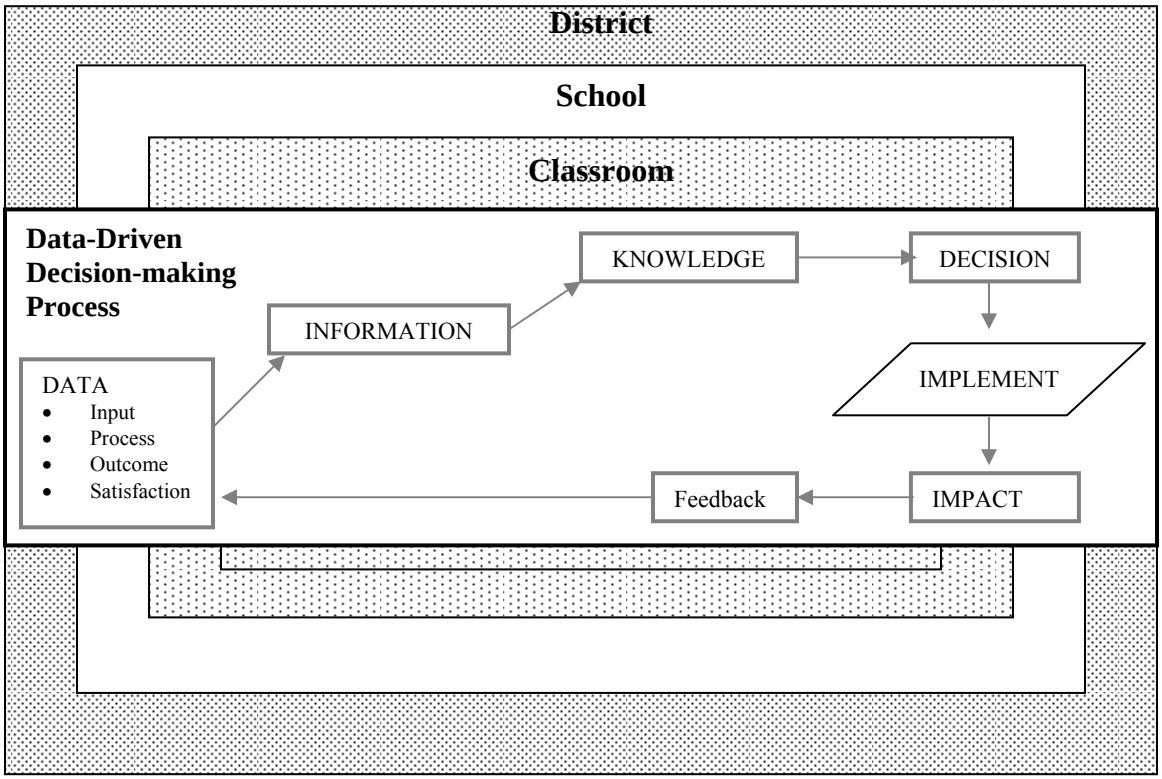

Figure 1. Ikemoto and Marsh's framework demonstrating the process educators use to move from data to action in the DDDM process (2008, p. 109).

McLeod (2005) defines data-driven decision-making as "a system of teaching and management practices that gets better information about students into the hands of classroom teachers" (p. 1). McLeod developed a competency framework based on his

work with the Chicago Public Schools Office of Technology Services eLearning, differentiating data-driven decision-making (DDDM) and the No Child Left Behind (NCLB) legislation. McLeod describes NCLB as an accountability model and DDDM as the driving force behind substantial improvements in student learning. According to McLeod, principals need to provide teachers with the time needed to collaborate, to analyze data, and to act upon the data. He suggests that teachers be trained in teaming and communication so they have the skills needed to effectively collaborate.

Data-driven instruction is defined by McLeod (2005) as having the following five major elements:

1. good baseline data,
2. measurable instructional goals,
3. frequent formative assessments,
4. professional learning communities, and
5. focused instructional interventions (p. 1).

Data-driven educators use summative and formative assessments to make meaningful instructional changes (McLeod). As such, teachers need to be provided with professional development opportunities on data analysis and use.

Most recently, White (2008) completed a census study of elementary school principals in Florida to examine their beliefs about data-driven decision-making using portions of McLeod's (2006) Data-Driven Decision-making Readiness Survey. White (2008) found an indirect relationship between each of the four factors (beliefs regarding teacher use of data-driven decision-making, beliefs regarding data-driven cultures, beliefs regarding

supporting systems, and beliefs regarding collaboration) and student achievement. Student achievement was measured using the Florida Comprehensive Assessment Test (FCAT) and the Norm-Referenced Test scale scores for reading and mathematics in grades 3-5. While the overall results of White's research were inconclusive, two of the four factors, principals' beliefs regarding teacher use of data-driven decision-making by teachers to influence student achievement and collaboration among teachers who use data-driven decision-making, proved significant in all tests.

Data Use

Several studies have reported on factors that promote or inhibit data use. Lachat and Smith (2005) presented the findings of a case study that focused on the use of data in five low-performing urban high schools. They found that data use is impacted by several key factors, including the quality and accuracy of available data, staff access to data in a timely manner, the capacity to disaggregate data, the collaborative use of data around a clear set of expectations, and leadership structures that support school wide use of data.

Another qualitative study about data use by principals was conducted in Virginia in 2002. Six middle school principals from a single school division in a large, suburban school division in Virginia were interviewed for this study (Mathews, 2002). Mathews found that the availability of data aids in the decision-making process with principals, but some principals noted it is critical to have the right data available at the right time to make data-based decisions. Despite the abundance of data available to principals in the

division studied, there were some principals who "lack the resources to make data-based decision" (p. 83).

While the principals in Mathews' (2002) study were provided with summative data, formative assessment data can be used to improve student achievement levels. In 1998, Black and Wiliam completed a meta-analysis of 280 studies focused on raising student achievement. They found that "there is a body of firm evidence that formative assessment is an essential component of classroom work and that its development can raise standards of achievement" (p. 148). Unlike the past when schools historically used assessment data to identify student differences and rank students by achievement, educators are using assessment data to help students meet standards (Stiggins, 2007). Stiggins suggests using assessment *for* learning, as opposed to assessment *of* learning. Assessment for learning involves the sharing of information with students to discuss goals and provide descriptive feedback to improve performance.

Barriers to Using Data.

The proliferation of data has not necessarily meant the proliferation of good, informative data. If the data are not accurate and provided in a timely manner to the classroom teacher, then it is not useful data for making instructional decisions (Lachat and Smith, 2005). Lachat and Smith found that within the urban districts they studied the schools often experienced a lag in data access due to student mobility and dropout rates between ninth and tenth grades. The other issue cited by Schmoker (2003) is having data at the right time in the right format. Data system personnel and end users need to work in

collaboration to make the data accessible in a user-friendly and timely format (Lachat and Smith).

The lack of time to review and analyze data has been cited as a barrier to data use (Bernhardt, 2004; Holcomb, 1999; Ingram, Louis & Schroeder, 2004). It is not just time to work, but time to work collaboratively, that Holcomb found as a common factor in three success stories. Wayman and Stringfellow (2006) found that all three principals in their qualitative study found creative ways to build time into the school day for teacher collaboration. Love (2009) concurred that schools need to build time into the school day for collaborative planning and reflecting with colleagues. Love sees this time for collaboration as a necessity for school improvement, and many school improvement experts suggest at least 45 minutes per week of unencumbered data time. Halverson, Grigg, Prichett and Thomas (2005a) suggest "data retreats" to provide the time needed to reflect on data.

Data Disaggregation

Multiple studies support the need for disaggregation for effective data use (Bernhardt, 2000; Holcomb, 1999; Lachat and Smith, 2005; Love, 2000). Lachat and Smith, in a case study, looked at conditions and practices that either promote or act as barriers to data use for school reform (p.334). They found that data disaggregated by federally-mandated subgroups permitted more targeted instructional decisions. Disaggregated data tends to be more meaningful data. Lachat and Smith found that school teams came to see the disaggregated data as "their" data (p. 342). One of the urban districts studied by Lachat and Smith determined that they had multiple issues – student attendance and the quality

of instruction – when they disaggregated their data to look at performance on statewide testing versus attendance data. Lachat and Smith (2005) compared course grades with state test scores, and they found that there was not always a correlation between these two outcomes. Their research resulted in schools making different instructional decisions. For example, teachers in one urban high school turned to better grading practices using rubrics to provide alignment between grades and performance on high stakes assessments. For restructuring low-performing, urban high schools, Lachat and Smith found disaggregated data was essential to examining and guiding progress to improve student achievement.

Collaborative Inquiry

The practice of collaborative data use centered around clear expectations is "a potent strategy for building staff skills and keeping the focus on student learning and achievement," (Lachat and Smith, 2006). The results are far more powerful if the school leaders establish data use as a school wide practice, where the school leaders can be the principal or another administrator, the department chair or a content area coach. Collaboration centered on data can bring a focus and a sense of purpose to collaborative efforts (Wayman and Cho, 2009). Many researchers have found that the data-collaboration relationship allows data use to foster collaboration and simultaneously collaboration to improve data use (Lachat & Smith, 2005; Wayman, 2005; Wayman & Stringfield, 2006).

A potent strategy that Lachat and Smith (2006) found for building skills and maintaining focus on student learning is the practice of collaborative data use centered on

a clear set of questions. However, they found in their case study of five urban high schools that in three of the five high schools this practice is far more powerful if the school leaders are the building champions for data use (p. 343).

Johnson County, Tennessee was the setting of a division wide study on collaborative inquiry by Love (2009). The Johnson County schools employed a collaborative inquiry model which included professional development for data use. They saw gains with all student subgroups. Students scoring proficient or advanced proficient in mathematics increased from 77% to 92% from 2003 to 2006. During this same time period, low socioeconomic status students saw performance gains of 17 points from 72% to 89% while students with disabilities went from 36% proficient or advanced in 2004 to 73% in 2005. These gains were sustained in 2006. Similar results were experienced in reading, with students with disabilities jumping from 54% to 70% over the three years. Love attributed these sustained gains to collaborative inquiry among teachers.

Trust

Standards and accountability policies are in place, but for them to be effective in changing the culture of teaching and learning, schools must use accountability data. On the basis of the data, decisions are made to continue on the same path or to change practices. If practices are changed, schools must monitor the effectiveness of those changes.

A study of nine high schools that were nominated as leading practitioners of continuous improvement practices was undertaken by Ingram, Louis, and Schroeder (2004, p. 1258). The results showed that while teachers are willing to use data, there are

concerns about the kind of information available and how data are used to judge their own performance or that of their colleagues.

Similarly, Holcomb (1999) found that the greatest conundrum schools face in getting teachers to use data is the fear of evaluation. This is despite the fact that Holcomb found no accounts of teachers being terminated based on student performance data. The other issue is anxiety over perceived inadequacies being exposed to their colleagues – whether the perceived inadequacies are instructional or technological in nature.

Capacity for Data Use

Studies indicate that teachers lack the expertise to use data effectively (Feldman & Tung, 2001; Kerr et al., 2006; Symonds, 2004; Wohlstetter, Datnow & Park, 2008). Feldman and Tung based their multi-site case study on six affiliated public schools. One school was K-8, three were middle schools (Grades 6-8), and two were high schools (Grade 9-12). Multiple methods of data collection included interviews, observations and examination of artifacts. Feldman and Tung found that principals lack the expertise to use data effectively. The teachers expressed concern over the school's institutional capacity to dig into the data and emerge with the "right" question. Feldman and Tung suggest external support, such as a data coach, to assist with the data analysis process to assure meaningful use of the data. Teachers expressed a need to have assistance in adhering to district and school timelines.

Resources can also impact the capacity to use data. Kerr et al. (2006) found that "many school districts, particularly in urban districts, lack adequate human and financial resources to successfully use data to drive improvement," (p. 497). Kerr et al. also noted

that when resources are allocated for professional development and technical assistance, teachers and principals are more likely to perceive data as useful for guiding instructional decisions. Principal support in data use was identified as significant in helping teachers to adapt their practices.

A study by Bettesworth (2006) used a nonequivalent control group, pre-test, post-test design with a convenience sample of pre-assembled classes to examine the effect of professional development about statistical manipulation on administrators' self-efficacy for data-driven decision-making. Thirty-one administrators participated in three seminar sessions. Bettesworth reported that administrators who completed the professional development did learn how to use data as a part of the decision-making process; however, their confidence with making data-driven decisions was reported as low, limiting their overall use of data-driven decision-making. These findings were consistent with previous research on efficacy and its impact on participants' ability to perform tasks using data (Bettesworth).

Similar results were reported by Symonds (2004). In a study of 32 K-8 schools in the San Francisco Bay area, 50% of the low performing schools received professional development at least several times a month for the purpose of showing teachers how to link data to effective instructional practices. The remaining 50% of the schools in Symonds' study did not exhibit large achievement gaps, and less than one-third of these schools report receiving such professional development and 11% reported never receiving any professional development on data use. It was also noted that principals at

schools with larger achievement gaps were more likely to support teachers in seeing data as central to their role as a teacher.

Leadership

The literature clearly suggests that principals play an integral role in the use of data within a school (Copland, 2003; Lachat & Smith 2005, Supovitz and Klein, 2003; Wayman & Stringfield, 2006). Schools that are able to effectively use data have leadership who are committed to the use of data and have built a strong vision for data use within their schools (Choppin, 2002; Feldman and Tung, 2001; Lachat and Smith, 2005). Supovitz and Klein conducted a study addressing the use of student performance data to influence school improvement. They found that both formal and informal leadership exist in the schools they studied, but it was the principal who was the "driving force behind strong data use" (p. 36). It was "the principal's constant emphasis on data that turned the data from numbers on a page into action in the classroom" (p. 36).

A case study of five urban high schools undergoing comprehensive, school wide reform points to the role of the leader in supporting data use (Lachat & Smith, 2005). In the two high schools where data was used most effectively, the principal's leadership, as well as the distributed leadership to assistant principals, department chairs and teacher leaders, was seen as instrumental to data use. Unfortunately, even if a principal supports data use, they do not necessarily have the skills and time needed to move the school forward on data use. In this instance, the role of data coaches and data teams was found central to increasing communication between teachers about trends and issues shown by data (Lachat & Smith).

A mixed-method study of three urban school districts to improve instructional practices revealed several factors that affect data use, including the need for training and support for analyzing and interpreting data (Kerr, Marsh, Ikemoto, Darelik and Barney, 2006). In two of the school districts, the design and implementation of district policies encouraged and supported the use of data for instructional purposes at both the school and district levels. Kerr et al. found that some school-level staff lacks the capacity to engage in data use, and they found this is true at the district level as well. This is particularly important when the lack of school capacity to analyze data and use the results to drive decisions is compounded by the lack of district capacity as well.

Summary

The No Child Left Behind Act of 2001 has brought data and data use to the forefront of education. It is through each state's framework for making Adequate Yearly Progress that all students are to meet minimum competency standards in mathematics and reading by 2014. Thus, data has become commonplace in public schools across the United States as divisions and schools work to close achievement gaps while raising overall student achievement. Teachers need to know the data they have is trustworthy, and they need to know how to transform it into information that can be used to improve teaching and learning (Kerr et al., 2006). Principal leadership is key to teachers having the skill and comfort to effectively use data (Copland, 2003; Lachat & Smith 2005, Supovitz and Klein, 2003; Wayman & Stringfield, 2006).

Over the last decade, there has been an increase in the number of studies that have focused on using data to make decision to continuously improve student learning and achievement. Multiple studies have identified the collaborative use of data as essential in this process (Halverson et al., 2005; Holcomb, 1999; Lachat & Smith, 2005; Love, 2009; McLeod, 2005; Wayman, 2005; Wayman & Cho, 2009; Wayman & Stringfellow, 2006). However, Feldman and Tung (2001) found principals lack the expertise and resources to use data effectively, thus they are unable to help teachers use data effectively. Principals' self-efficacy for using data to make decisions was found to be low even after receiving professional development specifically focused on learning how to use data as part of the decision-making process (Bettesworth, 2006; Symonds, 2004).

Lachat and Smith identified one key factor impacting school wide data use as the leadership structures that exist within a school, but while the principal plays a primary role in supporting data use, the leadership distributed across assistant principals, deans of students, administrative assistants, department chairs, and lead teachers is also important. From Data-Based Inquiry and Decision-making (DBDM) to Data-Driven Instructional Systems (DDIS) to Data-Informed Decision-making (DIDM) to Data-Driven Decision-making (DDDM), the role of the principal in fostering the collective and continuous use of data by teachers to reflect on the effectiveness of their teaching practices as it relates to student achievement seems to be central. The principal is the instructional leader within a school, and as such, establishes the expectations of data use within the school. The principal also determines the priorities that provide the time and resources for teachers to use data.

CHAPTER 3

Methodology

This study investigated principals' beliefs about the use of data within their schools. More specifically, principals were surveyed to determine the data culture within their schools. Sixty-one elementary, middle and high school principals from a large, suburban school division were asked to participate to examine school-level differences in their perceptions of teachers' use of data to make instructional decisions. This study explored the perceived level of collaboration among teachers to support data-driven decision-making. Information was collected to determine if the use of data to make decisions was related to either the length of time an administrator had been in an administrative position or their time in the current setting. Finally, the impact of Adequate Yearly Progress status on an administrator's perception of data use to make instructional decisions was examined.

The data that principals were asked to consider in this study included the results of state-mandated assessments for reading and mathematics. The state assessments consist of the grade level Standards of Learning (SOL) tests administered in grades three through eight and the end-of-course testing for grades nine through twelve. A grade level SOL

test for reading is administered in third through eighth grade, and there is a single reading end-of-course SOL test administered at some point between ninth and twelfth grades. Grade level SOL testing in mathematics occurs in third through eighth grade with end-of-course testing administered for Algebra I, Algebra II, and Geometry.

While there is merit in exploring the perceptions of teachers and administrators to determine if a school division uses data-driven decision-making, the focus of this study was on principals only. The principal is the instructional leader within the school. Robinson, Lloyd and Rowe (2008) found "the more [school] leaders focus their relationships, their work, and their learning on the core business of teaching and learning, the greater their influence on student outcomes" (p. 635). Principals are responsible for providing and promoting professional development opportunities for teachers to learn about classroom assessment practices that improve student learning outcomes (Stiggins & Duke, 2008).

The principals from a large school division in Virginia were the focus of this study. The principals at the 61 comprehensive schools in the division were surveyed to determine their perceptions of the data-driven decision-making readiness of their schools. The primary research aim that guided this study was to determine if there was a difference among elementary, middle and high school principals regarding the perceived use of data within their schools. Several research questions were used to guide the investigation:

1. Is there a difference among elementary, middle and high school principals' beliefs about the use of data-driven decision-making by teachers to improve student achievement?
2. Is there a difference among elementary, middle and high school principals' beliefs regarding the data-driven culture within their schools?
3. Is there a difference among elementary, middle and high school principals' beliefs regarding the level of collaboration among teachers to support data-driven decision-making?

Additionally, there may have been factors present that influenced principals' perceptions of teachers' use of data to improve student achievement. Additionally, these factors were examined:

- Does the length of time a person has been a principal influence the reported use of data within the school?
- Does the length of time a principal has been in their current setting influence the reported use of data within the school?
- Are the principals at schools that did not make Adequate Yearly Progress more likely to use data?

Research Design and Rationale

This study was conducted within a large public school division in Virginia. This division is currently one of the largest school divisions in the state and all of its schools are fully accredited based on the 2008-2009 state assessment results. The division has also made Adequate Yearly Progress (AYP) for the past four years (2005 – 2009) based on the aggregate results of all students in the division. While some schools in the division have not made AYP due to the performance of students within particular subgroups, when the results of subgroups are aggregated at the county level, each subgroup has performed above the minimum required level.

A survey research design was employed in this descriptive, non-experimental study. Survey research is often used when addressing multi-faceted questions such as those proposed in this study (Dillman, 2000). McMillan (2004, p.195) states "surveys are versatile in being able to address a wide range of problems or questions, especially when the purpose is to describe the attitudes, perspectives, and beliefs of the respondents." Using a survey design permits the researcher to obtain data from a larger group of participants while minimizing sampling error (Dillman). "The ability to estimate with considerable precision the percentage of a population that has a particular attribute by obtaining data from only a small fraction of the total population is what distinguishes surveys from all other research methods" (Dillman, p. 9). An important attribute of survey research is the ability to generalize fairly accurately the results from the participants to the population (McMillan).

Because every principal within the 61 comprehensive elementary, middle and high schools was contacted to participate in the survey, a census approach to selection was used. The target population was asked to participate in a paper-pencil survey that was administered at one of the principals' regularly scheduled, bi-monthly meetings. While Schaefer & Dillman (1998) indicate that e-mail surveys provide comparable response rates while providing a more rapid response time than paper-mail, the small population for this study required a higher response rate than may be obtained through a web-based administration of the survey. Henerson, Morris, and Fitz-Gibbon (1978) suggest that a paper-pencil survey administration provides sufficient response time while permitting numerous individuals to respond simultaneously (p. 29). The participation goal was a minimum of an 80% target response rate, meaning 49 of the 61 principals needed to respond to the survey. The response rate exceeded target response rate as 50 of the 61 principals submitted completed surveys yielding a response rate of 82%.

School Division Context

As of September 30, 2008, the total division membership was slightly over 59,000 students, including approximately 350 students enrolled in one of two regional governor's schools and nearly 200 pre-school children enrolled in the Head Start Program.[1] Demographics based on 2007-2008 enrollment show a student body that is 61% white, 27% black, 7% Hispanic, 3% Asian/Pacific Islander and 1% American Indian/Alaskan native. Nearly 23% of the students qualify for free or reduced-price lunch

[1] This data is from the study district's web site. To maintain anonymity, a detailed reference is not provided.

in elementary and middle schools. High schools do not follow the federal lunch program. The demographics of each school can be seen in the tables in Appendix A (see Tables 18, 19, 20, and 21).

According to the Virginia Department of Education's School Division Report Card (www.doe.virginia.gov), the division in this study made Adequate Yearly Progress (AYP) for 2007-2008. One elementary school did not make AYP during this same year but no elementary schools were in improvement. Five middle schools and one high school did not make AYP during the 2007-2008 school year. Table 1 shows the number of years these middle and high schools have been in improvement for English and mathematics.

Table 1

Status of Schools in Improvement for 2008-2009

	School 43	School 44	School 45	School 47	School 49	School 58
School Level	Gr 6-8	Gr 6-8	Gr 6-8	Gr 6-8	Gr 6-8	Gr 9-12
Years in Improvement						
English	2	2	4	5	3	3
Mathematics	0	0	3	0	2	4

Population

The population of interest in this study was principals within a large public school division in Virginia. There are 64 schools within the division, including 38 elementary schools, thirteen comprehensive middle schools, one alternative middle school, ten comprehensive high schools, one alternative high school, and one technical school.

A census approach to recruitment was employed, so all principals from the 61 comprehensive schools in the school division were contacted to participate. A census is a "one-by-one count of the entire population" (Salant & Dillman, 1994, p. 6). A census provides accurate information with a small population because sampling only a part of the population might not provide correct estimates of the whole (Salant & Dillman). The population consisted of 38 elementary school (grades K-5) principals, 13 middle school (grades 6-8) principals and 10 high school (grades 9-12) principals. The alternative middle and high school principals were excluded from this study since their student populations differ significantly from the comprehensive middle and high schools within the division. The principals ranged from first year principals to seasoned principals with more than a decade of experience as a building administrator. Table 2 contains demographic information about the principals assigned to the comprehensive schools within the school division.

Table 2

D*emographic Information for Population of Principals by Level*

	Elementary (Gr K-5) *N* (%)	Middle (Gr 6-8) *N* (%)	High (Gr 9-12) *N* (%)
Gender			
Male	10 (26.3%)	9 (69.2%)	6 (60.0%)
Female	28 (73.7%)	4 (30.8%)	4 (40.0%)
Ethnicity			
Black	8 (21.1%)	4 (30.8%)	2 (20.0%)
White	30 (78.9%)	9 (69.2%)	8 (80.0%)
Educational Level			
Masters	34 (89.5%)	10 (76.9%)	8 (80.0%)
Doctorate	4 (10.5%)	3 (23.1%)	2 (20.0%)
Mean Years Administrative Experience			
Total	28.0 yrs	23.1 yrs	25.6 yrs
Within the Division	19.8 yrs	15.1 yrs	17.0 yrs

Participants

Sixty-one principals were invited to participate. Of the 50 participants who responded, 50% female and 50% were male, and 54% were elementary school principals, 26% were middle school principals, and 20% were high school principals. Ethnicity distributions showed 80% of the respondents were white and the remaining 20% were black, not of Hispanic origin. No other ethnicities were reported. In addition, each respondent was asked to report his or her years of experience as a principal and years of experience as the principal of his or her current school. Table 3 shows participant demographic information by school level.

Tables 2 and 3 allow a comparison of the respondents with the population. An examination of the respondents to the total population indicates that overall the respondents were representative of the population. The only level that did not have 100% participation was the elementary level. Every middle and high school principal submitted a completed survey.

Since all of the middle and high school principals completed their surveys, the demographics of these respondents mirrored the demographics of the population. The high response rate at the secondary level may be a result of the researcher being a member of this secondary principal cohort. It was the participation from the elementary principals that differed from the population. Overall, male principals had a higher rate of response than the females, and white principals responded at a higher rate then their black

colleagues. While the elementary principals were slightly underrepresented, the characteristics of the participants seem to represent those of the population.

Table 3

Respondents' Demographic Information by Level

	Elementary (Gr K-5) *n* (%)	Middle (Gr 6-8) *n* (%)	High (Gr 9-12) *n* (%)
Gender			
Male	10 (37.0%)	9 (69.2%)	6 (60.0%)
Female	17 (63.0%)	4 (30.8%)	4 (40.0%)
Ethnicity			
Black	4 (14.8%)	4 (30.8%)	2 (20.0%)
White	23 (85.2%)	9 (69.2%)	8 (80.0%)
Educational Level			
Masters	25 (92.6%)	10 (76.9%)	8 (80.0%)
Doctorate	2 (7.4%)	3 (23.1%)	2 (20.0%)
Mean Years as Principal			
Total	10.0 yrs	5.4 yrs	11.9 yrs
Within Current School	5.0 yrs	2.8 yrs	6.3 yrs

Instrumentation

The survey instrument used in this study to assess the data-driven readiness of the principals was developed by McLeod (2006) and administered with his permission. This particular survey instrument was selected for use in this study because the questions were clearly written and easy to comprehend. In addition, this particular survey had been used by several other researchers (McLeod, 2005; Sulser, 2006; White, 2008). The order of the questions suggested a high degree of salience to the respondents. The survey was presented in an open, unboxed format with the appropriate grouping of questions. Modifications and deletions of several items were made to the survey prior to it being distributed to the principals to better align the survey to the goals of this study.

There was also a close alignment between the constructs of the survey and the elements that the American Association of School Administrators (2002) has identified with principals' beliefs about the use of data-driven decision-making. More specifically, the American Association of School Administrators standards address the expectation that administrators understand collecting, analyzing, and reporting data, as well as communicating data with key stakeholders. Furthermore, a principal needs to know how to use data for school improvement purposes. Similarly, Hoyle, English and Steffy (1998) suggest that school leaders need to be data users, and they report that it is through disaggregated data that schools are "propelled to action" (p.97). The survey items were aligned to measure principal beliefs on assessment, data use, data support systems, and school culture.

McLeod (2005) developed three separate surveys – one for teachers, one for principals, and one for superintendents. These surveys were designed to measure Chicago Public Schools' teachers, principals, and superintendent readiness to use data-driven decision-making to improve student learning (McLeod, 2005). Results from the Chicago readiness study were used to develop a professional development framework for a data-driven school improvement plan. Susler (2006) administered McLeod's Statewide Data-Driven Readiness Study: Principal Survey to determine if a relationship existed between the use of a data management system for making data-driven decisions and student achievement in high school mathematics. He found no significant relationship between student math assessment outcomes and the use of technology for data-driven decision-making capacity by educators. More recently, White (2008) used McLeod's principal survey to assess the data-driven readiness of all elementary school principals in public schools with pre-kindergarten or kindergarten through grade 5 in Florida. With a response rate of 39%, White found that elementary school principals recognized the importance of data-driven decision-making and an environment that fosters the use of data.

The survey administered in this study consisted of 86 of the 89 items comprising the Statewide Data-Driven Readiness Study: Principal Survey (McLeod, 2006). Seventy-six of the items used a six-point Likert rating scale with the response options ranging from Disagree Strongly, Disagree Moderately, Disagree Slightly, Agree Slightly, Agree Moderately, to Agree Strongly. The survey contained no neutral responses which according to Saris and Gallhofer (2007) "force respondents to make a choice in a specific

direction" (p. 111). The remaining 10 items were open-response or multiple-choice items and obtained primarily demographic information about the respondents.

Constructs Measured

White (2008) used McLeod's (2006) Statewide Data-Driven Readiness Study: Principal Survey for her doctoral research and completed a factor analysis using principal components analysis with Varimax with Kaiser Normalization rotation. White found four factors within the 57 items related to acting upon data, support systems and school culture. The factor analysis indicated that 22 of the items were related to the underlying structure of the survey and measured the following four constructs:

- Construct 1: Beliefs regarding the use of data-driven decision-making by teachers to improve student achievement (data-driven decision-making); 9 items
- Construct 2: Beliefs regarding a data-driven culture (data-driven culture); 6 items
- Construct 3: Beliefs regarding supporting systems (data supporting systems); 5 items
- Construct 4: Beliefs regarding collaboration among teachers using data-driven decision-making (collaboration around data); 2 items

Sample items for each of the constructs are shown in Table 4.

Table 4

Data-Driven Decision-making Constructs and Sample Related Survey Questions

Construct	Item
Construct 1: Beliefs regarding the use of data-driven decision-making by teachers to improve student achievement	Teachers in my school use assessment data to identify students who are not experiencing academic success. Teachers in my school use data to verify their assumptions about the causes of student behavior and performance. If teachers in my school propose a change, they bring data o support their proposal. Teachers in my school use data from student assessments to set instructional targets and goals. Teachers conduct self-assessments to continuously improve performance.
Construct 2: Beliefs regarding a data-driven culture	My school's improvement goals are clear, specific, measurable, and based on student data. As a school we have open and honest discussions about data. Administrators model data-driven educational practices. My school adequately supports teachers' use of data to improve classroom instruction. Using data has improved the quality of decision-making in my school. If we constantly analyze what we do and adjust to get better, we will improve.
Construct 3: Beliefs regarding supporting systems	My school uses multiple data sources to assess the effectiveness of educational programs. Whole-school staff meetings focus on measured progress toward data-based improvement goals. Student achievement data are used to determine teacher professional development needs and resources. Student achievement data are used to determine resource allocation.
Construct 4: Beliefs regarding collaboration among teachers using data-driven decision-making.	Teacher teams in my school meet regularly to look at student data and make instructional plans. When teachers in my school meet with each other, they usually focus on improving student learning outcomes.

Reliability

The population in this study consisted of 61 principals. For White's (2008) study, 1468 elementary school principals in Florida were surveyed, thus the sample size was much larger. White had a response rate of 32%, indicating 470 principals responded to her survey. With a larger sample size, White was able to validate the constructs. Each construct was analyzed by White (2008) to determine internal consistency using Cronbach's alpha. White found that the Cronbach's alpha for the constructs ranged from a high of 0.80 for Construct 1 to a low of 0.76 for Construct 4, with Constructs 2 and Construct 3 both having a value of 0.77. Cronbach's alpha values show the reliability on the four constructs identified by White (2008) to be within the acceptable range (Mitchell & Jolley, 2007, p.123).

Table 5 shows the comparison of the reliability indices based of White's study and the current study. Based on the consistency of the scale reliabilities of the two studies, the four constructs identified by White were used for the current study.

Table 5

Comparative Reliability Indices

Construct	*n*	Cronbach's Alpha	
		White's Data	Current Data
Data-driven Decision-making	9	0.80	0.88
Data-driven Culture	6	0.77	0.81
Data Supporting Systems	5	0.77	0.83
Collaboration around Data	2	0.76	0.91

Survey Administration

Procedures

The participants were asked to complete a paper-pencil survey at a regularly scheduled, bimonthly meeting with their director. The researcher administered the survey to principals without their director being present. This helped minimize the potential threat of response bias resulting from the director's supervisory status (McMillan, 2004). Because participation in the survey process was optional, the director was not aware of who chose to participate in the survey. The researcher was also not aware of who chose to participate, as the researcher appointed one of the principals at the meeting to collect the surveys and place them in a pre-addressed envelop to return to the researcher through the interoffice mail system. Furthermore, by administering the survey at a regularly scheduled principals' meeting, the researcher hoped to increase the participation rate.

The administration of the survey occurred at three separate principals' meetings, as the elementary, middle, and high school principals meet separately with their respective directors. Administration of the survey began in mid-June 2009 and was concluded in two days. All the principals except one from the comprehensive K-12 schools in the division participated. Four principals, two high school and two middle school principals, chose to complete the survey after the meeting, and they returned their surveys through the interoffice mail system.

Response

The response rate of middle and high school principals was 100%, while the response rate of the elementary school principals was just over 71%. Of the 31 elementary

principals who returned surveys, only 27 were fully completed. Excluding the four incomplete surveys, the response rate exceeded the targeted response rate of 80%. With 27 elementary principals and 23 secondary principals fully completing the survey, the overall response rate was approximately 82%.

Variables

Multiple independent and dependent variables were needed to address the research questions that guided this study. Since the primary research question asked if there is a difference between elementary, middle, and high school principals' perceived use of data within their schools, one of the independent variables primary administrative assignment. This independent variable had three levels – elementary (grades K-5), middle (grades 6-8) or high (grades 9-12). Two other independent variables included administrative experience – the length of time a principal has been a principal and the length of time serving as the principal in the current school. This information was used to examine if experience was associated with principals' perceptions about data use within their current building. The years of serving as a principal were grouped into two levels of zero to five years and six or more years. The years of serving as the principal at the current school were also grouped into two levels of zero to three years and four or more years. The final independent variable was the current AYP status of the participant's school and included two levels – made AYP or did not make AYP.

It was presumed that one extraneous variable that might have influenced the principal's perceptions of data-driven decision-making was the Adequate Yearly Progress

(AYP) status of the school. In a key policy letter (dated July 24, 2002), Education Secretary Rod Paige stated:

> "Under the [No Child Left Behind Act], each State establishes a definition of 'adequate yearly progress' (AYP) to use each year to determine the achievement of each school district and school. The new definition of AYP is diagnostic in nature, and intended to highlight where schools need improvement and should focus their resources." (www.ed.gov/policy/elsec/guid/secletter/020724.html)

Thus, principals' perceptions on the use of data may vary based on their school's AYP status. As such, AYP status was included in the study as an independent variable.

The constructs measured in the survey served as the dependent variables of interest. Principals were asked to respond to statements about data-driven decision-making by teachers to improve student achievement, the existence of a data-driven culture, supporting systems for data use, and the collaboration among teachers using data-driven decision-making (White, 2008). The responses to these items were averaged to derive a composite score for each of the four constructs identified by White. The resulting dependent variables had a range of one to six, with a higher score correlating to a higher level of perceived data use.

Data Analysis

Data Entry and Missing Data

Because the survey was administered on paper, the data had to be hand-entered. The data was entered directly into PASW Statistics 17.0.2 (formerly SPSS 17) for analysis. Descriptive statistics were run to check the accuracy of data entry. Descriptive statistics

included frequency distributions, means, medians, modes, and standard deviations (see Appendix B, Tables 23, 34, 25, 26, 27 and 28).

Research questions focused on school level. Consequently, surveys missing school level data were not included in any data analyses. After the removal of these incomplete surveys, the individual response for each survey item and the average response for each construct were examined and an outlier analysis was performed. While some survey responses were identified as being outside acceptable limits on a given item or mean response, the responses were not identified as outliers when the data was analyzed by administrative level. As such, no outliers were deleted, and all responses were included in subsequent analyses. Furthermore, only completed surveys were used. Finally, the mean response rates were calculated for the items comprising each of the four constructs identified by White (2008).

School Level Comparisons

The responses to survey items comprising each construct were averaged to yield a score of one to six, creating composite variables. To answer each of the three research questions, a one-way analysis of variance was conducted using these composite variables. Due to the small sample size ($n = 50$), there was insufficient power to run a multivariate analysis of variance. Consequently, for each one-way analysis of variance, the independent variable was the principal's level of assignment (elementary, middle or high), and the dependent variable was the mean scale score for each of the constructs identified by White (2008).

To determine if there was a significant difference among administrators' perceptions at the three different levels, four one-way analyses of variance were run. The first one-way analysis of variance compared administrative assignment and the mean for Construct 1. A series of one-way analyses of variance compared administrative assignment and the mean of Construct 2 and then Construct 3. Finally, a one-way analysis of variance compared administrative assignment and the mean for Construct 4.

Due to power issues arising from the small sample size ($n = 50$) being split into three levels, multiple one-way analyses of variance were conducted to investigate the differences among administrators' perceptions about data use. The independent variable was the school level (elementary, middle or high), and the dependent variable was the mean scale scores for McLeod's (2005) Statewide Data-Driven Readiness Study: Principal Survey.

Mediating Variables

Analyses of possible mediating variables were performed. A series of one-way analyses of variance was performed to determine if the length of time a person had been a principal influence the reported use of data within a school. Years as an administrator was the independent variable with two levels – zero to five years and six or more years. The dependent variables were the means of the four subscales. Similarly, the same analysis was performed to examine the influence of the length of time a principal has been in their current assignment and reported data use within the school. The final mediating variable explored in this study was the impact of adequate yearly progress status of the previous year on principals' perceptions of data use.

In determining the influence of the length of time as an administrator on the use of data, a one-way analysis of variance was conducted to compare administrators' perceptions of data use based on zero to five years of experience or six or more years of experience. Similarly, a one-way analysis of variance was conducted to compare administrators' perceptions of data use based on being assigned to their current school for zero to three years versus four or more years.

Student achievement on the Virginia Standards of Learning assessments in reading and mathematics was used to determine if a relationship exists between school-wide achievement and the use of data. A one-way analysis of variance was conducted. There were three levels for schools when examining SOL performance – elementary, middle and high. Student achievement was defined by two levels, Made AYP or Did Not Make AYP, as defined by the Virginia Department of Education.

Delimitations

The survey in this study was administered within a single, large, suburban school division. As public school administrators, all respondents were familiar with the accountability measures mandated by the No Child Left Behind legislation. Throughout the past two years (2007-2009), there has been an emphasis within the division to use data to improve student achievement. The county-wide professional development for administrators and teachers has focused on using common assessments and the subsequent disaggregated data from those assessments to evaluate student preparedness for the state assessments. While restricting the survey administration to a single school

division has limited the generalizability of the findings, the consistency of policy within the division provides for common expectations regarding data use.

The potential for sampling bias was minimized through the use of a census approach. The small sample size of 50 principals disaggregated into the three school levels could lead to a Type II error. A Type II error is when the researcher fails to reject the null hypothesis when it is in fact false (Mitchell & Jolley, 2007). When a Type II error is present, the data might suggest there is no relationship between the independent and dependent variables, when in actuality one exists. To increase the statistical power of the research design, the survey was administered under as consistent conditions as possible. The participants were all given the survey at the same point in their meeting – at the beginning. As stated previously, the meetings were within the same week, with the middle school principals surveyed on one day and the elementary and high school principals surveyed on the next day. Of the 61 principals contacted to participate in this study, 50 submitted completed surveys. The response rate was sufficient to reduce sampling bias.

Summary

Sixty-one elementary, middle and high school principals from a large, suburban school division in Virginia were asked to participate in a census survey to determine if there are differences based on school level in their perceptions of teachers' use of data to make instructional decisions. This study examined the perceived level of data use, a data-driven culture, data supporting systems and teacher collaboration to support data-driven

decision-making within a school. Information was collected to determine if the use of data to make decisions was associated with either the length of time an administrator had been in an administrative position or their time in the current setting. Finally, the impact that making Adequate Yearly Progress had on an administrator's perception on the use of data use to make instructional decisions was examined.

CHAPTER 4

Findings

This study focused on factors that influence school principals in using data to make instructional decisions. The purpose was to examine if there were differences in perceptions according to school level. The research questions that guided the study were:

1. Is there a difference among elementary, middle and high school principals' beliefs about the use of data-driven decision-making by teachers to improve student achievement?
2. Is there a difference among elementary, middle and high school principals' beliefs regarding the data-driven culture within their schools?
3. Is there a difference among elementary, middle and high school principals' beliefs regarding the level of collaboration among teachers to support data-driven decision-making?

Results

The frequency distributions for the 22 survey items comprising White's (2008) four constructs are shown in Appendix B (see Table 22). For each of the survey items, a majority of the responses (≥62%) were in agreement with the statements, indicating the

principals agreed either slightly, agreed moderately, or agreed strongly that within their school data-driven decision-making by teachers to improve student achievement is occurring, a data-driven culture and data supporting systems exists, and teachers are collaborating and using data to make decisions.

Data Use by Teachers to Improve Student Achievement

White (2008) indicated that nine items clustered together around data use by teachers to improve student achievement. These items had responses ranging from one to six. Higher response values represent more positive perceptions of data use and lower response values represent more negative perceptions of data use. Items were coded 1 for "disagree strongly," 2 for "disagree moderately," 3 for "disagree slightly," 4 for "agree slightly," 5 for "agree moderately," and 6 for "agree strongly." All items were positively worded, so no recoding of responses was required. The nine scores for the individual items comprising this construct were used to calculate a mean scale score for each respondent.

Overall results.

The frequency distributions (Appendix B, Tables 23, 24, 25, 26 and 27) indicated that the vast majority of principals moderately agree that their teachers are working collaboratively to improve the curriculum and instruction (94%) and using assessment data to identify students who are not experiencing academic success (94%). Thirty-six percent of the principals disagreed with the statement that teachers conduct self-assessments to continuously improve their performance. Similarly, 88% reported that their teachers feel personally responsible when school improvement goals are not met.

The majority of principals (80%) agreed teachers use data to verify their assumptions about the causes of student behavior and performance, yet only 64% agreed that teachers bring data when proposing a change.

The mean responses for the individual items comprising Construct 1 were 4.00 or greater, indicating that on average the principals agreed at least slightly with each of the nine survey items. The lowest mean response was 4.00 for the item indicating teachers conduct self-assessment to continuously improve performance. Principals only felt minimally more positive about teachers bringing data when they propose a change (M = 4.10). Similarly, principals had a mean response of 4.14 when reflecting on teachers using data to verify their assumptions about the causes of student behavior and performance. When responding to statements about using data to make changes in their instruction and to set instructional targets and goals, the principals indicated they agreed moderately with mean responses of 4.72 and 4.88, respectively. The principals felt more positively, indicating moderate to strong agreement, with statements concerning teachers working collaboratively to improve curriculum and instruction (M = 5.18) and teachers using assessment data to identify students not meeting with success (M = 5.28).

School-level results by construct.

In order to compare means among the elementary, middle and high school principals, mean scale scores were computed by averaging the responses to the nine survey items that comprised the construct, and the results are shown in Table 6. The elementary principals had the highest mean response. The mean scores decreased from elementary (M = 4.79) to middle (M = 4.50) to high school principals (M = 4.29) for responses

pertaining to acting upon data. While elementary school principals agreed moderately that teachers are using data to improve student achievement, the high school principals only slightly agreed on average. The smallest standard deviation between the school-level responses is evident with the group of elementary principals, with a standard deviation of .581 for the composite score suggesting less variability within the elementary group.

Table 6.

Means on Teachers Use of Data-Driven Decision-making by School Level

School Level	*n*	*M*	*SD*
Elementary	27	4.79	.581
Middle	13	4.50	.958
High	10	4.29	.898

A one-way analysis of variance was conducted to determine if there was a significant difference in mean values by school level. The one-way analysis of variance used independent groups while controlling the family-wise Type I error rate at an alpha level of .05 (Weinberg & Abramowitz, 2008, p. 317). The results of this statistical analysis are presented in Table 7. The between and within groups effects were not significant with an alpha level of .05, indicating there was no significant statistical difference among the principals' level of assignment and their beliefs about teachers using data to make decisions about student achievement.

Table 7

One-Way Analysis of Variance for Elementary, Middle and High School Principals with Respect to Their Beliefs about the Use of Data-Driven Decision-making by Teachers to Improve Student Achievement

		df	*F*	*p*
Data-driven Decision-making	Between Groups	2	1.838	.170
	Within Groups	47		
	Total	49		

$p < .05$

School-level results by item.

The response means for the individual survey items by administrative level are shown in Appendix B, Table 29. Overall, the response means for the elementary school principals indicated slight to moderate agreement with each item. The same can be stated for the middle school principals with the exception of teachers using data to verify their assumptions about student behavior and performance (Item 29; $M = 3.85$) and teachers conducting self-assessment to continuously improve their performance (Item 67; $M = 3.62$). The high school principals slightly disagreed with the same two statements, as well as the statement about teachers bringing data when requesting a change. The majority of the mean responses, for items 22, 25, 29, 32, and 36, are highest for the elementary school principals and lowest for the high school principals, with the middle school

principals falling between these two. Items 31 and 38 had the highest mean responses for the middle school principals (M = 4.38 and M = 4.69, respectively) with the high school having the lowest (M = 3.90 and M = 3.70, respectively). The one consistency between the three levels of principals is that the highest means correspond to teachers collaborating and using assessment data to improve teaching and thereby academic success of the students.

To ascertain whether there was any significance between the school level and the individual items, a series of one-way analyses of variance was conducted. The results are shown in Table 30 (Appendix C). At an alpha level of .05, there were significant differences between the elementary and high school principal responses to Item 22 (p = .04) and Item 25 (p = .03). Item 22 states teachers in this school work collaboratively to improve curriculum and instruction, while item 25 refers to teachers using assessment data to identify students who are not experiencing academic success. The elementary principals responded that they agree moderately to strongly (M = 5.48 and 5.56, respectively) and high school principals responded with slightly to moderately agree (M = 4.70 for both) on items 22 and 25. On both of these statements, elementary principals on average had higher means than high school principals suggesting the elementary principals were significantly more likely to agree that teachers work collaboratively to improve curriculum and instruction and use assessment data to improve student achievement.

Data-driven Culture

Within a data-driven culture there are open and honest discussions about data. There is also a focus on data use that emanates from the instructional leaders within the building, with the principal being the primary instructional leader (Glickman, 1990; Schein, 1985). Thus, the principal needs to model the use of data and use data to drive the school improvement and professional development plans for the school. This focus on data means that teachers receive the support they need to be able to use data to improve the decision-making and instruction within the school. According to White (2008), there are six items on McLeod's (2005) survey that measure the existence of a data culture within a school.

Overall results.

The majority of the principals responded positively about the data culture within their school (see Appendix B, Table 28). One hundred percent of the principals indicated that they agree to some extent that their school supports teachers' use of data to improve classroom instruction. Of the respondents, 42% strongly agree and 48% moderately agree that they support their teachers' data needs. Every principal believes to some extent that if teachers and administrators constantly analyze what they do and adjust to get better, improvement is inevitable. Fifty-eight percent strongly agree with this concept while 24% moderately agree. One principal responded that he or she disagreed slightly that his or her improvement plans were clear, specific, measurable, and based on student data. This same principal is one of two who slightly disagrees with the statement that using data has

improved the quality of decision-making in his or her school. The two principals who moderately disagree with this same statement are at the secondary level. Only one elementary principal disagrees that data use has improved decision-making within the school.

While 92% of the principals indicated they agreed with the statements concerning their schools' use of multiple data sources to assess programs and the use of data to evaluate professional development needs, only 64% indicated agreement with the notion that teachers have significant input into data management and analysis practices. As for faculty meetings being focused on making measured progress toward data-based improvement goals, 78% of the principals indicated some level of agreement. Eighty-four percent of the principals felt student achievement data are used to determine resource allocation.

The mean responses to individual survey items concerning the existence of a data culture ranged from 4.96 (moderately agree) for using data to improve the quality of decision-making to 5.40 for believing that constant analysis of what is undertaken and adjustment to get better will lead to improvement (see Appendix C, Table 28). The principals' mean response was 5.36, indicating a strong agreement that their school improvement plans were clear, specific, measurable, and based on student data. There was less agreement, though still moderate agreement, with the statement that the administrators in the building model data-driven educational practices ($M = 5.14$).

The mean responses for Construct 3, data supporting systems, ranged from 3.80 for

Item 44 to 4.73 for Item 43. This suggests that on average the principals agree minimally that teachers have significant input into data management and analysis practices within the school (Item 44), yet they moderately agree that their school uses multiple data sources to assess the effectiveness of educational programs (Item 43). This is consistent with the mean response of 4.69 (moderate agreement) that student achievement data are used to determine teacher professional development needs and resources.

School-level results by construct.

When the data is disaggregated by school level, the high school principals have the lowest mean of 5.13, and middle school principals have the highest mean of 5.28 on Construct 2 (data-driven culture). The standard deviation for the high school principals' responses is almost twice that of the elementary and middle school principals indicating a greater degree of variability, or less consistency, within the high school principal group (see Table 8).

There is minimally less variability in the principal responses to the five statements on the survey related to data supporting systems. The differences in mean responses was greater, however, with the elementary principals having a mean response of 4.54, the middle school principals having a mean response of 4.28, and the high school principals having the lowest mean response of 4.14 (see Table 8). The elementary school principals have a stronger agreement than their secondary counterparts, thus perceiving their schools have access to more data, and they see their schools as more likely to use this data to drive school improvement, professional development plans, and resource

allocations. In addition, the elementary principals feel more strongly than the secondary principals that their teachers have input into the data management and analysis processes.

Table 8

Means on a Data-driven Culture by School Level

	Data-driven Culture			Data Supporting Systems		
School Level	*n*	*M*	*SD*	*n*	*M*	*SD*
Elementary	27	5.26	.505	27	4.54	.803
Middle	13	5.28	.576	13	4.28	.862
High	10	5.13	.912	10	4.14	.910

To determine if there were any significant differences among the principals, two additional analyses of variance were conducted to compare the means across the three levels of assignment. The analyses of variance were performed on the individual constructs about the existence of a data-driven culture (Construct 2) and data supporting systems (Construct 3). No significant differences were found (see Table 9). While principals at all three levels feel relatively positive about the data-driven culture within their buildings, their responses by comparison were less positive when responding to items about the existence of data supporting systems.

Table 9

One-Way Analysis of Variance for Elementary, Middle and High School Principals with Respect to Their Beliefs Regarding a Data-Driven Culture within Their School

		df	*F*	*p*
Data-driven Culture	Between Groups	2	.187	.830
	Within Groups	47		
	Total	49		
Data Supporting Systems	Between Groups	2	.993	.378
	Within Groups	47		
	Total	49		

$p < .05$

School-level results by item.

The response means for the individual survey items for Construct 2 and Construct 3 by administrative level are shown in Appendix C, Table 29. The elementary principals reported moderate to strong agreement with each item. The middle school and high school principals reported moderate to strong agreement on most of the items but reported a slight disagreement with Item 44. Item 44 states that teachers have significant input into data management and analysis practices. The middle school principals had a mean of 3.38 (*SD* = 1.325) while the high school principals had a mean of 3.40 (*SD* = .966). The standard deviations indicate greater variation within the high school principals.

To determine if there was any significant difference between the school level and the individual items, a series of analyses of variance was conducted. The results are shown in Table 30 (Appendix C). No significant differences were found at an alpha level of .05.

Teacher Collaboration

Teacher collaboration is another essential component of the data-driven decision-making process (Halverson et al., 2005; Holcomb, 1999; Lachat & Smith, 2005; Love, 2009; McLeod, 2005; Wayman, 2005; Wayman & Cho, 2009; Wayman & Stringfellow, 2006). The data-collaboration relationship allows data use to foster collaboration and simultaneously collaborate to improve data use (Lachat & Smith, 2005; Wayman, 2005; Wayman & Stringfield, 2006).

Overall results.

The survey contained two items that comprised the construct to measure teacher collaboration. These two items asked the principals to respond with their level of agreement to the following two statements:

- Teacher teams in my school meet regularly to look at student data and make instructional decisions.
- When teachers in my school meet with each other, they usually focus on improving student learning outcomes.

Every one of the principals indicated some level of agreement to the first statement (Item 20), with 12% strongly agreeing and 38% moderately agreeing. The overall mean for this item was 5.38, indicating strong agreement that teachers are meeting regularly to examine data and create lesson plans (see Appendix B, Table 28). There were five principals who

slightly disagreed with the Item 21 which pertains to teachers meeting with each other for the purpose of improving student learning outcomes. (see Appendix B, Table 26). The one principal who moderately disagreed that teacher collaboration in the school is focused on improving student learning outcomes is a middle school principal. Of the four principals who slightly disagreed that when meeting teachers focus on student outcomes, three are high school principals varying in age and experience, and one was an elementary principal. This small group of five principals could be viewed as outliers. The mean for this item is shown in Appendix B, Table 28. It is 4.84, indicating moderate agreement. It should be noted, though, that the standard deviation for each Item 21 is .93 units, meaning there is much variation between principal responses.

School-level results by construct.

The means for collaboration around data by school level are shown in Table 10.

Table 10

Means for Collaboration around Data by School Level

School Level	*n*	*M*	*SD*
Elementary	27	5.35	.662
Middle	13	4.73	.904
High	10	4.45	.956

As a collective group, the elementary principals agreed moderately ($M = 5.35$) with less variability ($SD = .662$) than the high school principals ($M = 4.45$ and $SD = .956$), who

only slightly agreed, that teachers meet to look at data and use this data to make instructional decisions. The middle school principals' mean response (M = 4.73 SD = .904) was between the elementary and high school principals' mean responses, indicating moderate agreement that teachers in their schools meet to look at data and use this data to make instructional decisions.

A one-way analysis of variance was conducted to determine if there was a significant difference in means among the three levels of assignment. At a confidence level of 95%, results show there is a significant difference between the principal groups (p <.05). The results are shown in Table 11.

Table 11

Way Analysis of Variance for Elementary, Middle and High School Principals with Respect to Their Beliefs Regarding Collaboration among Teachers Using Data-Driven Decision-making

		df	*F*	*p*
Collaboration	Between Groups	2	5.831	.005*
	Within Groups	47		
	Total	49		

*p < .05

School-level results by item.

The response means for the individual survey items for Construct 4 by administrative level are shown in Appendix C, Table 29. For each of the two items, each level of

principals reported slight to strong agreement. The high school principals reported the lowest means for each item. Their mean for Item 20 was 5.20 (*SD* = .919) suggesting moderate agreement that teachers in their schools meet regularly to look at student data and make instructional plans. Their mean response was lower on Item 21 (*M* = 4.20, *SD* = .919) indicating a slight agreement that when teachers meet they are focused on improving student learning outcomes. The middle school principals reported the highest mean scores of 5.46 (*SD* = .660) for Item 20 and 4.54 (*SD* = .660) for Item 21.

To determine if there was any significant difference between the school level and the individual items, two analyses of variance were conducted. The results are shown in Table 30 (Appendix C). At an alpha level of .05, there was significant differences between the elementary and high school principal responses to Item 21 (*p* = .003). The elementary teachers had a mean of 5.22 (*SD* = .698) suggesting elementary principals on average were significantly more likely to agree that when teachers meet they are focused on improving student learning.

Experience as an Administrator

Further analyses were conducted to determine if there were moderating variables that influence principals' perceptions about data use within their school. There was insufficient power to conduct a multivariate analysis of variance to examine the administrators' years of experience as a principal, as well as their years of experience in their current setting. Thus, a series of analyses of variance was conducted for each of these variables.

Construct results.

The first set of four analyses of variance conducted was to determine if there was a significant difference in the means on the four constructs based on their years as a principal. The independent variable had two levels – zero to five years or more than five years experience as a principal. The dependent variables were the means from the four subscales for the constructs identified by White (2008). The results of the descriptive statistics for the principals with respect to their years of experience are shown in Table 12.

Table 12

Descriptive Statistics for Principals with Respect to Years Experience

Construct	0 to 5 Years of Experience			6 or More Years of Experience		
	n	*M*	*SD*	*n*	*M*	*SD*
Data-driven Decision-making	24	4.38	.843	26	4.84	.637
Data-Driven Culture	24	5.31	.635	26	5.18	.593
Data Supporting Systems	24	4.49	.958	26	4.30	.839
Collaboration	24	4.94	.993	26	5.08	.744

The results from the four analyses of variance are shown in Table 13 and indicate there is a significant difference in the means of the 24 respondents with five or fewer

years as a principal versus the remaining 26 respondents who had been a principal for more than five years when responding to items about data-driven decision-making (p = 0.03).

Table 13

One-Way Analysis of Variance for Principals with Respect to Years Experience

		df	*F*	*p*
Data-driven Decision-making	Between Groups	1	4.839	.033*
	Within Groups	48		
	Total	49		
Data-driven Culture	Between Groups	1	.526	.472
	Within Groups	48		
	Total	49		
Data Supporting Systems	Between Groups	1	.726	.398
	Within Groups	48		
	Total	49		
Collaboration	Between Groups	1	.340	.563
	Within Groups	48		
	Total	49		

*$p < .05$

Principals with six or more years of experience as a principal had mean response for data-driven decision-making of 4.84 while those with five or less years of experience had a mean of 4.38, meaning that on average those principals with more experience had a stronger belief that teachers are using data to improve student achievement. According to Mitchell and Jolley (2007, p. 578), the *F*-ratio, or the ratio of between-groups variance to within-groups variance, indicates the observed difference is most likely not attributable to chance. Thus, as a principal's years of administrative experience increases, so may his or her perceptions that teachers are making data-driven decisions. The differences in the means for the other three constructs varied less than 0.2, providing no significant differences between the groups.

Experience in Current Setting as an Administrator

The years of experience seemed to influence principals' perceptions about data-driven decision-making in their school, but what about their tenure in their current setting? Further analyses were conducted to determine if the length of time an administrator had served as principal within their current building had an effect on their perceptions. Thirty-seven of the principals had three or fewer years of experience in their current setting, while 13 principals had more than three years of experience within their current building.

Construct results.

The frequency, the mean, and the standard deviation for principals with zero to three years of experience and those for principals with more than three years of experience and their beliefs on each of the constructs are shown in Table 14. The mean scores for the principals with three or less years in their current setting were greater for each construct

except the one pertaining to data-driven decision-making by teachers. Those principals with less time serving in the capacity of principal at their current school had a mean response of 4.57 while those with greater than three years in their current setting had a mean response of 4.79. The greatest difference in response means was for data supporting systems, with there being a difference of 0.56 in the means. For all constructs, though, both groups of principals had mean responses indicating agreement with each of the four constructs.

Table 14

Descriptive Statistics for Principals with Respect to Years Experience in Current Setting

Construct	0 to 3 Years of Experience			4 or More Years of Experience		
	n	*M*	*SD*	*n*	*M*	*SD*
Data-driven Decision-making	37	4.56	.783	13	4.79	.741
Data-Driven Culture	37	5.32	.571	13	5.00	.677
Data Supporting Systems	37	4.51	.802	13	4.07	.889
Collaboration	37	5.00	.874	13	4.82	.877

Another set of four one-way analyses of variance was conducted to determine if the respondents' beliefs varied on the four constructs based on the years they had been a principal at their current school. Based on the results shown in Table 15, there is a significant difference between the means of principals with three or less years as

compared to those with more than three years assigned to their current school with respect to their beliefs regarding the data-driven culture within their building ($p = .007$) and their beliefs regarding teacher collaboration ($p = 0.033$).

Table 15

One-Way Analysis of Variance for Principals with Respect to Years Experience in Current Setting

		df	*F*	*p*
Data-driven Decision-making	Between Groups	15	1.621	.120
	Within Groups	34		
	Total	49		
Data-driven Culture	Between Groups	15	2.768	.007*
	Within Groups	34		
	Total	49		
Data Supporting Systems	Between Groups	15	1.311	.249
	Within Groups	34		
	Total	49		
Collaboration	Between Groups	15	2.140	.033*
	Within Groups	34		
	Total	49		

*$p < .05$

Principals with three or fewer years in their current setting felt more strongly than those principals with more experience at their current school that a data-driven culture exists within their buildings. They also reported believing more strongly that teacher collaboration occurs within their schools.

Impact of Adequate Yearly Progress

Data-driven decision-making is focused on using feedback from formative assessments to improve instruction and therefore increase student achievement. This process of using data as evidence for implementing an appropriate instructional program is fundamental to the No Child Left Behind Act of 2001. It is No Child Left Behind that requires states to demonstrate Adequate Yearly Progress (AYP) in English and mathematics. Student assessment results are compared to the Annual Measurable Objectives (AMOs) which are based on proficiency levels. Thus, a school or division makes AYP by exceeding the minimum set for the number of students testing as proficient.

For this study the independent variable of AYP status had two levels – Made AYP or Did Not Make AYP. The dependent variables remain the mean responses to the individual survey items or the constructs (see Table 16). In 2008-2009, two schools did not have any baseline AYP data, as they were in there first year of operation. These schools were not included in the analyses involving AYP status. Of the remaining 48 schools, 41 made AYP and seven did not.

Construct results.

A comparison of a school's 2008-2009 AYP status and the principals' beliefs about data use was conducted using a one-way analysis of variance. The independent variable was AYP status, and it had two levels – Made AYP or Did Not Make AYP. The dependent variable remained the four mean scale scores resulting from the four constructs (see Table 16).

Table 16

Descriptive Statistics for Principals with Respect to 2008 -2009 AYP Status

Construct	Made AYP			Did Not Make AYP		
	n	*M*	*SD*	*n*	*M*	*SD*
Data-driven Decision-making	41	4.72	.656	7	3.97	1.172
Data-Driven Culture	41	5.26	.596	7	5.10	.732
Data Supporting Systems	41	4.41	.801	7	4.14	1.136
Collaboration	41	5.13	.733	7	4.36	1.314

Principals with three or fewer years in their current setting felt more strongly than those principals with more experience at their current school that a data-driven culture exists within their buildings. They also reported believing more strongly that teacher collaboration occurs within their schools.

Statistical significance exists between the means of principals whose school made AYP for 2008-2009 AYP versus those whose schools did not make AYP with respect to

collaboration among teachers using data-driven decision-making ($p = .05$). The results from a series of four analyses of variance are shown in Table 17.

Table 17

One-Way Analysis of Variance by Construct for Principals with Respect to 2008-2009 AYP Status

		df	*F*	*p*
Data-driven Decision-making	Between Groups	2	3.112	.054
	Within Groups	47		
	Total	49		
Data-driven Culture	Between Groups	2	.222	.802
	Within Groups	47		
	Total	49		
Data Supporting Systems	Between Groups	2	.708	.498
	Within Groups	47		
	Total	49		
Collaboration	Between Groups	2	3.199	.050*
	Within Groups	47		
	Total	49		

*$p < .05$

The principals whose schools made AYP moderately agree ($M = 5.13$) that teachers collaborate and use data-driven decision-making, while principals whose schools did not make AYP only agree slightly ($M = 4.36$) that collaboration occurs. The unequal cell sizes may present a limitation, so the results should be used with caution.

The means for the individual survey items based on making AYP or not making AYP for 2008-2009 and 2009-2010 are shown in Appendix C, Table 35 and Table 36.

Summary

The four constructs derived by White (2008) were used to determine if there was a significant difference in principals' beliefs based on their level of assignment – elementary, middle or high school. The four constructs grouped related survey items around data-driven decision-making, data-driven culture, data supporting systems and collaboration around data. Multiple analyses of variance were conducted to determine if there were statistical differences in means among the principals.

The results from an analysis of variance to determine if there was a difference among elementary, middle and high school principals' beliefs about teachers' use of data. No significant differences were found among principals' assignment level and their beliefs about teachers'use of data-driven decision-making to improve student achievement. At the item level, an analysis of variance indicated significant differences between elementary and high school principals at an alpha level of .05 on two items. Item 22 ($p = .04$) addresses teachers working collaboratively to improve curriculum and instruction, while Item 25 ($p = .03$) refers to teachers using assessment data to identify students who

are not being academically successful. The elementary school principals had a higher mean response for both items (M = 5.48 for Item 22 and M = 5.56 for Item 25) as compared with the high school principals (M = 4.70 for Items 22 and 25). Thus, elementary school principals are more likely to agree that teachers collaborate and use assessment data to improve student achievement.

In this study, principals were asked about the data-driven culture within their schools. In general, principals responded that they support teachers' data needs. No significance was found, however, based on two analyses of variance that were conducted to examine the two constructs related to having a data culture. The middle school principals had the highest mean response of 5.28 while the high school principals had the lowest mean response of 5.13 when asked about the existence of a data-driven culture within their schools. Both of these mean responses indicate moderate agreement. High school principals also had the lowest mean response (M = 4.14) for the construct about data supporting systems. The elementary school principals had the highest response mean (M = 4.54), and middle school principals fell in between (M = 4.28). Based on these results, elementary principals on average perceive their school have access to more data and are using data to drive their school improvement and professional development plans, and to allocate their resources.

Principals' beliefs about collaboration around data were another focus of this study. The principals participating in this study strongly agreed that teachers are meeting regularly to examine student data and make instructional decisions (M = 5.38). An analysis of variance was conducted to examine for differences among principal levels. At

an alpha level of .05, significant mean difference was found between elementary and high school principals' beliefs regarding teacher collaboration. The elementary principals strongly agreed (M = 5.35) while the high school principals only moderately agreed (M = 4.45) that teachers meet regularly to analyze student data and use this data to make instructional plans.

Other factors that may have impacted principals' beliefs about data include such mediating variables as their years of experience as an administrator, as well as their years as a principal in their current school. Two analyses of variance found significant differences in principals' responses to two constructs concerning a data-driven culture and collaboration around data. Those respondents serving as principals for three or less years in their current setting were found to have a higher mean response (M = 5.32 and 5.00, respectively) than their colleagues who had been in their current setting for over three years (M = 5.00 and 4.82, respectively). Therefore, principals assigned to their current school for less than four years hold a stronger belief than those who have been assigned to their current building more than three years that their school's improvement goals are clear, specific, measurable, and based on student data. They believe strongly that there are open and honest discussions about data and teachers are supported in their use of data to improve classroom instruction and the quality of decision-making within the school. Furthermore, the principals with less years of service in their current setting hold stronger beliefs that teachers in their school meet regularly to analyze student data and use this data to make instructional plans.

The impact of schools making or not making Adequate Yearly Progress (AYP) was also investigated in this study. Results indicate that principals at schools that made AYP in 2008-2009 had a higher mean response ($M = 5.13$) than those at schools that did not make AYP ($M = 4.36$) on Construct 4. Construct 4 focused on collaboration around data, and the principals at schools making AYP moderately agreed that collaboration among teachers using data-driven decision-making was happening in their schools while the principals at schools not making AYP slightly agreed that this level of collaboration was occurring at their schools. At the item level, the principals assigned to schools that did not make AYP had a mean response of 2.86 (slightly disagree) on Item 29 which refers to teachers using data to verify assumptions about causes of student behavior and performance. The principals assigned to schools that did make AYP had a means response of 4.37 (moderately agree) for this same item. Similarly, the principals differed on Item 36, with principals at schools not making AYP slightly agree ($M = 4.00$) and those at school making AYP moderately agree ($M = 5.05$) that teachers use student assessment data to set instructional goals. However these results need to be considered in light of the disparity in cell sizes and should be interpreted with caution.

CHAPTER 5

Conclusions and Recommendations

The aim of this study was to examine principal beliefs concerning data use within their schools. The purpose was to discover if there is a difference in elementary, middle, and high school principals' beliefs concerning data use within their buildings to make instructional decisions that may impact student achievement. This research was based on a census survey of elementary, middle and high school principals at comprehensive schools in a single school division in Virginia. Research questions were developed to examine the relationship among principal beliefs, school characteristics and Adequate Yearly Progress status concerning data-driven decision-making within a large school division. The research questions for this study were:

1. Is there a difference among elementary, middle and high school principals' beliefs about the use of data-driven decision-making by teachers to improve student achievement?
2. Is there a difference among elementary, middle and high school principals' beliefs regarding the data-driven culture within their schools?

3. Is there a difference among elementary, middle and high school principals' beliefs regarding the level of collaboration among teachers to support data-driven decision-making?

The statistical analyses examined the relationship among principal characteristics, such as administrative level and years of experience as a principal and years in his or her current school setting, and student achievement as defined by the school's Adequate Yearly Progress status for 2008-2009.

Significant Findings

School-Level Results

The results in Chapter 4 show significant differences between elementary and high school principals' beliefs about collaboration among teachers using data-driven decision-making. Elementary school principals reported stronger agreement ($M = 5.35$) than the high school principals ($M = 4.45$) when responding to statements about collaboration around data that occurs within their respective schools. Thus, on average the elementary school principals perceive their teachers meeting regularly to examine student data and use that data to improve student learning outcomes. The high mean response rate of 5.35 ($SD = .662$) suggests elementary schools in this division are venues where there are open and honest discussions about data. The elementary principals evidently see themselves as modeling data-driven educational practices and supporting teachers be providing the time and resources to support data use.

Administrative experience.

Statistically significant differences were found between principals with less than five years experience compared those with more than five years experience when examining their beliefs regarding the use of data-driven decision-making by teachers to improve student achievement. Principals with more than five years of experience had a mean response for data-driven decision-making of 4.84 while those with five or less years of experience had a mean of 4.38. Thus, on average, those principals with more experience had a stronger belief that teachers are using data to improve student achievement.

Administrative experience in current setting.

In addition, significant differences were found between principals with less than three years experience and those with more than three years experience in their current assignment when examining their beliefs regarding a data-driven culture and collaboration around data. On average, when responding to statements about the data-driven culture within their schools and level of teacher collaboration around data, the principals in their current setting less than three years were found to have a higher mean response than their colleagues who had been in their current setting for over three years. Therefore, principals assigned to their current school for less than three years hold a stronger belief than those who have been assigned to their current building more than three years that their school's improvement goals are clear, specific, measurable, and based on student data. Principals in their current position for less than three years strongly agreed that there are open and honest discussions about data, and teachers are supported in their use of data to improve classroom instruction and the quality of

decision-making within the school. Furthermore, they hold stronger beliefs that teachers in their school meet regularly to analyze student data and use this data to make instructional plans, yet it is the principals with more than three years of experience in their current setting that have a stronger belief that teachers are using data to improve student achievement.

AYP status.

Student achievement was defined for this study as the school's Adequate Yearly Progress status for the 2008-2009 school year. Significant differences were found when AYP status was examined with respect to principals' beliefs about collaboration between teachers using data-driven decision-making. The principals whose schools made AYP moderately agreed that teachers were collaborating to use data-driven decision-making, while principals whose schools did not make AYP only agreed slightly that collaboration was occurring.

Discussion

Assessments and accountability continue to be of immediate and urgent relevance to educators due to the No Child Left Behind Act of 2001. Teachers and administrators are accountable for the collection, use and interpretation of data. Provisions of NCLB require that data be disaggregated when reporting student achievement results, and many studies support the need for disaggregation for effective data use (Bernhardt, 2000; Holcomb, 1999; Lachat and Smith, 2005; Love, 2000). Thus, the principal must transform himself and herself from manager to leader. Even the limited research available on data-driven

decision-making seems to indicate that as an instructional leader the principal must become fluent in data-driven decision-making (Arnold, 2007; Copland, Knapp, & Swinnerton, 2009; Feldman & Tung, 2001; Halverson et al., 2005; McLeod, 2005).

Supovitz and Klein (2003) found the driving force behind strong data use was the principal. They contend that there must be a constant emphasis by the principal on transforming "data from numbers on a page [to] action in the classroom" (p. 36). This is best visualized using Ikemoto and Marsh's (2008) framework for describing the data-driven decision-making process as it applies to education. They state that the level of the educator may determine the obstacles that need to be overcome to transform data into valid information then actionable knowledge (Ikemoto and Marsh). This study focused on the principal level and did not address the other levels of teacher or central office personnel.

Data-driven Decision-making

Multiple researchers have proposed frameworks to apply business models for knowledge management to educational settings (Petrides & Guiney, 2002; Light, D., Wexler, D. H., & Heinze, J., 2005; Petrides & Nodine, 2006). The process of turning data into actionable knowledge can shape how a school develops its plan and strategies for improvement in student achievement. The framework proposed by Petrides and Guiney is referred to as an ecological framework that involves all stakeholders not just those within the school walls. Their framework encompasses the gathering, synthesizing, and deciphering the meaning of information. Within the context of schools, this translates to

teachers using information as a tool to plan instruction for the purpose of improved student performance.

Another pair of researchers, Ikemoto and Marsh (2008), used the patterns that emerged from previously collected data to develop a framework of data-driven decision-making. Their framework showed the progression from data to information to knowledge to action. Ikemoto and Marsh found that teachers, administrators, and central office personnel may encounter different obstacles, such as accuracy and accessibility of data, and this can hinder the process of turning data into valid information and actionable knowledge.

This study only examined principals' perceptions of teachers' use of data. The principals responded to nine survey items that measured their beliefs about data-driven decision-making by their teachers. The results showed there was no significant difference among elementary, middle and high school principals' responses at an alpha level of .05. Thus, their beliefs about the use of data-driven decision-making by teachers to improve student achievement were similar across grade levels.

The lack of a significant difference among these principal groups could be the result of contextual factors or school division policies and practices. For instance, there has been a division-wide focus on data disaggregation to improve student achievement. Professional development for the 2008-2009 school year centered on professional learning communities and data discussions within these learning communities. In August 2008, Richard and Rebecca DuFour provided a one-day in-service for all teachers within the division on developing professional learning communities. As a follow-up to this

workshop, in the spring of 2009 the Director of High Schools randomly surveyed middle and high school teachers required to administer end of year Standards of Learning assessments to examine changes in their instructional practices as a result of the centralized directive of membership in a professional learning community.

Another district directive in 2008-2009 required principals at schools not making Adequate Yearly Progress (AYP) to submit benchmark data every quarter. In addition, every school in the division had to administer quarterly benchmark assessments in mathematics, and the principal had to submit a formal report within one week of administering the benchmarks to the appropriate director and the Assistant Superintendent of Instruction. This report consisted of the overall course or grade level of rate of correct answers. No disaggregated data by AYP subgroups was required; however, principals were expected to identify the five items most frequently missed by students. Principals also had to reflect on the overall results of the benchmark assessments. Furthermore, principals were expected to schedule time with individual teachers to discuss the benchmark results and the teacher's plans for future instructional practices.

Lachat and Smith (2005) found that disaggregated data by federally-mandated subgroups permitted more targeted instructional decisions. Applying Lachat and Smith's findings to this study, the division policies may have impacted the principals' beliefs since the central office required some schools to disaggregate benchmark data by AYP subgroups. The division uses the term "bubble school" to identify schools within the division that would not make AYP using the current year Annual Measurable Objectives (AMOs) given the prior year's test results. Bubble schools were required to submit

disaggregated benchmark data by AYP subgroup for each teacher of reading and mathematics, whichever was applicable based on their previous year's Virginia's Standards of Learning assessment data. The fourth quarter benchmark assessment was a Standards of Learning simulation administered two to three weeks prior to the administration of the state-mandated end of course or grade level assessments.

With the division expectation that all principals establish data use as a school-wide practice, it seems likely that the principals would respond that teachers are using the data to drive instructional changes. The principal beliefs, although not necessarily their practices, in this division differ from the findings of Ingram, Louis and Schroeder (2004). Ingram et al. found in their longitudinal study of nine high schools from across the United States that had leading practitioners of continuous improvement practices that approximately 40% of the teachers and administrators in their study described using systematic data for decision-making, while another 40% reported using anecdotal information, experience or intuition for making decisions. There were, however, no items on the survey that specifically addressed the use of anecdotal information, experience or intuition. The items on the survey were specific to data-driven decision-making only.

As for the differences at the item level, a series of one-way analyses of variance was conducted to determine if there was any statistical significance among the school levels on the individual items. At an alpha level of .05, there was a significant difference between the elementary and high school principals' responses to item 22 ($p = .040$) and item 25 ($p = .029$). Elementary school principals agreed moderately to strongly that teachers work collaboratively to improve curriculum and instruction, $M = 5.48$, and that

teachers use assessment data to identify students who are not experiencing academic success, *M*= 5.56. The high school principals' mean for these same two items were 4.70 for both.

This difference may be the result of the organizational structures within the school. Elementary school teachers meet regularly with their grade level team. While they plan collaboratively, they are generally responsible for teaching one group of 18 to 25 students. In contrast, the high school teachers meet regularly with their colleagues who teach within the same content areas. More specifically, they meet with their colleagues who teach the same course, but they each teach 125-150 different students. There were no statistically significant mean differences between the elementary and middle school principals or the middle and high school principals. Since their organizational structure is a hybrid of the elementary schools and the high schools, this may explain the lack of differences. Middle school teachers meet on grade level teams, and a typical team shares approximately 125 students. A grade level team consists of the six core teachers – two mathematics, two English, one science and one social studies teacher. At some of the middle schools, the science and social studies teachers change teams mid-year since their classes operate on a semester schedule. Thus, the differences in the organizational structure at the three levels may influence the principals' beliefs about the extent of collaboration occurring within their schools.

Data-driven Culture

Again, considering only at the administrative level, the principals responded to six items measuring their beliefs about the existence of a data-driven culture within their

schools. The mean values for the individual items varied but no item had more than four principals disagree with the statement. Two items had 100% of the principals agree at some level that their schools adequately support teachers' use of data to improve classroom instruction, and they believe that constant analysis of what is happening within the school and making necessary adjustments will lead to improvement. There was no significant difference on Construct 2 or Construct 3 as a result of level of assignment when two separate, one-way analyses of variance were conducted. Furthermore, there was no significant difference found when comparing the means for the principals' beliefs regarding a data-driven culture within their school and the level of administrative assignment. These results are consistent with those of White (2008) who found no significance with respect to the data culture of the school across grade level. The three levels of administrators responded that they moderately agreed that a data-driven culture existed within their schools, with means ranging from 5.13 for the high school principals to 5.28 for the middle school principals to 5.26 for the elementary school principals. The principals agreed only slightly that data supporting systems existed within their schools with the means ranging from 4.14 for the high school principals and 4.54 for the elementary principals.

The supporting systems construct is comprised of statements about the use of data to define professional development needs and resource allocations. Based on the research by Lachat and Smith (2005), the principals may support data use to improve student achievement, but they may not necessarily have the skills and time needed to move the school forward on data use. Thus the principals may know the value of creating a data-

driven culture but may lack the resources to create such a culture. This may be a reflection of the lack of structured professional development offered within the division to train teachers in data-driven decision making. Such professional development is provided to individual schools at the request of the principal.

Collaboration

The final construct focused on teacher collaboration. A one-way analysis of variance was conducted at a confidence level of 95% to examine the differences in principals' beliefs concerning the level of collaboration among teachers to support data-driven decision-making (Construct 4). Finding statistical mean differences a Bonferroni post hoc analysis indicated that the elementary and high school principals' beliefs differed significantly with regard to teacher collaboration.

The elementary school principals had a mean score of 5.35 while the high school principals had a mean score of 4.45 on Construct 4. Based on the Likert-like response scale, a score of four represents that the respondent agrees slightly, a score of five represents the respondent agrees moderately, and a score of six translates to agrees strongly. As such, the elementary school principals reported more strongly that collaboration among teachers to support data-driven decision-making is occurring in their schools than their high school counterparts. The research of Lachat and Smith (2005) suggests student achievement results improve when the school leader establishes data use as a school-wide practice. Collaboration centered on data brings a focus and sense of purpose to collaborative efforts (Wayman and Cho, 2009).

In practical terms, this finding was marginally less conclusive than those supported by White (2008). While this study was focused on the differences in beliefs based on the assignment level of the principal, both groups reported a slight to moderate agreement with respect to collaboration among teachers to use data to make decisions. The higher mean score for the elementary principals compared to high school principals could be the result of elementary school teachers having weekly grade level meetings with such a small group of teachers. The typical elementary school in this division has five to six teachers per grade level. The typical team at the middle school also has five to six teachers. At the high school, a department can consist of upwards of 20 teachers with nine or more meeting in a professional learning community to examine data.

A comparison of these results to White (2008) found minimal similarities. While White's overall research results were mixed, beliefs regarding teacher use of data-driven decision-making by teachers to influence student achievement and collaboration among teachers who use data-driven decision-making proved significant in all tests. The results from the current study with a small cohort of elementary, middle and high school principals, rather than only elementary principals (White, 2008), found that the elementary school principals perceived a significantly greater level of collaboration among teachers to use data-driven decision-making, with elementary principals having a mean scale score of 5.35 and high school principals having a mean scale score of 4.45. While there is some practical significance to these results, the mean scale scores indicate a weak to moderate level of agreement suggesting that, according to principals, teachers are making data-driven decisions in a collaborative environment.

Leadership

Administrators need to be monitoring student assessment data, as well as other student and teacher data, on a continuous basis (Bernhardt, 2007). Feldman and Tung (2001) studied the experiences of six Massachusetts schools whose teachers were trained in data-based inquiry and decision-making. Of these six schools, only two were effectively implementing the data-based decision-making model; and only one of these two schools were successful in raising achievement. They determined that the principal was central to the successful use of data to improve student achievement. Only when the principal had a vision which expected all teachers to participate in the use of data was data-based decision making truly effective (Feldman and Tung, 2001). Halverson et al. (2005) found that school leaders were instrumental in keeping school achievement the focus of all school discussions. The principals surveyed in the current study reported moderately to strongly ($M = 5.36$) that their school's improvement goals are clear, specific, measurable, and based on student data.

The three levels of principals, elementary, middle and high school, responded similarly. The high school principals had the highest mean score of 5.40, while the middle school principals had the lowest mean score of 5.31. Overall, all three levels of principals reported their schools' goals were clear, specific and measurable. Thus, it seems that the principals participating in this study believe they are providing the necessary vision for data-driven decision-making to be occurring within their schools. This is not unexpected. Each principal must submit a three-year, comprehensive school improvement plan with an annual review with central office personnel. The goal is for

central office staff to work more effectively with schools. This intensive and continuous comprehensive review process is focused on a school's achievement, discipline, attendance, and climate data.

Influence of Administrative Experience

To answer the secondary questions about the factors that might influence a principal's perceptions of data use within his or her building, several one-way analyses of variance (ANOVAs) were performed. The ANOVAs were conducted to determine if there was any significant difference in the years of experience as a principal, the length of time a principal has served in their current school, and the status of his or her school with respect to making Adequate Yearly Progress (AYP) in 2008-2009 and 2009-2010 and the influence that each of these factors may have on the reported data use within the school.

Statistical significance was found with the length of time a person had been a principal and perception that teachers are using data-driven decision-making to improve student achievement. Principals with six or more years of experience as a principal had mean response for Construct 1 of 4.84 while those with five or less years of experience had a mean of 4.38, suggesting that on average those principals with more experience had a stronger belief that teachers are using data to improve student achievement. Both of the means reflect a low to moderate level of agreement with statements aligned to the belief that teachers are using data to drive instruction.

Statistical difference was also found with respect to the length of time a principal had been in their current setting and perception about the existence of a data-driven culture and the level of collaboration within the school. On average the principals in their current

setting less than three years were found to more strongly agree than their colleagues who had been in their current setting for over three years that a data-driven culture exists within their school.

To examine any possible relationships between the length of time a person has been a principal and the length of time a principal has been in their current setting, a cross tabulation of responses to data-driven decision-making and data-driven culture was conducted (see Appendix F, Table 40). The results from the cross tabulation suggest principal perceptions are similar for both years of experience and length of time in the current setting. Three 2x2 factorial analyses of variance to test between-subject effects yielded no significant difference at an alpha level of .05 for the constructs concerning data-driven decision-making, data-driven culture, and collaboration..

Based on personal experience, this difference in years of experience and principals' perceptions of teachers using data to improve student achievement may be a result of the more experienced principals having developed the expertise and skills for the management aspect of administration and are able to focus more on the leadership portion of the job. Based on the research by Lachat and Smith (2005), the differences noted in the current study could also be a result of the principals with more experience having learned how to distribute their leadership to assistant principals, department chairpersons, and teacher leaders.

Influence of AYP Status

Differences were found when comparing the length of time a person had been a principal and the AYP status of the school for 2009-2010. Principals at schools that use

online Standards of Learning (SOL) testing may have known they were not going to make Adequate Yearly Progress (AYP) before the preliminary results were released in July 2009. Principals at some middle schools knew they would not make AYP as a result of not meeting the 95% participation requirement in mathematics as a result of programmatic changes. The 2008-2009 year was the final implementation year of an algebra initiative resulting in all eighth graders taking algebra. Some schools chose to offer Algebra Part I which did not have an end-of-year state test. Since these students had previously taken the eighth grade mathematics SOL test, they did not take any mathematics SOL in eighth grade as mandated by the state of Virginia. Furthermore, principals may have responded based on their scores from the previous year and knowing the bar had increased four points for both reading and mathematics. As Salpeter (2004) and Secada (2001) reported data collection has become an integral part of K-12 education. More experienced principals have had more time to adjust to the requirements of the No Child Left Behind Act and may have learned how to support teachers through the process of using data to make instructional decisions (Feldman and Tung, 2001).

Implications for Practice

According to Lachat & Smith (2005), educational leaders and classroom teachers need to be able to organize and analyze data to make effective instructional changes. A principal's inability to transform data into information may have an impact of his or her ability to lead teachers through the data-driven decision-making process. One suggestion would be to include data sharing as a part of the time principals meet as a professional

learning community. Through professional development or coaching, the principals would learn to make and to model data-driven decision-making. In addition, principals could be required to submit data reports relevant to their school's improvement plan, and then use these reports to evaluate their ability to use data. This may have the domino effect of having to train central office personnel on data-driven decision-making. Based on the results that principals who have been in their current setting for more than three years, it may be that some principals are relying on intuition rather than knowledge to evaluate programs within their buildings.

Another recommendation for further study would be to evaluate the principals' level of assessment literacy. Black and Wiliam (1998c) found teachers who have a firm foundation in assessment literacy and use summative assessment data in a formative way can have a significant effect on student learning. Principals need to understand the effect of a teacher's assessment literacy level and the process for developing, administering, and scoring assessments if they are to lead teachers in this process. It is through this process that data-driven decision-making leads to improved student learning. In 2006, Vogel, Rau, Baker and Ashby evaluated the education reform movement in Illinois and recommended an increased focus on professional development purposely designed to increase teacher's assessment literacy. Principal assessment literacy levels could have a direct impact on future professional development opportunities.

Lastly, the school division needs to identify best practices used at schools where teachers and administrators are effectively making data-driven decisions. The division could then provide professional development opportunities for experienced and novice

principals to learn how to implement these best practices. This would hopefully build the data-driven decision-making capacity within all the schools in the division.

Limitations

In conducting research on the beliefs of principals on data-driven decision-making, the study participants were from a single school division in Virginia. The school division is one of the largest in the Commonwealth of Virginia with 63 comprehensive schools K-12. This limits the generalizabiliy of the results, but smaller or more rural school divisions might find the results from a larger division informative for their purposes. The county itself, however, is rather diverse with some schools drawing students from areas of greater wealth and less diversity than other schools.

The timing of the administration of the survey may have influenced the response rate, making it a limitation of this study. The survey was administered in mid-June during the first week of summer vacation for the students and teachers. This is traditionally a time when educators are tired, yet trying to look ahead to the next year. The thought of schools making Adequate Yearly Progress (AYP) is a concern to principals and central office personnel. Failure to make AYP has a significant impact on the principal and the teachers within a school. The desire to have successfully made AYP and avoid consequences from the division leaders may have impacted principals' responses.

Principals' perceptions of data use within their school could vary based on outside influences. For example, schools in the process of developing their three-year school improvement plan could see a spike in data use by the teachers on the school

improvement committee that is not necessarily indicative of the majority of the faculty. Furthermore, the school division in this study has spent the past two years providing resources and professional development to administrators and teachers in using data to improve student achievement. Given the initiatives to promote data use within the division, principals might have felt compelled to answer in a manner that supports data-driven decision-making.

In an attempt to reduce response bias, the researcher administered the survey rather than having someone from the Office of Accountability administer the survey. The survey was distributed to principals at their regularly planned principals' meetings in June 2009. There were three separate administrations within a single week to accommodate the meetings for each of the levels – elementary, middle, and high. Each of these three levels is supervised by a different director.

A final limitation is the nature of the survey data itself. Survey data is self-reported, and methodology textbooks frequently point to this as a possible limitation (Cronbach, 1970). Cronbach suggested social desirability effects can result in systematically biased responses. Cronbach (1970, p. 40) summarized the problem as follows:

> The crucial problem with self-report, if it is to be interpreted as a picture of typical behavior, is honesty. Even when [the respondent] tries to be truthful we cannot expect him to be detached and impartial. His report about himself is certain to be distorted to some degree.

The principals may have responded in a way so their behavior appeared to be consistent with the division's expectations and more socially appropriate for their position

(Bradburn, Sudman, & Associates, 1980), but their perceptions were subjective and most appropriately assessed through self-reports (Crockett, Schulenberg & Petersen, 1987).

The sample size was small. With a population of 61 and a respondent rate of 82%, the results may be skewed. The respondents who failed to complete the entire survey or opted not to participate altogether may have feared being identified as a principal whose school is not using data or not using data effectively. The small sample size also limited the statistical power, and may have resulted in Type II errors. Type II errors occur "when the statistical test fails to detect that the variables are related" (Mitchell & Jolley, 2007, p. 86). The multiple tests of statistical significance to examine differences at the item level without adjusting the alpha level accordingly may have resulted in Type I errors (Huck, 2004). Therefore, the significant findings at the item level may be due to chance. The disparate cell sizes for the AYP analyses may also present a limitation, so the results concerning the influence of AYP status should be used with caution.

Recommendations for Further Research

This study is limited in its application as it provides no definitive reason as to why differences exist between principals at the different assignment levels. The statistical analyses do indicate that there are differences in perceptions about data use based on the level of assignment and the years of experience as a principal in a school. However, further research is needed to determine why these differences exist.

The findings of this research were based on survey responses McLeod's (2005) Statewide Data-driven Readiness Study: Principal Survey and provide only principal

beliefs. McLeod also has a corresponding survey for teachers entitled Statewide Data-driven Readiness Study: Teacher Survey. This study could be extended through the administration of the corresponding teacher survey to the faculty of the schools whose principals participated in this study. This would enable the results within a given school building to be linked, possibly providing more information as to how well principal perceptions of teachers relate to the perceptions and practices of teachers. This would have the same limitation of this research since surveys are self-reports, providing only an indirect measure. While Sulser's (2006) research did include teachers, principals, and technology coordinators, the study focused on how school leaders and teachers are using the available technology to analyze data as it relates to student progress in mathematics.

This study could be replicated using a revised survey instrument that focuses more on the principal's actions as they relate to data-driven decision-making. McLeod's (2006) survey for principals focuses on principals' perceptions of teachers rather than assessing their practices. A revised survey instrument could incorporate the leadership characteristics associated with effective data use (Choppin, 2002; Feldman and Tung, 2001; Lachat and Smith, 2005). Similarly, future research could extend the work of Supovitz and Klein (2003) by investigating the role of assistant principals and department chairs in data use in schools where a data-driven culture exists yet the principal is not the driving force behind strong data use.

Future research could include a longitudinal study. Principals could be surveyed again at the end of another academic year with the results compared to the outcome of the previous year. Much of the recent research about data-driven decision-making is cross-

sectional (McLeod, 2005; Sulser, 2006; White, 2008), meaning the studies took place at a single point in time. In comparison, a longitudinal study involves a series of measurements taken over a period of time. The repeated measures aspect of longitudinal studies helps to exclude time-invariant unobserved differences such as student ability or motivation to better identify the impact of school leaders (Rivkin, Hanushek, and Kain, 2005).

Based on work with the Chicago Public Schools Office of Technology Services eLearning, McLeod (2005) found that principals need to provide teachers with the time needed to collaborate, to analyze data, and to act upon the data. Future research could focus on the amount of time needed to effectively collaborate, analyze data and act upon data, as this could information could assist schools in creating master schedules that better support data-driven decision-making.

Conclusions

The extent to which principals believe data-driven decision-making is occurring in their schools is a timely question. Schools are being held accountable for student achievement as documented on state proficiency assessments in reading and mathematics. While this is not new, the level of student proficiency expected is continuing to increase. By 2014 all students are expected to meet minimum competency levels. For this to occur, teachers and administrators must learn how to use data to improve student learning. The hope is that this research will help to identify specific professional development needs for principals and teachers according to school level.

From the results of this study, one can draw conclusions about data-driven decision-making within K-12 schools within a given school division. This research supports the use of the four constructs from White's factor analysis, as it applies White's factors to a different group of principals. Through the use of these four constructs, it was determined that there are differences between the responses of elementary and high school principals in several areas. Based on these differences, further research is needed to determine why these differences exist as well as ways to improve the use of data-driven decision-making in ways appropriate for all schools.

The results of this research suggest that all principals, regardless of assignment level, believe in the value of data-driven decision-making. All of the principals within this division seem to understand the importance of creating a culture that supports the "continuous cycle of collection, organization, and synthesis of data in support of decision-making" (Ikemoto & Marsh, p. 109). Further research on the principals' use of time to establish the appropriate percentage or numbers of hours each week required to build a data-driven culture within a school. Further research should include determining if a relationship exists between principal beliefs about data-driven decision-making and the amount of professional development in which administrators and/or teachers participate.

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APPENDICES

APPENDIX A

School Division and School Demographics

Table 18

2008-9 Student Demographics for Division[2]

	Asian (%)	Black (%)	Hispanic (%)	White (%)
Division	5,899 (3%)	48,973 (28%)	13,684 (8%)	104,878 (60%)

[2] This data is from the study district's intranet site. To maintain anonymity, a detailed reference is not provided.

Table 19

2008-9 Student Demographics for Division High Schools[3]

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 52	0.34	1.46	34.34	6.39	57.37	0.11	0.00
School 53	1.2	5.01	23.43	2.54	66.96	0.13	0.73
School 54	0.28	2.79	9.27	1.48	85.49	0.00	0.68
School 55	0.45	4.25	15.10	6.35	73.30	0.00	0.55
School 56	0.69	1.28	31.43	4.97	61.04	0.00	0.59
School 57	0.18	0.86	38.26	1.28	59.11	0.06	0.24
School 58	0.36	5.28	60.36	17.03	16.36	0.05	0.56
School 59	0.21	4.47	8.26	2.20	84.10	0.00	0.76
School 60	0.26	2.64	29.75	4.88	61.48	0.00	0.99
School 61	0.45	2.18	25.59	3.33	68.01	0.04	0.41

[3] This data is from the study district's intranet site. To maintain anonymity, a detailed reference is not provided.

Table 20

2008-9 Student Demographics for Division Middle Schools[4]

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 39	0.62	1.79	18.13	4.13	75.09	0.00	0.25
School 40	0.08	3.02	41.98	6.43	48.25	0.24	0.00
School 41	1.22	2.23	19.66	3.75	72.24	0.00	0.91
School 42							
School 43	0.50	2.88	57.89	22.94	15.39	0.10	0.30
School 44	0.60	3.34	40.67	8.49	45.69	0.13	1.07
School 45	0.09	2.78	32.87	1.30	62.79	0.00	0.17
School 46	0.27	5.18	11.49	2.19	79.95	0.00	0.93
School 47	0.34	3.15	45.67	11.14	38.36	0.00	1.35

[4] This data is from the study district's intranet site. To maintain anonymity, a detailed reference is not provided.

Table 20 Cont.

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 48	0.33	4.53	17.05	5.27	72.32	0.00	0.49
School 49	0.33	1.64	27.52	11.73	58.44	0.00	0.33
School 50	1.18	2.76	12.21	2.04	81.02	0.13	0.66
School 51							

Table 21

2008-9 Student Demographics for Division Elementary Schools[5]

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 1	0.92	3.20	20.14	29.98	45.54	0.00	0.23
School 2	0.95	0.79	49.05	31.55	17.35	0.00	0.32
School 3	0.00	2.36	52.55	24.91	20.18	0.00	0.00
School 4	0.00	6.48	10.80	10.58	71.92	0.22	0.00
School 5	0.54	0.40	61.61	28.32	8.32	0.00	0.81
School 6	0.57	5.80	15.24	1.71	76.45	0.23	0.00
School 7	0.54	2.72	23.37	6.39	66.71	0.27	0.00
School 8	0.17	4.45	25.68	14.21	54.28	0.00	1.20

[5] This data is from the study district's intranet site. To maintain anonymity, a detailed reference is not provided.

Table 21 Cont.

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 9	0.54	1.88	16.80	4.84	74.60	0.13	1.21
School 10	2.30	1.38	44.70	18.43	32.57	0.00	0.61
School 11	0.69	3.47	16.64	22.33	56.03	0.14	0.69
School 12	0.38	2.38	23.50	7.50	63.75	0.25	2.25
School 13	0.94	8.80	14.79	3.56	70.79	0.00	1.12
School 14	0.76	0.57	75.33	1.53	19.69	0.00	2.10
School 15	1.29	5.71	16.90	4.95	68.68	0.32	2.15
School 16	1.58	4.58	41.90	33.80	17.78	0.00	0.35
School 17	0.70	0.93	20.65	2.33	75.03	0.00	0.35
School 18	0.16	4.12	8.73	2.14	84.51	0.00	0.33
School 19	0.22	2.63	8.55	1.32	87.17	0.00	0.11

Table 21 Cont.

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 20	0.00	7.31	11.88	4.94	75.50	0.18	0.18
School 21	0.00	0.71	47.53	4.24	47.53	0.00	0.00
School 22	0.33	3.84	56.03	10.86	26.43	0.22	2.30
School 23	0.33	2.46	60.16	20.00	15.74	0.00	1.31
School 24	0.79	3.40	31.54	3.53	59.55	0.26	0.92
School 25	0.25	4.15	49.25	2.89	43.06	0.00	0.38
School 26	0.80	0.40	28.69	1.79	68.33	0.00	0.00
School 27	0.99	2.98	38.51	7.11	48.93	0.00	1.49
School 28	0.71	3.72	39.82	14.16	41.06	0.00	0.53
School 29	0.30	3.43	6.42	1.19	88.66	0.00	0.00
School 30	2.61	1.38	17.67	15.82	61.14	0.00	1.38

Table 21 Cont.

School	American Indian (%)	Asian (%)	Black (%)	Hispanic (%)	White (%)	Pacific Islander (%)	Other (%)
School 31	0.52	1.57	14.77	3.01	76.21	0.00	3.92
School 32	0.64	3.05	11.18	2.92	80.05	0.13	2.03
School 33	0.52	8.89	11.11	3.79	73.99	0.00	1.70
School 34	1.46	5.72	11.07	2.19	78.59	0.00	0.97
School 35	0.00	3.99	2.17	1.14	92.70	0.00	0.00
School 36	0.57	3.26	27.66	3.69	64.68	0.14	0.00
School 37	5.30	3.66	6.76	1.46	80.62	0.00	2.19
School 38	1.70	4.31	5.74	1.314	86.55	0.13	0.26

APPENDIX B

Descriptive Statistics for Survey Results

Table 22

Data-Driven Decision-making Constructs and Related Survey Items

Construct	Item
Construct 1: Beliefs regarding the use of data-driven decision-making by teachers to improve student achievement	22. Teachers in this school work collaboratively to improve curriculum and instruction. 25. Teachers in my school use assessment data to identify students who are not experiencing academic success. 29. Teachers in my school use data to verity their assumptions about the causes of student behavior and performance. 31. If teachers in my school propose a change, they bring data to support their proposal. 32. Teachers in my school make changes in their instruction based on assessment results. 36. Teachers in my school use data from student assessments to set instructional targets and goals. 38. Teachers and parents communicate frequently about student performance data. 67. Teachers conduct self-assessments to continuously improve performance. 75. Teachers in my school feel personally responsible

Table 22 Cont.

Construct	Item
Construct 2: Beliefs regarding a data-driven culture	34. My school's improvement goals are clear, specific, measurable, and based on student data. 56. As a school we have open and honest discussions about data. 60. Administrators model data-driven educational practices. 61. My school adequately supports teachers' use of data to improve classroom instruction. 71. Using data has improved the quality of decision-making in my school. 74. If we constantly analyze what we do and adjust to get better, we will improve.
Construct 3: Beliefs regarding supporting systems	43. My school uses multiple data sources to assess the effectiveness of educational programs. 44. Teachers have significant input into data management and analysis practices. 52. Whole-school staff meetings focus on measured progress toward data-based improvement goals. 53. Student achievement data are used to determine teacher professional development needs and resources. 55. Student achievement data are used to determine resource allocation.
Construct 4: Beliefs regarding collaboration among teachers using data-driven decision-making.	20. Teacher teams in my school meet regularly to look at student data and make instructional plans. 21. When teachers in my school meet with each other, they usually focus on improving student learning outcomes.

Table 23

Frequency of Responses to Survey Questions Comprising Construct 1: Data-driven Decision-making

Item #	Item Description	*n*	Response	Frequency	Percent	Cumulative Percent
22	Teachers in this school work collaboratively to improve curriculum and instruction.	50	6	21	42%	42%
			5	20	40%	82%
			4	6	12%	94%
			3	6	6%	100%
25	Teachers in my school use assessment data to identify students who are not experiencing academic success.	50	6	26	52%	52%
			5	15	30%	82%
			4	6	12%	94%
			3	3	6%	100%
29	Teachers in my school use data to verity their assumptions about the causes of student behavior and performance.	50	6	4	8%	8%
			5	18	36%	44%
			4	17	34%	78%
			3	4	8%	86%
			2	6	12%	98%
			1	1	2%	100%
31	If teachers in my school propose a change, they bring data to support their proposal.	50	6	5	10%	10%
			5	19	38%	48%
			4	7	14%	62%
			3	14	28%	90%
			2	5	10%	100%
32	Teachers in my school make changes in their instruction based on assessment results.	50	6	12	24%	24%
			5	21	42%	66%
			4	10	20%	86%
			3	5	10%	96%
			2	2	4%	100%
36	Teachers in my school use data from student assessments to set instructional targets and goals.	50	6	11	22%	22%
			5	29	58%	80%
			4	4	8%	88%
			3	5	10%	98%
			2	1	2%	100%

Table 23. Cont.

Item #	Item Description	*n*	Response	Frequency	Percent	Cumulative Percent
38	Teachers and parents communicate frequently about student performance data.	50	6	7	14%	14%
			5	15	30%	44%
			4	22	44%	88%
			3	3	6%	94%
			2	3	6%	100%
67	Teachers conduct self-assessments to continuously improve performance.	50	6	5	10%	10%
			5	14	28%	38%
			4	13	26%	64%
			3	13	26%	90%
			2	4	8%	98%
			1	1	2%	100%
75	Teachers in my school feel personally responsible when our school improvement goals are not met.	50	6	19	6%	6%
			5	14	18%	24%
			4	11	40%	64%
			3	3	26%	90%
			2	2	6%	96%
			1	1	4%	100%

Table 24

Frequency of Responses to Survey Questions Comprising Construct 2: Data-driven Culture

Item #	Item Description	*n*	Response	Frequency	Percent	Cumulative Percent
34	My school's improvement goals are clear, specific, measurable, and based on student data.	50	6	25	50%	50%
			5	19	38%	88%
			4	5	10%	98%
			3	1	2%	100%
56	As a school we have open and honest discussions about data.	50	6	25	50%	50%
			5	17	34%	84%
			4	5	10%	94%
			3	2	4%	98%
			2	1	2%	100%
60	Administrators model data-driven educational practices.	50	6	21	42%	42%
			5	19	38%	80%
			4	6	12%	92%
			3	4	8%	100%
61	My school adequately supports teachers' use of data to improve classroom instruction.	50	6	21	42%	42%
			5	24	48%	90%
			4	5	10%	100%
71	Using data has improved the quality of decision-making in my school.	50	6	15	30%	30%
			5	24	48%	78%
			4	7	14%	92%
			3	2	4%	96%
			2	2	4%	100%
74	If we constantly analyze what we do and adjust to get better, we will improve.	50	6	29	58%	58%
			5	12	24%	82%
			4	9	18%	100%

Table 25

Frequency of Responses to Survey Questions Comprising the Construct 3: Data Supporting Systems

Item #	Item Description	*n*	Response	Frequency	Percent	Cumulative Percent
43	My school uses multiple data sources to assess the effectiveness of educational programs.	50	6	9	18%	18%
			5	24	48%	66%
			4	13	26%	92%
			3	3	6%	98%
			2	1	2%	100%
44	Teachers have significant input into data management and analysis practices.	50	6	3	6%	6%
			5	9	18%	24%
			4	20	40%	64%
			3	13	26%	90%
			2	3	6%	96%
			1	2	4%	100%
52	Whole-school staff meetings focus on measured progress toward data-based improvement goals.	50	6	5	10%	10%
			5	19	38%	48%
			4	15	30%	78%
			3	6	12%	90%
			2	5	10%	100%
53	Student achievement data are used to determine teacher professional development needs and resources.	50	6	8	16%	16%
			5	25	50%	66%
			4	13	26%	92%
			3	2	4%	96%
			2	2	4%	100%
55	Student achievement data are used to determine resource allocation.	50	6	14	28%	28%
			5	12	24%	52%
			4	16	32%	84%
			3	3	6%	90%
			2	4	8%	98%
			1	1	2%	100%

Table 26

Frequency of Responses to Survey Questions Comprising Construct 4: Collaboration

Item #	Item Description	*n*	Response	Frequency	Percent	Cumulative Percent
20	Teacher teams in my school meet regularly to look at student data and make instructional plans.	50	6	25	50%	50%
			5	19	38%	88%
			4	6	12%	100%
21	When teachers in my school meet with each other, they usually focus on improving student learning outcomes.	50	6	11	22%	22%
			5	26	52%	74%
			4	8	16%	90%
			3	4	8%	98%
			2	1	2%	2%

Table 27

Frequency of Responses to Survey Questions Comprising the Four Constructs

Item #	Item Description	*n* Total	Agree (%)	Disagree (%)
Construct 1				
22	Teachers in this school work collaboratively to improve curriculum and instruction.	50	47 (94)	3 (6)
25	Teachers in my school use assessment data to identify students who are not experiencing academic success.	50	47 (94)	3 (6)
29	Teachers in my school use data to verity their assumptions about the causes of student behavior and performance.	50	40 (80)	10 (20)
31	If teachers in my school propose a change, they bring data to support their proposal.	50	32 (64)	18 (36)
32	Teachers in my school make changes in their instruction based on assessment results.	50	43 (86)	6 (12)
36	Teachers in my school use data from student assessments to set instructional targets and goals.	50	44 (88)	6 (12)
38	Teachers and parents communicate frequently about student performance data.	50	44 (88)	6 (12)
67	Teachers conduct self-assessments to continuously improve performance.	50	32 (64)	18 (36)
75	Teachers in my school feel personally responsible when our school improvement goals are not met.	50	44 (88)	6 (12)

Table 27. Cont.

Item #	Item Description	Total	*n* Agree (%)	Disagree (%)
Construct 2				
34	My school's improvement goals are clear, specific, measurable, and based on student data.	50	49 (98)	1 (2)
56	As a school we have open and honest discussions about data.	50	47 (94)	3 (6)
60	Administrators model data-driven educational practices.	50	46 (92)	4 (8)
61	My school adequately supports teachers' use of data to improve classroom instruction.	50	50 (100)	0 (0)
71	Using data has improved the quality of decision-making in my school.	50	47 (94)	3 (6)
74	If we constantly analyze what we do and adjust to get better, we will improve.	50	50 (10%)	0 (0)
Construct 3				
43	My school uses multiple data sources to assess the effectiveness of educational programs.	50	46 (92)	4 (8)
44	Teachers have significant input into data management and analysis practices.	50	32 (64)	18 (36)
52	Whole-school staff meetings focus on measured progress toward data-based improvement goals.	50	39 (78)	11 (22)
53	Student achievement data are used to determine teacher professional development needs and resources.	50	46 (92)	4 (8)
55	Student achievement data are used to determine resource allocation.	50	42 (84)	8 (16)

Table 27. Cont.

Item #	Item Description	Total	*n* Agree (%)	Disagree (%)
Construct 4				
20	Teacher teams in my school meet regularly to look at student data and make instructional plans.	50	50 (100)	0 (0)
21	When teachers in my school meet with each other, they usually focus on improving student learning outcomes.	50	45 (90)	5 (10)

Table 28

Descriptive Statistics for Survey Responses

	n	*Min*	*Max*	*M*	*SD*
Construct Means					
Construct 1	50	2.6	5.8	4.62	0.772
Construct 2	50	3.8	6.0	5.24	0.610
Construct 3	50	2.6	5.8	4.39	0.839
Construct 4	50	3.0	6.0	5.01	0.866
Survey Subscale Means					
Acting Upon Data	50	3.5	5.9	4.81	0.653
Data Supporting Systems	50	3.4	5.6	4.44	0.436
School Culture of Data Use	50	3.4	5.8	4.88	0.576
Survey Items					
Item 20	50	4	6	5.38	0.697
Item 21	50	2	6	4.84	0.934
Item 22	50	3	6	5.18	0.873
Item 23	50	1	6	4.14	1.539
Item 24	50	1	6	4.32	1.058
Item 25	50	3	6	5.28	0.904
Item 26	50	2	6	4.48	0.995
Item 27	50	1	6	4.51	1.386
Item 28	50	4	6	5.56	0.675
Item 29	50	1	6	4.14	1.195
Item 30	50	2	6	4.52	0.953
Item 31	50	2	6	4.10	1.216
Item 32	50	2	6	4.72	1.070
Item 33	50	2	6	5.28	0.948
Item 34	50	3	6	5.36	0.749
Item 35	50	2	6	5.12	0.940
Item 36	50	2	6	4.88	0.940
Item 37	50	2	6	4.10	1.165
Item 38	50	2	6	4.40	1.010
Item 39	50	2	6	4.66	0.872
Item 40	50	2	6	4.16	1.017
Item 41	50	2	6	4.18	0.962
Item 42	50	2	6	4.20	0.969
Item 43	50	2	6	4.73	0.908
Item 44	50	1	6	3.80	1.136
Item 45	50	2	6	4.34	1.099

Table 28. Cont.

	n	*Min*	*Max*	*M*	*SD*
Item 46	50	1	6	4.56	1.373
Item 47	50	3	6	4.98	0.845
Item 48	50	1	6	4.12	1.154
Item 49	50	1	6	4.06	1.126
Item 50	50	1	6	4.46	1.328
Item 51	50	2	6	5.12	0.940
Item 52	50	2	6	4.26	1.121
Item 53	50	2	6	4.69	0.940
Item 54	50	3	6	4.94	0.843
Item 55	50	1	6	4.52	1.297
Item 56	50	2	6	5.24	0.947
Item 57	50	2	6	5.00	0.833
Item 58	50	3	6	5.22	0.771
Item 59	50	3	6	5.10	0.886
Item 60	50	3	6	5.14	0.926
Item 61	50	4	6	5.32	0.653
Item 62	50	2	6	5.08	0.922
Item 63	50	3	6	5.40	0.904
Item 64	50	2	6	4.80	1.030
Item 65	50	2	6	5.06	0.890
Item 66	50	2	6	4.80	1.069
Item 67	50	1	6	4.00	1.212
Item 68	50	1	6	4.38	1.308
Item 69	50	3	6	4.56	0.929
Item 70	50	1	6	2.64	1.481
Item 71	50	2	6	4.96	0.989
Item 72	50	4	6	5.48	0.677
Item 73	50	1	6	5.02	1.059
Item 74	50	4	6	5.40	0.782
Item 75	50	1	6	4.84	1.235
Item 76	50	2	6	4.96	.968

Table 29.

Responses for Survey Items by Administrative Level

	Elementary			Middle			High School		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
20	27	5.41	0.636	13	5.46	0.660	10	5.20	0.919
21	27	5.22	0.698	13	4.54	1.050	10	4.20	0.919
22	27	5.48	0.700	13	4.92	0.862	10	4.70	1.059
23	27	3.59	1.575	13	5.15	0.987	10	4.30	1.418
24	27	4.56	1.050	13	4.08	1.115	10	4.00	0.943
25	27	5.56	0.698	13	5.15	1.068	10	4.70	0.949
26	27	4.67	1.000	13	4.15	0.987	10	4.40	0.966
27	27	4.89	0.934	12	4.17	1.850	10	3.90	1.595
28	27	5.48	0.700	13	5.69	0.630	10	5.60	0.699
29	27	4.48	0.975	13	3.85	1.214	10	3.60	1.506
30	27	4.67	0.877	13	4.38	0.961	10	4.30	1.160
31	27	4.04	1.160	13	4.38	1.325	10	3.90	1.287
32	27	4.93	0.997	13	4.69	1.251	10	4.20	0.919
33	27	5.19	1.001	13	5.38	1.121	10	5.40	0.516
34	27	5.37	0.688	13	5.31	0.947	10	5.40	0.699
35	27	5.07	1.035	13	5.23	0.725	10	5.10	0.994
36	27	5.15	0.662	13	4.69	0.947	10	4.40	1.350
37	27	3.89	1.050	13	4.77	1.301	10	3.80	1.033
38	27	4.52	0.849	13	4.69	0.751	10	3.70	1.418
39	27	4.81	0.557	13	4.77	1.092	10	4.10	1.101
40	27	4.19	0.879	13	4.54	1.050	10	3.60	1.174
41	27	4.22	0.934	13	4.23	1.166	10	4.00	0.816
42	27	4.33	0.920	13	4.08	1.115	10	4.00	0.943
43	27	4.89	0.751	13	4.38	1.044	10	4.80	1.033
44	27	4.15	0.989	13	3.38	1.325	10	3.40	0.966
45	27	4.41	1.083	13	4.15	1.281	10	4.40	0.966
46	27	4.52	1.578	13	4.77	1.166	10	4.40	1.075
47	27	5.07	0.781	13	4.77	0.832	10	5.00	1.054
48	26	4.41	0.971	13	3.77	1.363	10	3.80	1.229
49	27	4.23	1.142	13	4.00	1.225	10	3.70	0.949
50	27	4.70	1.295	13	4.23	1.481	10	4.10	1.197
51	27	5.19	0.786	13	5.23	1.092	10	4.80	1.135

Table 29. Cont.

	Elementary			Middle			High School		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
52	27	4.26	1.163	13	4.62	0.870	10	3.80	1.229
53	27	4.93	0.874	13	4.38	0.961	10	4.50	0.972
54	27	5.04	0.808	13	4.85	0.689	10	4.80	1.135
55	27	4.59	1.279	13	4.62	1.325	10	4.20	1.398
56	27	5.26	0.859	13	5.38	0.961	10	5.10	1.197
57	27	5.07	0.958	13	4.92	0.641	10	4.90	0.738
58	27	5.27	0.778	13	5.23	0.599	10	5.10	0.994
59	27	5.22	0.847	13	4.92	0.954	10	5.00	0.943
60	27	5.19	0.786	13	5.15	0.801	10	5.00	1.414
61	27	5.37	0.629	13	5.31	0.630	10	5.20	0.789
62	27	5.15	1.027	13	5.00	0.577	10	5.00	1.054
63	27	5.56	0.751	13	5.31	0.947	10	5.10	1.197
64	27	5.11	0.751	13	4.38	1.325	10	4.50	1.080
65	27	5.22	0.641	13	4.62	1.121	10	5.20	1.033
66	27	4.93	0.874	13	4.46	1.330	10	4.90	1.197
67	27	4.04	1.192	13	3.62	1.261	10	4.40	1.174
68	27	4.44	1.188	13	3.85	1.405	10	4.90	1.370
69	27	4.59	0.931	13	4.38	0.870	10	4.70	1.059
70	27	2.93	1.542	13	2.69	1.601	10	1.80	0.789
71	27	5.04	0.854	13	4.92	0.954	10	4.80	1.398
72	27	5.52	0.700	13	5.46	0.660	10	5.40	0.699
73	27	5.22	0.801	13	4.62	1.502	10	5.00	0.943
74	27	5.33	0.784	13	5.62	0.650	10	5.30	0.949
75	27	4.96	1.055	13	4.46	1.664	10	5.00	1.054
76	27	5.15	0.818	13	4.62	1.325	10	4.90	0.738

APPENDIX C

Results

Table 30

One-Way Analyses of Variance by Item for Elementary, Middle and High School Principals with Respect to Their Beliefs about the Use of Data-Driven Decision-making by Teachers to Improve Student Achievement

Item	Elementary			Middle			High		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
20	27	5.41	.636	13	5.46	.660	10	5.20	.919
21	27	5.22*	.698	13	4.54	1.050	10	4.20*	.919
22	27	5.48*	.700	13	4.92	.862	10	4.70*	1.059
25	27	5.56*	.698	13	5.15	1.068	10	4.70*	.949
29	27	4.48	.975	13	3.85	1.214	10	3.60	1.506
31	27	4.04	1.160	13	4.38	1.325	10	3.90	1.287
32	27	4.93	.997	13	4.69	1.251	10	4.20	.919
34	27	5.37	.688	13	5.31	.947	10	5.40	.699
36	27	5.15	.662	13	4.69	.947	10	4.40	1.350
38	27	4.52	.849	13	4.69	.751	10	3.70	1.418
43	27	4.89	.751	13	4.38	1.044	10	4.80	1.033
44	27	4.15	.989	13	3.38	1.325	10	3.40	.966
52	27	4.26	1.163	13	4.62	.870	10	3.80	1.229
53	27	4.93	.874	13	4.38	.961	10	4.50	.972
55	27	4.59	1.279	13	4.62	1.325	10	4.20	1.398
56	27	5.26	.859	13	5.38	.961	10	5.10	1.197
60	27	5.19	.786	13	5.15	.801	10	5.00	1.414
61	27	5.37	.629	13	5.31	.630	10	5.20	.789
67	27	4.04	1.192	13	3.62	1.261	10	4.40	1.174
71	27	5.04	.854	13	4.92	.954	10	4.80	1.398
74	27	5.33	.784	13	5.62	.650	10	5.30	.949
75	27	5.15	.818	13	4.62	1.325	10	4.90	.738

* Significance between elementary and high school level at an alpha level of .05

Table 31

Mean Responses for Survey Items by Years of Administrative Experience

	0-5 Years Experience			6 or More Years Experience		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
20	24	5.33	0.637	26	5.42	0.758
21	24	4.83	1.090	26	4.85	0.784
22	24	5.04	0.955	26	5.31	0.788
23	24	4.25	1.511	26	4.04	1.587
24	24	4.08	1.213	26	4.54	0.859
25	24	5.17	1.007	26	5.38	0.804
26	24	4.33	1.129	26	4.62	0.852
27	24	4.13	1.576	26	4.85	1.120
28	24	5.42	0.776	26	5.69	0.549
29	24	3.79	1.414	26	4.46	0.859
30	24	4.33	1.007	26	4.69	0.884
31	24	3.75	1.152	26	4.42	1.206
32	24	4.50	1.216	26	4.92	0.891
33	24	5.58	0.717	26	5.00	1.058
34	24	5.50	0.659	26	5.23	0.815
35	24	4.96	1.083	26	5.27	0.778
36	24	4.63	1.135	26	5.12	0.653
37	24	4.46	1.103	26	3.77	1.142
38	24	4.46	0.932	26	4.35	1.093
39	24	4.63	0.970	26	4.69	0.788
40	24	4.21	1.280	26	4.12	0.711
41	24	3.92	0.929	26	4.42	0.945
42	24	4.38	0.924	26	4.04	0.999
43	24	4.83	1.007	26	4.65	0.797
44	24	3.96	1.398	26	3.65	0.797
45	24	4.25	1.260	26	4.42	0.945
46	24	4.71	1.334	26	4.42	1.419
47	24	4.92	1.018	26	5.04	0.662
48	24	3.96	1.301	26	4.27	1.002
49	23	4.04	1.296	26	4.08	0.977
50	24	4.67	1.465	26	4.27	1.185
51	24	5.25	0.794	26	5.00	1.058

Table 31.Cont.

	0-5 Years Experience			6 or More Years Experience		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
52	24	4.33	0.963	26	4.19	1.266
53	24	4.71	1.042	26	4.69	0.838
54	24	5.04	0.859	26	4.85	0.834
55	24	4.71	1.334	26	4.35	1.263
56	24	5.25	1.073	26	5.27	0.827
57	24	4.92	0.974	26	5.08	0.688
58	24	5.21	0.779	26	5.24	0.779
59	24	4.96	0.908	26	5.23	0.863
60	24	5.13	0.992	26	5.15	0.881
61	24	5.38	0.647	26	5.27	0.667
62	24	4.96	1.042	26	5.19	0.801
63	24	5.42	0.830	26	5.38	0.983
64	24	4.58	1.100	26	5.00	0.938
65	24	4.75	0.944	26	5.35	0.745
66	24	4.75	1.032	26	4.85	1.120
67	24	3.58	1.213	26	4.38	1.098
68	24	4.21	1.351	26	4.54	1.272
69	24	4.38	0.970	26	4.73	0.874
70	24	2.79	1.444	26	2.50	1.530
71	24	5.17	0.761	26	4.77	1.142
72	24	5.58	0.584	26	5.38	0.752
73	24	4.79	1.250	26	5.23	0.815
74	24	5.42	0.830	26	5.38	0.752
75	24	4.46	1.285	26	5.19	1.096
76	24	4.92	0.929	26	5.00	1.020

Table 32

One-Way Analyses of Variance by Item for Elementary, Middle and High School Principals with Respect to Their Years of Administrative Experience

	0-5 Years Experience			6 or More Years Experience		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
20	24	5.33	0.637	26	5.42	0.758
21	24	4.83	1.090	26	4.85	0.784
22	24	5.04	0.955	26	5.31	0.788
25	24	5.17	1.007	26	5.38	0.804
29	24	3.79*	1.414	26	4.46*	0.859
31	24	3.75*	1.152	26	4.42*	1.206
32	24	4.50	1.216	26	4.92	0.891
34	24	5.50	0.659	26	5.23	0.815
36	24	4.63	1.135	26	5.12	0.653
38	24	4.46	0.932	26	4.35	1.093
43	24	4.83	1.007	26	4.65	0.797
44	24	3.96	1.398	26	3.65	0.797
52	24	4.33	0.963	26	4.19	1.266
53	24	4.71	1.042	26	4.69	0.838
55	24	4.71	1.334	26	4.35	1.263
56	24	5.25	1.073	26	5.27	0.827
60	24	5.13	0.992	26	5.15	0.881
61	24	5.38	0.647	26	5.27	0.667
67	24	3.58*	1.213	26	4.38*	1.098
71	24	5.17	0.761	26	4.77	1.142
74	24	5.42	0.830	26	5.38	0.752
75	24	4.46*	1.28	26	5.19*	1.10

* Significance between 0-5 years versus 6 or more years of administrative experience at an alpha level of .05

Table 33

Mean Responses for Survey Items by Years of Administrative Experience in Current Setting

	0-3 Years Experience			4 or More Years Experience		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
20	21	5.10	.700	29	5.59	.628
21	21	4.57	1.028	29	5.03	.823
22	21	4.95	.973	29	5.34	.769
23	21	3.95	1.465	29	4.28	1.601
24	21	3.86	1.153	29	4.66	.857
25	21	4.95	1.024	29	5.52	.738
26	21	4.05	.921	29	4.79	.940
27	21	3.95	1.538	29	4.90	1.145
28	21	5.29	.845	29	5.76	.435
29	21	3.57	1.248	29	4.55	.985
30	21	4.10	.831	29	4.83	.928
31	21	3.43	1.121	29	4.59	1.053
32	21	4.29	1.056	29	5.03	.981
33	21	5.33	.730	29	5.24	1.091
34	21	5.19	.750	29	5.48	.738
35	21	5.00	.775	29	5.21	1.048
36	21	4.52	1.078	29	5.14	.743
37	21	4.38	1.024	29	3.90	1.235
38	21	4.48	.873	29	4.34	1.111
39	21	4.86	.793	29	4.52	.911
40	21	4.05	1.024	29	4.2414	1.023
41	21	3.95	1.071	29	4.34	.857
42	21	4.24	.831	29	4.17	1.071
43	21	4.43	.870	29	4.97	.865
44	21	3.76	1.338	29	3.83	.966
45	21	3.90	1.179	29	4.66	.936
46	21	4.48	1.327	29	4.62	1.425
47	21	4.90	.944	29	5.03	.778
48	21	3.62	1.322	29	4.48	.871
49	21	3.85	1.387	29	4.21	.902
50	21	4.38	1.396	29	4.52	1.299
51	21	5.24	.700	29	5.03	1.085

Table 33. Cont.

	0-3 Years Experience			4 or More Years Experience		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
52	21	4.57	.978	29	4.03	1.180
53	21	4.62	1.071	29	4.76	.830
54	21	4.86	.854	29	5.00	.845
55	21	4.43	1.326	29	4.59	1.296
56	21	5.10	1.091	29	5.38	.820
57	21	4.90	.831	29	5.07	.842
58	21	5.05	.740	28	5.36	.780
59	21	4.81	.981	29	5.31	.761
60	21	4.90	.889	29	5.31	.930
61	21	5.24	.625	29	5.38	.677
62	21	4.86	1.062	29	5.24	.786
63	21	5.43	.926	29	5.38	.903
64	21	4.52	1.123	29	5.00	.926
65	21	4.71	.956	29	5.31	.761
66	21	4.57	.978	29	4.97	1.117
67	21	3.76	1.221	29	4.17	1.197
68	21	4.43	1.287	29	4.34	1.344
69	21	4.29	.902	29	4.76	.912
70	21	2.86	1.389	29	2.48	1.550
71	21	4.86	.727	29	5.03	1.149
72	21	5.33	.730	29	5.59	.628
73	21	4.48	1.250	29	5.41	.682
74	21	5.33	.796	29	5.45	.783
75	21	4.48	1.289	29	5.10	1.145
76	21	4.71	1.189	29	5.14	.743

Table 34

One-Way Analyses of Variance by Item for Elementary, Middle and High School Principals with Respect to Their Years of Administrative Experience in Their Current Setting

Item	0-3 Years Experience			4 or More Years Experience		
	n	*M*	*SD*	*n*	*M*	*SD*
20	21	5.10*	.700	29	5.59*	.628
21	21	4.57	1.028	29	5.03	.823
22	21	4.95	.973	29	5.34	.769
25	21	4.95*	1.024	29	5.52*	.738
29	21	3.57*	1.248	29	4.55*	.985
31	21	3.43	1.121*	29	4.59*	1.053
32	21	4.29	1.056*	29	5.03*	.981
34	21	5.19	.750	29	5.48	.738
36	21	4.52*	1.078	29	5.14*	.743
38	21	4.48	.873	29	4.34	1.111
43	21	4.43*	.870	29	4.97*	.865
44	21	3.76	1.338	29	3.83	.966
52	21	4.57	.978	29	4.03	1.180
53	21	4.62	1.071	29	4.76	.830
55	21	4.43	1.326	29	4.59	1.296
56	21	5.10	1.091	29	5.38	.820
60	21	4.90	.889	29	5.31	.930
61	21	5.24	.625	29	5.38	.677
67	21	3.76	1.221	29	4.17	1.197
71	21	4.86	.727	29	5.03	1.149
74	21	5.33	.796	29	5.45	.783
75	21	4.48	1.289	29	5.10	1.145

* Significance between 0-5 years versus 6 or more years of administrative experience at an alpha level of .05

Table 35

Mean Responses for Survey Items by 2008-2009 AYP Status

	Made AYP			Did Not Make AYP		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
20	41	5.39	0.666	7	5.14	0.900
21	41	4.98	0.790	7	4.14	1.464
22	41	5.29	0.750	7	4.57	1.272
23	41	3.90	1.562	7	5.43	0.787
24	41	4.49	0.925	7	3.29	1.380
25	41	5.39	0.771	7	4.71	1.380
26	41	4.54	0.977	7	4.14	1.215
27	41	4.68	1.207	7	3.29	1.890
28	41	5.63	0.623	7	5.14	0.900
29	41	4.37	1.043	7	2.86	1.464
30	41	4.63	0.968	7	3.86	0.690
31	41	4.12	1.229	7	3.71	1.254
32	41	4.85	0.989	7	4.00	1.414
33	41	5.20	1.005	7	5.71	0.488
34	41	5.39	0.737	7	5.29	0.756
35	41	5.17	0.919	7	4.86	1.069
36	41	5.05	0.805	7	4.00	1.291
37	41	3.93	1.127	7	4.71	1.113
38	41	4.44	0.976	7	4.29	1.380
39	41	4.63	0.859	7	4.86	1.069
40	41	4.17	0.972	7	4.14	1.464
41	41	4.24	0.916	7	3.57	0.976
42	41	4.22	1.013	7	4.14	0.900
43	41	4.80	0.843	7	4.43	1.272
44	41	3.85	0.989	7	3.29	1.799
45	41	4.39	1.115	7	4.00	1.155
46	41	4.51	1.434	7	4.86	1.215
47	41	5.05	0.835	7	4.71	0.951
48	41	4.22	1.084	7	3.57	1.618
49	41	4.13	1.137	7	3.71	1.254
50	41	4.46	1.343	7	4.43	1.512
51	41	5.05	0.973	7	5.43	0.787
52	41	4.22	1.173	7	4.29	0.951
53	41	4.73	0.867	7	4.43	1.397

Table 35. Cont.

	Made AYP			Did Not Make AYP		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
54	41	4.95	0.835	7	5.00	1.000
55	41	4.51	1.287	7	4.29	1.496
56	41	5.29	0.901	7	5.00	1.291
57	41	5.00	0.866	7	5.14	0.690
58	41	5.30	0.791	7	5.00	0.577
59	41	5.17	0.834	7	4.71	1.254
60	41	5.20	0.872	7	4.71	1.254
61	41	5.37	0.623	7	5.29	0.756
62	41	5.12	0.900	7	4.86	1.069
63	41	5.37	0.942	7	5.43	0.787
64	41	4.93	0.905	7	4.14	1.574
65	41	5.17	0.738	7	4.43	1.512
66	41	4.88	1.029	7	4.29	1.254
67	41	4.05	1.203	7	3.57	1.397
68	41	4.41	1.264	7	3.86	1.574
69	41	4.71	0.901	7	3.86	0.900
70	41	2.66	1.527	7	2.43	0.976
71	41	5.00	1.049	7	4.71	0.488
72	41	5.49	0.675	7	5.57	0.535
73	41	5.20	0.813	7	3.86	1.676
74	41	5.34	0.794	7	5.57	0.787
75	41	4.93	1.127	7	4.00	1.633
76	41	5.00	0.922	7	4.57	1.272

Table 36

One-Way Analyses of Variance by Item for Elementary, Middle and High School Principals with Respect to Their School's 2008-2009 AYP Status

Item	Made AYP			Did Not Make AYP		
	n	*M*	*SD*	*n*	*M*	*SD*
20	41	5.39	0.666	7	5.14	0.900
21	41	4.98	0.790	7	4.14	1.464
22	41	5.29	0.750	7	4.57	1.272
25	41	5.39	0.771	7	4.71	1.380
29	41	4.37*	1.043	7	2.86*	1.464
31	41	4.12	1.229	7	3.71	1.254
32	41	4.85	0.989	7	4.00	1.414
34	41	5.39	0.737	7	5.29	0.756
36	41	5.05*	0.805	7	4.00*	1.291
38	41	4.44	0.976	7	4.29	1.380
43	41	4.80	0.843	7	4.43	1.272
44	41	3.85	0.989	7	3.29	1.799
52	41	4.22	1.173	7	4.29	0.951
53	41	4.73	0.867	7	4.43	1.397
55	41	4.51	1.287	7	4.29	1.496
56	41	5.29	0.901	7	5.00	1.291
60	41	5.20	0.872	7	4.71	1.254
61	41	5.37	0.623	7	5.29	0.756
67	41	4.05	1.203	7	3.57	1.397
71	41	5.00	1.049	7	4.71	0.488
74	41	5.34	0.794	7	5.57	0.787
75	41	4.93	1.127	7	4.00	1.633

* Significance between 0-5 years versus 6 or more years of administrative experience at an alpha level of .05

Table 37
Means for Survey Responses Based on Making AYP

Item #	Made AYP					
	N		*M*		*SD*	
	2008-2009	2009-2010	2008-2009	2009-2010	2008-2009	2009-2010
Item 20	43	39	5.42	5.49	0.663	0.601
Item 21	43	39	4.95	5.00	0.785	0.761
Item 22	43	39	5.28	5.31	0.766	0.766
Item 23	43	39	3.93	4.05	1.534	1.638
Item 24	43	39	4.49	4.54	0.910	0.884
Item 25	43	39	5.37	5.41	0.787	0.751
Item 26	43	39	4.53	4.62	0.960	0.990
Item 27	43	39	4.71	4.67	1.195	1.344
Item 28	43	39	5.63	5.49	0.618	0.683
Item 29	43	39	4.35	4.31	1.021	1.151
Item 30	43	39	4.63	4.54	0.952	1.022
Item 31	43	39	4.16	4.21	1.214	1.151
Item 32	43	39	4.84	4.82	0.974	0.997
Item 33	43	39	5.21	5.23	0.989	1.038
Item 34	43	39	5.37	5.38	0.757	0.782
Item 35	43	39	5.16	5.08	0.924	1.010
Item 36	43	39	5.02	4.95	0.801	0.944
Item 37	43	39	4.00	4.00	1.155	1.147
Item 38	43	39	4.42	4.49	0.957	0.914
Item 39	43	39	4.63	4.62	0.846	0.815
Item 40	43	39	4.16	4.10	0.949	1.021
Item 41	43	39	4.28	4.23	0.934	0.986
Item 42	43	39	4.21	4.15	0.989	0.933
Item 43	43	39	4.79	4.79	0.842	0.905
Item 44	43	39	3.88	3.89	0.993	1.060
Item 45	43	39	4.40	4.49	1.094	1.073
Item 46	43	39	4.51	4.49	1.404	1.374
Item 47	43	39	5.02	5.10	0.831	0.821
Item 48	43	39	4.21	4.21	1.059	1.056
Item 49	43	39	4.12	4.21	1.109	1.069
Item 50	43	39	4.47	4.62	1.316	1.248
Item 51	43	39	5.07	5.13	0.961	0.951
Item 52	43	39	4.26	4.28	1.157	1.099
Item 53	43	39	4.74	4.79	0.857	0.811
item 54	43	39	4.93	5.03	0.828	0.778
Item 55	43	39	4.56	4.59	1.278	1.251
Item 56	43	39	5.29	5.26	0.891	0.921

Table 37. Cont.

Item #	Made AYP	Item #	Made AYP	Item #	Made AYP	Item #
	N		*M*		*SD*	
	2008-2009	2009-2010	2008-2009	2008-2009	2009-2010	2008-2009
Item 57	43	39	4.98	5.00	0.859	0.858
Item 58	43	39	5.26	5.21	0.798	0.704
Item 59	43	39	5.16	5.18	0.814	0.823
Item 60	43	39	5.21	5.28	0.861	0.826
Item 61	43	39	5.33	5.33	0.644	0.621
Item 62	43	39	5.12	5.15	0.905	0.904
Item 63	43	39	5.40	5.49	0.929	0.823
Item 64	43	39	4.91	4.90	0.895	0.912
Item 65	43	39	5.16	5.23	0.721	0.742
Item 66	43	39	4.88	4.95	1.028	0.972
Item 67	43	39	4.07	4.15	1.183	1.182
Item 68	43	39	4.47	4.41	1.260	1.332
Item 69	43	39	4.67	4.64	0.892	0.903
Item 70	43	39	2.67	2.62	1.554	1.549
Item 71	43	39	5.00	5.10	1.047	0.912
Item 72	43	39	5.47	5.56	0.702	0.680
Item 73	43	39	5.21	5.13	0.804	1.005
Item 74	43	39	5.37	5.49	0.787	0.756
Item 75	43	39	4.98	5.00	1.123	1.100
Item 76	43	39	5.02	5.15	0.913	0.745

Table 38.

Means for Survey Responses Based on Not Making AYP

Item #	Did Not Make AYP					
	N		*M*		*SD*	
	2008-2009	2009-2010	2008-2009	2009-2010	2008-2009	2009-2010
Item 20	7	11	5.14	5.00	0.900	0.894
Item 21	7	11	4.14	4.27	1.464	1.272
Item 22	7	11	4.57	4.73	1.272	1.104
Item 23	7	11	5.43	4.45	0.787	1.128
Item 24	7	11	3.29	3.55	1.380	1.293
Item 25	7	11	4.71	4.82	1.380	1.250
Item 26	7	11	4.14	4.00	1.215	0.894
Item 27	7	11	3.29	3.90	1.890	1.449
Item 28	7	11	5.14	5.82	0.900	0.603
Item 29	7	11	2.86	3.55	1.464	1.214
Item 30	7	11	3.86	4.45	0.690	0.688
Item 31	7	11	3.71	3.73	1.254	1.421
Item 32	7	11	4.00	4.36	1.414	1.286
Item 33	7	11	5.71	5.45	0.488	0.522
Item 34	7	11	5.29	5.27	0.756	0.647
Item 35	7	11	4.86	5.27	1.069	0.647
Item 36	7	11	4.00	4.64	1.291	0.924
Item 37	7	11	4.71	4.45	1.113	1.214
Item 38	7	11	4.29	4.09	1.380	1.300
Item 39	7	11	4.86	4.82	1.069	1.079
Item 40	7	11	4.14	4.36	1.464	1.027
Item 41	7	11	3.57	4.00	0.976	0.894
Item 42	7	11	4.14	4.36	0.900	1.120
Item 43	7	11	4.43	4.55	1.272	0.934
Item 44	7	11	3.29	3.45	1.799	1.368
Item 45	7	11	4.00	3.82	1.155	1.079
Item 46	7	11	4.86	4.82	1.215	1.401
Item 47	7	11	4.71	4.55	0.951	0.820
Item 48	7	11	3.57	3.82	1.618	1.471
Item 49	7	11	3.71	3.55	1.254	1.214
Item 50	7	11	4.43	3.91	1.512	1.514
Item 51	7	11	5.43	5.09	0.787	0.944
Item 52	7	11	4.29	4.18	0.951	1.250
Item 53	7	11	4.43	4.36	1.397	1.286
item 54	7	11	5.00	4.64	1.000	1.027
Item 55	7	11	4.29	4.27	1.496	1.489
Item 56	7	11	5.00	5.18	1.291	1.079
Item 57	7	11	5.14	5.00	0.690	0.775

Table 38. Cont.

Item #	Did Not Make AYP					
	N		*M*		*SD*	
	2008-2009	2009-2010	2008-2009	2009-2010	2008-2009	2009-2010
Item 58	7	11	5.00	5.27	0.577	1.009
Item 59	7	11	4.71	4.82	1.254	1.079
Item 60	7	11	4.71	4.64	1.254	1.120
Item 61	7	11	5.29	5.27	0.756	0.786
Item 62	7	11	4.86	4.82	1.069	0.982
Item 63	7	11	5.43	5.09	0.787	1.136
Item 64	7	11	4.14	4.45	1.574	1.368
Item 65	7	11	4.43	4.45	1.512	1.128
Item 66	7	11	4.29	4.27	1.254	1.272
Item 67	7	11	3.57	3.45	1.397	1.214
Item 68	7	11	3.86	4.27	1.574	1.272
Item 69	7	11	3.86	4.27	0.900	1.009
Item 70	7	11	2.43	2.73	0.976	1.272
Item 71	7	11	4.71	4.45	0.488	1.128
Item 72	7	11	5.57	5.18	0.535	0.603
Item 73	7	11	3.86	4.64	1.676	1.206
Item 74	7	11	5.57	5.09	0.787	0.831
Item 75	7	11	4.00	4.27	1.633	1.555
Item 76	7	11	4.57	4.27	1.272	1.348

APPENDIX D

Post Hoc Results

Table 39

Post *Hoc Analysis for Elementary, Middle and High School Principals with Respect to Their Beliefs Regarding Collaboration among Teachers Using Data-Driven Decision-making*

	Construct 4		
	Diff	*SE*	*p*
Elementary*Middle	.6211	.2672	.073
Elementary*High	.9019*	.2930	.010
Middle*Elementary	-.6211	.2672	.073
Middle*High	.2808	.3329	1.000
High*Elementary	-.9019*	.2930	.010
High*Middle	-.2808	.3329	1.000

*$p < .05$

APPENDIX E

Outlier Analyses

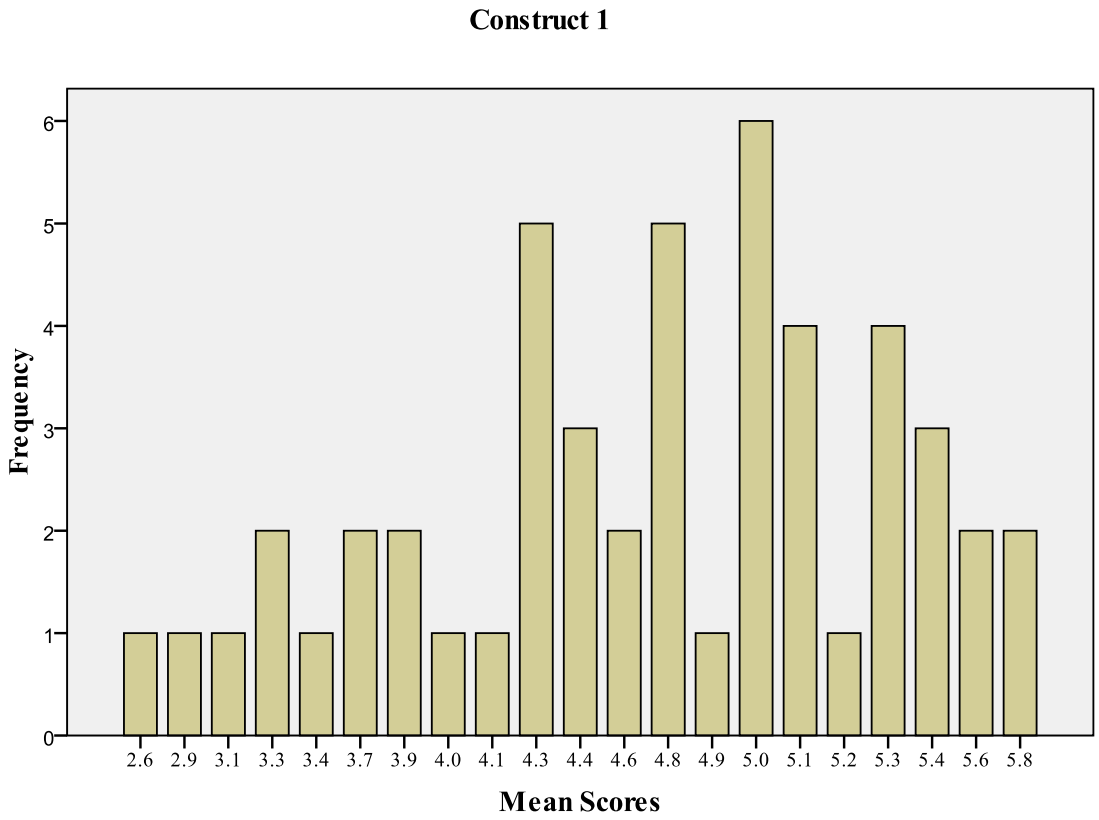

Figure 2. Mean scores of Construct 1: Beliefs regarding the use of data-driven decision-making by teachers to improve student achievement (9 items)

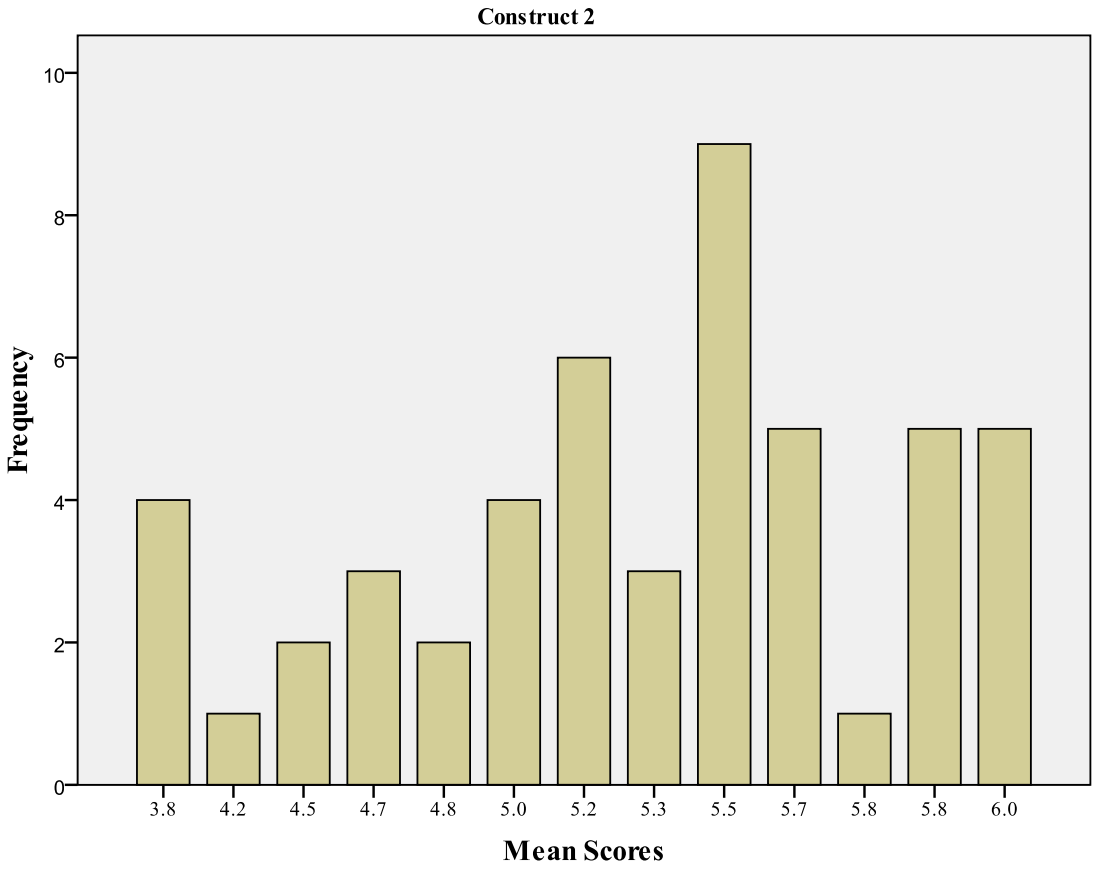

Figure 3. Mean scores of Construct 2: Beliefs regarding the existence of a data-driven culture (6 items)

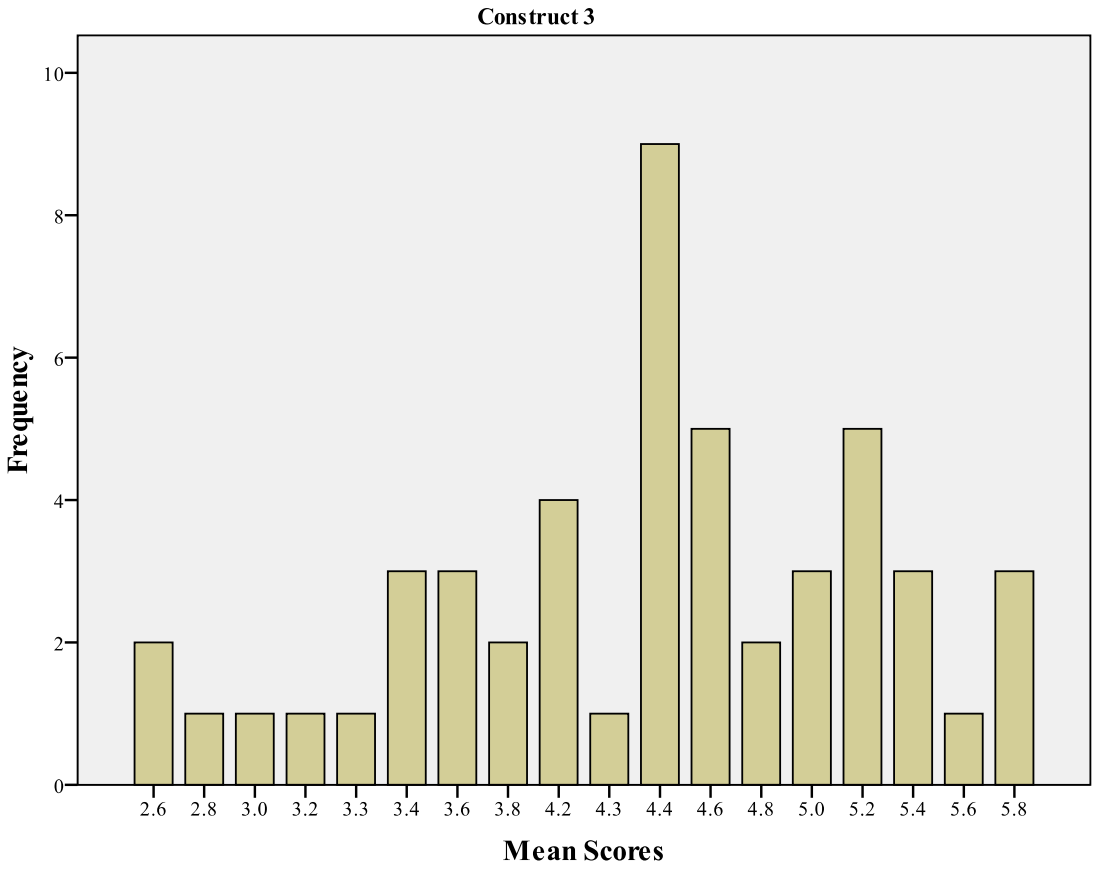

Figure 4. Mean scores of Construct 3: Beliefs regarding the use of data support systems (5 items)

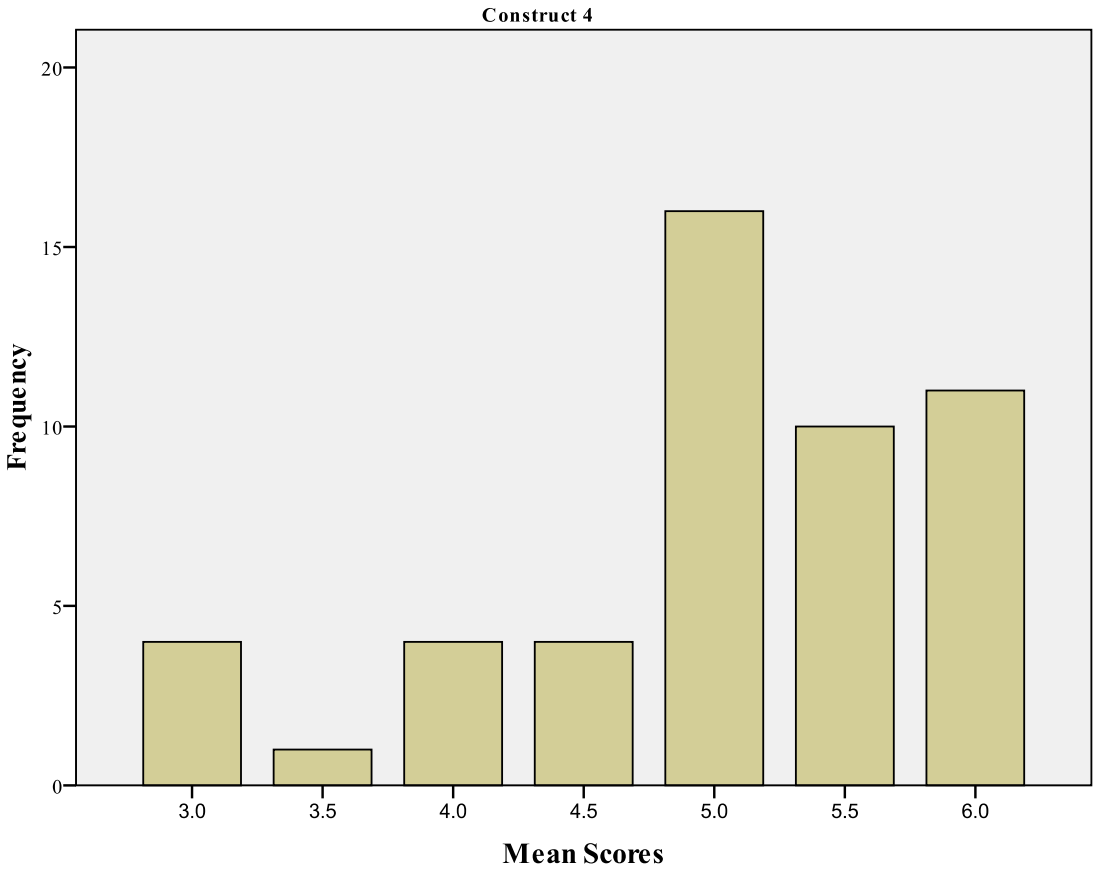

Figure 5. Mean scores of Construct 4: Beliefs regarding collaboration among teachers using data-driven decision-making (2 items)

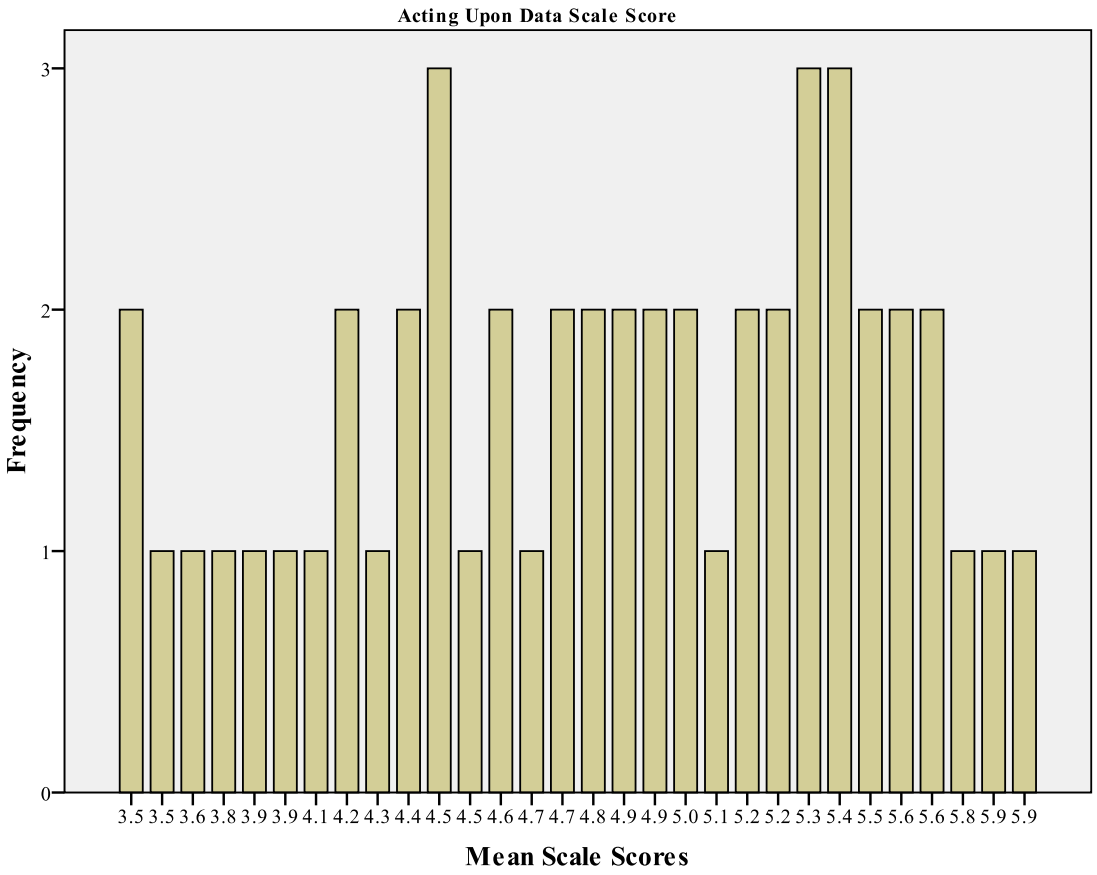

Figure 6. Subscale score for beliefs regarding acting upon data (17 items)

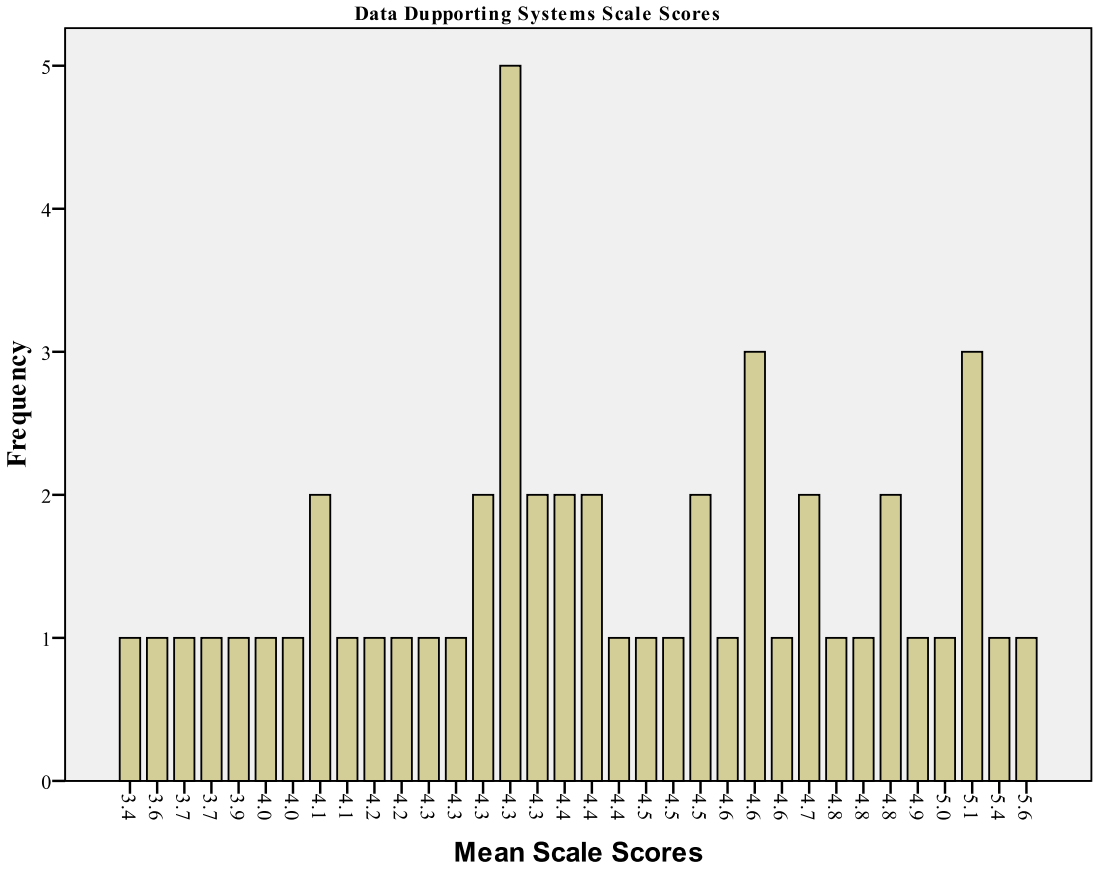

Figure 7. Subscale score for beliefs regarding the existence of data supporting systems (19 items)

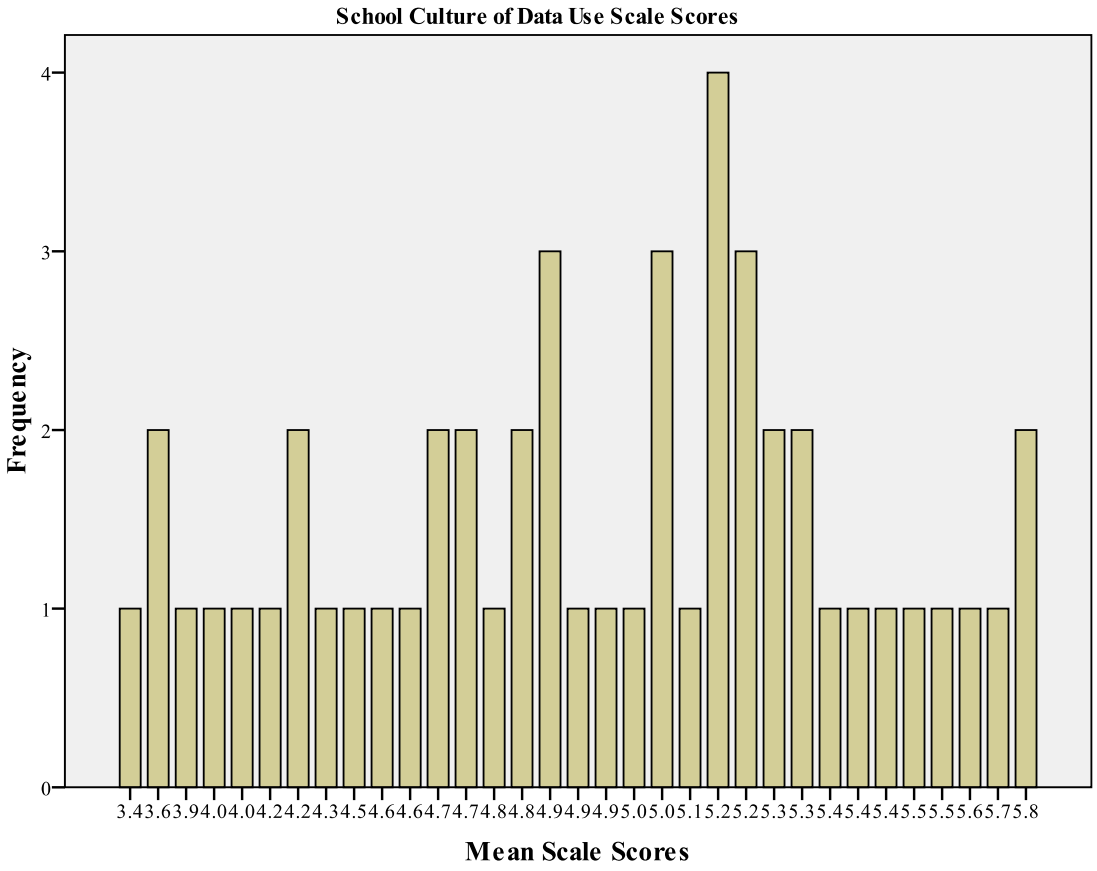

Figure 8. Subscale score for beliefs regarding the existence of a data culture within the school (21 items)

APPENDIX F

Crosstab Calculations

Table 40

Cross Tabulation of Experience and Beliefs about Data-drive Decision-making and Data-driven Culture

	Data-driven Decision-making		Data-driven Culture	
	Agree	Disagree	Agree	Disagree
Experience	*n* (%)	*n* (%)	*n* (%)	*n* (%)
As Principal				
0-5 years	18 (75)	6 (25)	22 (92)	2 (8)
6 or more years	22 (85)	4 (15)	24 (92)	2 (8)
Total	40 (80)	10 (20)	46 (92)	4 (8)
In Current Setting				
0-3 years	15 (71)	6 (29)	19 (91)	2 (9)
4 or more years	25 (86)	4 (14)	27 (93)	2 (7)
Total	40 (80)	10 (20)	46 (92)	4 (8)

APPENDIX G

Survey Instrument

DISTRICT DATA-DRIVEN READINESS STUDY
- Principal Survey -

Thank you for participating in this survey. Please note that Questions 1 to 19 ask you about four different kinds of assessments: A) yearly assessments from the state, B) yearly assessments from other sources, C) common periodic assessments created collaboratively by teachers, and D) other (i.e., not teacher-created) periodic assessments.

STATE ASSESSMENTS	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
1. State assessment results are timely enough to adequately inform teachers' instruction	O	O	O	O	O	O
2. State assessment results are detailed enough to adequately inform teachers' instruction	O	O	O	O	O	O
3. State assessments are aligned with state curriculum standards	O	O	O	O	O	O
4. State assessment results are easy to understand and interpret	O	O	O	O	O	O

	Yes	No
5. My school uses other yearly assessments (e.g. PALS, CogAT, DRA, PSAT) besides those from the state. **IF NO, SKIP TO QUESTION 10.**	O	O

OTHER YEARLY ASSESSMENTS	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
6. Results from these other yearly assessments are timely enough to adequately inform teachers' instruction	O	O	O	O	O	O
7. Results from these other yearly assessments are detailed enough to adequately inform teachers' instruction	O	O	O	O	O	O
8. These other yearly assessments are aligned with state curriculum standards	O	O	O	O	O	O
9. Results from these other yearly assessments are easy to understand and interpret	O	O	O	O	O	O

	Yes	No
10. My Teachers in my school collaborate and create common periodic assessments to monitor student progress During the school year. **IF NO, SKIP TO QUESTION 15.**	O	O

COMMON PERIODIC ASSESSMENTS	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
11. Results from these common assessments are timely enough to adequately inform teachers' instruction	O	O	O	O	O	O
12. Results from these common assessments are detailed enough to adequately inform teachers' instruction	O	O	O	O	O	O
13. These common assessments are aligned with state curriculum standards	O	O	O	O	O	O
14. Results from these common assessments are easy to understand and interpret	O	O	O	O	O	O

	Yes	No
15. Teachers in my school use other (i.e. not teacher-created) period assessments (e.g. county-made warm-ups, benchmarks) to monitor student progress during the school year. **IF NO, SKIP TO QUESTION 20.**	O	O

OTHER PERIODIC ASSESSMENTS	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
16. Results from these other periodic assessments are timely enough to adequately inform teachers' instruction	O	O	O	O	O	O
17. Results from these other periodic assessments are detailed enough to adequately inform teachers' instruction	O	O	O	O	O	O
18. These other periodic assessments are aligned with state curriculum standards	O	O	O	O	O	O
19. Results from these other periodic assessments are easy to understand and interpret	O	O	O	O	O	O

DISTRICT DATA-DRIVEN READINESS STUDY
- Principal Survey -

ACTING UPON DATA	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
20. Teacher teams in my school meet regularly to look at student data and make instructional plans	O	O	O	O	O	O
21. When teachers in my school meet with each other, they usually focus on student learning outcomes	O	O	O	O	O	O
22. Teachers in this school work collaboratively to improve curriculum and instruction	O	O	O	O	O	O
23. Teachers in my school are given adequate time for collaborative planning	O	O	O	O	O	O
24. Teachers in my school regularly discuss assumptions about teaching and learning	O	O	O	O	O	O
25. Teachers in my school use assessment data to identify students who are not experiencing academic success	O	O	O	O	O	O
26. Teachers in my school know what instructional changes to make when data show that students are not successful	O	O	O	O	O	O
27. Teachers in my school use assessment results to measure the effectiveness of their instruction	O	O	O	O	O	O
28. Teachers in my school are encouraged to try out new teaching strategies	O	O	O	O	O	O
29. Teachers in my school use data to verify their assumptions about the causes of student behavior and performance	O	O	O	O	O	O
30. Teachers in my school have clear criteria for determining the success of instructional activities	O	O	O	O	O	O
31. If teachers in my school propose a change, they bring data to support their proposal	O	O	O	O	O	O
32. Teachers in my school make changes in their instruction based on assessment results	O	O	O	O	O	O
33. Our district's goals are focused on student learning	O	O	O	O	O	O
34. My school's improvement goals are clear, specific, measurable, and based on student data	O	O	O	O	O	O
35. Teachers in my school have access to good baseline data from which to set annual instructional goals	O	O	O	O	O	O
36. Teachers in my school use data from student assessments to set instructional targets and goals	O	O	O	O	O	O

DISTRICT DATA-DRIVEN READINESS STUDY
- Principal Survey -

	SUPPORT SYSTEMS	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
37.	Teachers in my school can easily access the information they need from school and division data systems	O	O	O	O	O	O
38.	Teachers and parents communicate frequently about students performance data	O	O	O	O	O	O
39.	Student performance data available to me are accurate and complete	O	O	O	O	O	O
40.	Student performance data are easily available to the individuals that need them	O	O	O	O	O	O
41.	Parents and community members know what our school is doing and what is needed to improve students achievement	O	O	O	O	O	O
42.	Successful educational practices are widely shared in the division	O	O	O	O	O	O
43.	My school uses multiple data sources to assess the effectiveness of educational programs	O	O	O	O	O	O
44.	Teachers have significant input into data management and analysis practices	O	O	O	O	O	O
45.	Teachers in my school know how to use technology to monitor student progress	O	O	O	O	O	O
46.	Teachers in my school have adequate access to the technology necessary to monitor student progress	O	O	O	O	O	O
47.	My professional development has helped me to use data more effectively	O	O	O	O	O	O
48.	Teachers in my school have received adequate training to affectively interpret and act upon yearly state assessment results	O	O	O	O	O	O
49.	Professional development has improved my teachers' skill in developing classroom assessments	O	O	O	O	O	O
50.	Teachers have significant input into plans for professional development and growth	O	O	O	O	O	O
51.	Student achievement data are used to inform school and division improvement initiatives	O	O	O	O	O	O
52.	Whole-school staff meetings focus on measured progress toward data-based improvement goals	O	O	O	O	O	O
53.	Student achievement data are used to determine teacher professional development needs and resources	O	O	O	O	O	O
54.	School and classroom improvement efforts are aligned with state standards	O	O	O	O	O	O
55.	Student achievement data are used to determine resource allocations	O	O	O	O	O	O

DISTRICT DATA-DRIVEN READINESS STUDY
- Principal Survey -

SCHOOL CULTURE	Disagree Strongly	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Strongly
56. As a school we have open and honest discussions about data	O	O	O	O	O	O
57. Teachers have the knowledge and skills necessary to improve student learning	O	O	O	O	O	O
58. Student achievement data are used primarily for improvement rather that teacher evaluation	O	O	O	O	O	O
59. Administrators in this school trust the professional judgments of teachers	O	O	O	O	O	O
60. Administrators model data-driven educational practices	O	O	O	O	O	O
61. My school adequately supports teachers' use of data to improve classroom instruction	O	O	O	O	O	O
62. I buffer my school from distractions to our school improvement efforts	O	O	O	O	O	O
63. Our successes as educators should be determined primarily by our impact upon student learning	O	O	O	O	O	O
64. Teachers in my school routinely use data to inform their instructional practices and understand student needs	O	O	O	O	O	O
65. Teachers in my school have a sense of collective responsibility for student learning	O	O	O	O	O	O
66. My school uses data to uncover problems	O	O	O	O	O	O
67. Teachers conduct self-assessments to continuously improve performance	O	O	O	O	O	O
68. I am a valued member of my division's data-driven reform efforts	O	O	O	O	O	O
69. Teachers in my school have access to high-quality student assessments to evaluate student progress	O	O	O	O	O	O
70. Our success or failure in teaching students is primarily due to factors beyond our control rather than to our own efforts and ability	O	O	O	O	O	O
71. Using data has improved the quality and decision-making in my school	O	O	O	O	O	O
72. By trying different teaching methods, teachers can significantly affect students' achievement levels	O	O	O	O	O	O
73. There is a strong sense of trust among teachers and administrators in my school	O	O	O	O	O	O
74. If we constantly analyze what we do and adjust to get better we will improve	O	O	O	O	O	O
75. Teachers in my school feel personal responsibility when our school improvement goals are not met	O	O	O	O	O	O
76. Students in our school believe that they will succeed at learning if they keep trying	O	O	O	O	O	O

DISTRICT DATA-DRIVEN READINESS STUDY
- Principal Survey -

77. Is there anything else you want to tell me about data use in your school?

Questions 78-86 ask you for information that will help me better analyze your responses. This information will be kept private and confidential and will NEVER be shared with your school organization or with the Department of Education.

78. What is the name of your school?
(This information will not be reported in connection with your responses.)

79. Did your school make AYP last year?

Yes	No	Don't know
O	O	O

80. At what level is your primary administrative assignment?

Elementary	Middle	High
O	O	O

81. School characteristics:

- Number of students
- Percentage minority
- Percentage free/reduced lunch
- Percentage ESOL
- Percentage special education

82. How many years have you worked as a principal TOTAL? IN THIS BUILDING?

83. In the past two years, how many hours of professional development have you received (approximately)?

- *In school*
- *In district*
- *Outside district (please include attendance at conferences, graduate courses, etc.)*

84. How many of those professional development hours were related to student assessment (approximately)?

- *In school*
- *In district*
- *Outside district (please include attendance at conferences, graduate courses, etc.)*

85. What is your gender?

Male	Female
O	O

86. What is your race/ethnicity?

American Indian or Alaskan Native	O
Asian or Pacific Islander	O
Black, not of Hispanic origin	O
Hispanic or Latina	O
White	O
Native Hawaiian or other Pacific Islander	O
Unspecified	O

APPENDIX H

Informed Consent

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

TITLE: A Systematic Examination of Data-Driven Decision-making within a School Division: The Relationships among Principal Beliefs, School Characteristics, and Accreditation Status

VCU IRB NO.: HM#12233
This consent form may contain words that you do not understand. Please ask the study staff to explain any words that you do not clearly understand.

PURPOSE OF THE STUDY
The purpose of this dissertation research study is to investigate the beliefs of principals about the use of data and data-driven decision-making (DDDM) in their schools and how the use of DDDM may be differ across grade level and AYP status. You are being asked to participate in this study because you are the principal at a comprehensive school within the school division.

The results from this study will be used toward the completion of a doctoral dissertation through Virginia Commonwealth University.

DESCRIPTION OF THE STUDY AND YOUR INVOLVEMENT
If you decide to participate in this study, you will be asked to complete a survey which is being distributed to all 61 principals (K-12) assigned to comprehensive schools within the school division. The survey should take approximately fifteen minutes to complete. Items in this survey will ask about your perceptions of data use by teachers within your school, general information about your school (i.e. school level, student demographics, and AYP status), and general demographic information about you (i.e. years of administrative experience, gender, and ethnicity). There is minimal risk to you as a participant. All responses will be kept confidential and only aggregated data will be reported.

RISKS AND DISCOMFORT
It is not anticipated that completing the survey will pose any risk or discomfort to participants. However, if you are uncomfortable with answering any questions you may stop your participation altogether or skip certain questions in the survey.

BENEFITS TO YOU AND OTHERS
You may not benefit directly from participation, but the information learned from your survey responses may help this school division, as well as other school divisions, design and improve programs for teachers and schools related to data-driven decision-making.

COSTS
There are no costs for participating in this study other than the time you spend completing the survey.

ALTERNATIVES
There are no alternative studies. You may choose not to participate in this study.

CONFIDENTIALITY
Potentially identifiable information about you will consist of the survey responses. Information is being collected for research purposes only and the survey responses will only be identified by principal demographic information (i.e. gender, school level, years of administrative experience, etc.) and school characteristics. Once completed, each survey will be given a unique identifier that matches the school's unique identifier. Since the 2009 AYP data will not be available until after you complete the survey, it is necessary to link the survey responses to each schools' accreditation status. The AYP status will be considered a school characteristic in the analyses.

All study information (e.g., survey responses and AYP status) will be kept in password protected computer files and will be kept indefinitely. Other records, such as the paper copies of the survey, will be kept in a locked file cabinet for twelve months after the study ends and will be destroyed at that time. Access to all data will be limited to study personnel.

We will not tell anyone the answers you provide on the survey; however, information from the study may be looked at or copied for research or legal purposes by Virginia Commonwealth University.

What we find from this study may be presented at meetings or published in papers, but your name will not ever be used in these presentations or papers.

VOLUNTARY PARTICIPATION AND WITHDRAWAL
You do not have to participate in this study. If you choose to participate, you may stop at any time without any penalty. You may also choose not to answer particular questions that are asked in the survey.

Your completion and return of this survey represents your consent to participate.

QUESTIONS
In the future, you may have questions about your participation in this study. If you have any questions, complaints, or concerns about the research, please contact:

Lisa Abrams, Ph.D., Primary Investigator, Assistant Professor
School of Education - Foundations, Virginia Commonwealth University, 804-827-2627
lmabrams@vcu.edu

Beth Teigen, Doctoral Candidate, Educational Leadership
Virginia Commonwealth University School of Education, 804-586-1579
teigenb@vcu.edu

If you have any questions about your rights as a participant in this study, you may contact:

Office for Research, Virginia Commonwealth University
800 East Leigh Street, Suite 113
P. O. Box 980568, Richmond, VA 23298
Phone: 804-827-2157

Additional information about participation in research studies can be found at http://www.research.vcu.edu/irb/volunteers.htm.

APPENDIX I

Information for Survey Collector

INFORMATION FOR SURVEY COLLECTOR

Thank you for agreeing to collect the surveys from your colleagues. While you will not be engaged in any formal interviews or participate in the actual data analysis, you do play an important role in the data collection process.

As your colleagues turn in their surveys, have them place their survey directly in the pre-addressed manila envelope. Do not look at the materials. Once all surveys have been collected, seal the envelope and drop it into the interoffice mail pouch.

Thank you again for your assistance.

APPENDIX J

Vitae

Beth N. Teigen was born in 1962 in Petersburg, Virginia. The youngest of three children, she grew up in Virginia and Michigan, moving to Germany upon graduation from Lake Braddock Secondary School in Burke, Virginia in 1979. She received her Bachelor of Science in Chemistry with Honors from James Madison University in Harrisonburg, Virginia. She worked as a chemist at the Foxboro Company in Norwalk, Connecticut and Tecator Incorporated in Dulles, Virginia as an environmental chemist before pursuing a teaching career in mathematics and engineering studies at Lloyd C. Bird High School in Chesterfield County Public Schools. After four years in the classroom, she entered graduate school and subsequently received a Master of Education degree in Educational Leadership from the University of Virginia in 2005. Subsequently, she became an assistant principal at Lloyd C. Bird High School, leaving after one year to be the assistant principal at Cosby High School, a new high school in the same school division. In July 2007 she was appointed Principal at Lloyd C. Bird High School, a position she still holds.