

A MULTI-SITE CASE STUDY: ACCULTURATING MIDDLE SCHOOLS TO USE DATA-
DRIVEN INSTRUCTION FOR IMPROVED STUDENT ACHIEVEMENT

Rebecca C. James

Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Doctor of Education
in
Educational Leadership and Policy Studies

Committee Members:

Theodore B. Creighton, Chair

James R. Craig

LaDonna Meade

N. Wayne Tripp

November 30, 2010

Blacksburg, Virginia

Keywords: Data-Based Decision making in Schools, Data-driven Instruction, Use of Data in
Schools, Aggregating and Disaggregating Data, School Improvement, Collaboration, Data-
driven Decision Making

A MULTI-SITE CASE STUDY: ACCULTURATING MIDDLE SCHOOLS TO USE DATA-DRIVEN INSTRUCTION FOR IMPROVED STUDENT ACHIEVEMENT

Rebecca C. James

(ABSTRACT)

In the modern era of high-stakes accountability, test data have become much more than a simple comparison (Schmoker, 2006; Payne & Miller, 2009). The information provided in modern data reports has become an invaluable tool to drive instruction in classrooms. However, there is a lack of good training for educators to evaluate data and translate findings into solid practices that can improve student learning (Blair, 2006; Dynarski, 2008; Light, Wexler, & Heinze, 2005; Payne & Miller, 2009). Some schools are good at collecting data, but often fall short at what to do next. It is the role of the principal to serve as an instructional leader and guide teachers to the answer the reoccurring question of “now what?”

The purpose of this study was to investigate ways in which principals build successful data-driven instructional systems within their schools using a qualitative multi-site case study method. This research utilized a triangulation approach with structured interviews, on-site visits, and document reviews from various middle school supervisors, principals, and teachers.

The findings are presented in four common themes and patterns identified as essential components administrators used to implement data-driven instructional systems to improve student achievement. The themes are 1) administrators must clearly define the vision and set the expectation of using data to improve student achievement, 2) administrators must take an active role in the data-driven process, 3) data must be easily accessible to stakeholders, and 4) stakeholders must devote time on a regular basis to the data-driven process. The four themes led to the conclusion of ten common steps administrators can use to acculturate their school or school division with the data-driven instruction process.

DEDICATION

This dissertation is dedicated to my wonderful family. Particularly to my husband, Stephen, who has put up with a lot while I pursued my goals, and to our precious daughter Karrah, who is the joy of our lives. I must also thank my mother and father, Bill and Ann Carter, who have helped so much with baby-sitting and have instilled in me a love of learning. My family has been instrumental in providing the love and support needed to complete this journey.

ACKNOWLEDGEMENTS

A great number of people have lent their support to me throughout this endeavor. I owe my gratitude to all those who have made this dissertation possible as they have been with me throughout the entire journey to becoming a better educator.

I am very grateful for the guidance and wisdom of my committee chair, Dr. Ted Creighton. I would like to thank him for sharing his vast amount of knowledge on the topic of schools and data with me. I greatly appreciate Dr. Creighton's direction, dedication and invaluable advice along the way. I would like to also express my deep appreciation to the rest of my committee, Dr. Jim Craig, Dr. LaDonna Meade, and Dr. Wayne Tripp for sharing their knowledge with me as well.

A special thanks goes to the faculty, staff, and students at FCMS. I recognize the value of your hard work and continued dedication as we continue our journey through the data-driven instructional process. Most importantly, I would like to convey my gratitude to all the participant administrators, teachers, as well as the VA DOE instructional coaches who laid the framework for this study.

I am also truly grateful to my fellow doctoral cohort whose endearing support was continually uplifting. Especially my carpool, Greg, Kevin, and Vicki, you guys are outstanding educators and marvelous human beings. It was a pleasure to share doctoral studies and life with such wonderful people like you.

Lastly, I would like to thank family members who have been encouraging and supportive of my efforts throughout this entire process. I owe much gratitude and appreciation to my husband, daughter, and parents for their confidence and words of encouragement which were cherished.

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION	1
Statement of the Problem	1
Significance of the Study.....	2
Purpose of the Study.....	3
Research Questions	5
Theoretical and Conceptual Framework	6
Definition of Terms	9
Organization of Study	11
CHAPTER 2 LITERATURE REVIEW	13
Historical Context of a Principal’s Evolving Role as an Instructional Leader	14
The Impact of No Child Left Behind on How Administrators Monitor Student Achievement	15
Middle Level Schools: The Philosophy of Educating Young Adolescents in an Environment Conducive to Establishing a Culture of Data-driven Instruction	16
The Role of an Instructional Leader: Principals’ use of Data to Improve Student Achievement	19
The Role of an Instructional Leader: Principals’ Use of Data in Establishing Professional Learning Communities to Improve Student Achievement	20
The Advantage of Establishing Data-driven Instructional Systems in Schools	22
Building Data-Driven Instructional Systems to Enhance Student Achievement	24
The Collaborative Approach to Using Data to Improve Student Achievement.....	30
Cautions and Barriers to forming Data-Driven Instructional Systems in Schools	36
Summary	40
CHAPTER 3 METHODOLOGY	42
Assumptions and Rationale for a Case Study Design	42
Research Questions	43
Research Design	44
Population and Sample Selection	45

Interview/On-site Visit Selection Process.....	48
Data Collection Process	48
Qualitative Procedures for Planning the Research.....	48
Development of the Interview Questions	48
Content and Construct Validity.....	49
Interview Process.....	50
Observation Process	51
Qualitative Data Collection and Recording.....	51
Triangulation of the Multi-site Case Study	52
Case Study Protocol	52
Qualitative Data Analysis Procedures.....	53
CHAPTER 4 ARTICLE 1: TWO ARTICLE DISSERTATION - State	54
Acculturating Schools to Use Data-driven Instruction for Improved Student Achievement	54
The Intrigue of Using Data-driven Instruction to Close Achievement Gaps.....	54
School Data: The Leading Force Behind Improving Student Achievement in Virginia’s	
Middle School Math Classrooms	56
A Systematic Approach for Implementing an Effective Data-driven Instructional Model...	57
Which Data Matter Most?	58
Involving Teachers and Other Stakeholders in the School’s Data-Driven Instructional	
System With Collaboration and Time for Reflection	59
Administrators Guide Teachers with High Expectations in the Process of Using Data to	
Improve Student Achievement.....	61
Acculturating Their Schools with the Process of Using Data to Improve Student	
Achievement	67
CHAPTER 5 ARTICLE 2: TWO ARTICLE DISSERTATION (TAD) - National.....	69
Acculturating Schools to Use Data-driven Instruction for Improved Student Achievement	69
Introduction	69
The Insight Behind the Study	70
The Journey to Better Teaching and Learning Begins	71

The Four Key Elements Found on the Journey to Acculturating Schools with Using Data-driven Instruction for Improved Student Achievement	72
Element 1: Administrators Established Clearly Defined Goals and Set High Expectations for Their Schools to Use Data to Improve Student Achievement.	72
Element 2: Administrators Took an Active Role in Acculturating Their Schools With the Process of Using Data to Improve student Achievement.	74
Element 3: Administrators Made Data Easily Accessible for Stakeholders	75
Element 4: Administrators Devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.	76
The Journey of Data Exploration Takes Commitment and Should be Implemented as a Cyclical Process	78
CHAPTER 6 DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS	80
Discussion of Findings	80
Administrators established a clearly defined vision and set high expectations for their schools to use data to improve student achievement.	81
Administrators took an active role in acculturating their schools with the process of using data to improve student achievement.	82
Administrators made data easily accessible for stakeholders	83
Administrators devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.	83
Commentary	84
Conclusion	85
Implications and Recommendations	86
Implications for University Principal Preparation Programs	89
Recommendations for Future Research	90
REFERENCES	92
APPENDIX A Literature Review and Variable Matrix	99
APPENDIX B Correlation of the Interview Questions.....	101
APPENDIX C Copy of Letter to Superintendents.....	114

APPENDIX D Phone Interview Transcript (Instructional Supervisor).....	116
APPENDIX E Phone Interview Transcript (Principal).....	117
APPENDIX F On-site Interview Transcript (Teacher).....	119
APPENDIX G The Frequency of Occurrence Table used Determine Common Themes and Patterns (Instructional Supervisor).....	120
APPENDIX H The Frequency of Occurrence Table used Determine Common Themes and Patterns (Principal)	124
APPENDIX I The Frequency of Occurrence Table used Determine Common Themes and Patterns (Classroom Teacher)	129

LIST OF TABLES

Table 1	Southwest Virginia Middle Schools Receiving 2-year “Accredited with Warning” Status from 2005-2008 Characterized by Population, SOL scores, and AYP status ...	47
Table 2	Sample Symbolic Logic Matrix of Interview Questions for Division Level Middle School Instructional Supervisors.....	50

LIST OF FIGURES

Figure 1. Theoretical framework for building data-driven instructional systems to improve student achievement. 7

Figure 2. Conceptual framework for researching successful data-driven instructional systems.8

Figure 3. The data wise improvement process..... 31

Note: Reprinted with permission from Data Wise: A Step-by-Step Guide to Using Assessment Results to Improve Teaching and Learning, edited by Kathryn Parker Boudett, Elizabeth A. City, and Richard J. Murnane, (Cambridge, MA: Harvard Education Press, 2005), pp. 5. For more information, please visit www.harvardeducationpress.org, or call 1-888-437-1437.

Figure 4. Virginia middle schools receiving “accredited with warning” status since the implementation of the sixth and seventh grade math tests from 2006 to 2009. 46

Figure 5. Triangulation of sources used to gather information on a school’s data-driven culture. 52

Figure 6. Virginia middle schools receiving “accredited with warning” status since the implementation of the sixth and seventh grade math tests from 2005 to 2010. 57

Figure 7. The top down method used to implement he data driven instructional process for school improvement. 63

CHAPTER 1

INTRODUCTION

In this modern era of high-stakes accountability, school administrators are being asked to think differently about educational decision-making (Hess, 2008-09; Ronka et.al., 2008-09; Schmoker, 2006). Using various types of data to make educational decisions has become a driving force behind the endeavor to improve student achievement (Picciano, 2008; Steele & Boudett, 2008-09).

During the last decade and in the wake of the *No Child Left Behind* legislation, standards, assessments, and accountability have emerged as three prongs of a national education reform movement that has asked district and school administrators to think differently about educational decision-making and the use of data. However, research about data-driven decision-making is limited. (Light, Wexler, & Heinze, 2005, p.1)

Building data-driven educational systems to guide instruction and improve student achievement is a crucial component in a principal's evolving role as an instructional leader (Berube et al., 2004; Blink, 2007; Del Favero, 2009, Mandinach et al., 2006).

School principals must establish themselves as strong instructional leaders where they have the opportunity to become an engaged learner as opposed to merely a facilitator (Hirsh & Hord, 2008). With the passage of the No Child Left Behind Act (2002), the instructional leadership demands of the principal have increased significantly (Aspen Institute., 2007; Hirsh & Hord, 2008). As a result, the role of a principal has quickly evolved from the role of a manager in to the role of a leader of academic reform (Berube et al., 2004). The principal's ability to influence student learning and increase academic achievement has become the primary role of a modern day school administrator (Aspen Institute, 2007). Recognizing the importance of effectively using data to guide instruction is a major way principals can influence student learning (Schmoker, 2006).

Statement of the Problem

Although effective use of data can improve results, many principals and teachers are not accustomed to using data for instruction and school improvement (Dynarski, 2008-09; Murnane et al., 2005). The No Child Left Behind legislation has caused educators in school divisions to think differently about educational decision-making and the use of data. Administrators need additional information on how to design an effective data-driven culture in their schools using

evidence based decision making to improve instruction and advance student achievement (Dynarski, 2008-09). Administrators need a clear, well defined template of how to implement a data-driven culture as a part of their school improvement process to advance student achievement. The research in the study sought to discover how educators implement data-driven instructional systems and improve student achievement through the instructional leadership of school administrators.

Research on data-driven instructional systems and how data can support instructional decisions is new and gaining popularity in the field of education (Mandinach et al., 2006). The new expectations of accountability assume school leaders and teachers know how to use data and also understand how to turn this knowledge into classroom practice (Popham, 2008-09). From the onset of NCLB “schools are woefully under prepared to engage in such inquiry. The practice of applying large-scale data to classroom practice is virtually nonexistent” (Herman & Gribbons, 2001, p. 1). A study of how data-driven instructional systems are developed and implemented is crucial to principals as they perform their duties as the key instructional leader of their school.

Significance of the Study

It is necessary for principals and teachers to analyze student data that will help them reach school goals and raise student achievement (Bernhardt, 2004; Blink, 2007; Del Favero, 2009; Learning Point Associates, 2004; Morrison, 2008; Picciano, 2006; Schmoker, 2006; Steele & Boudett, 2008). When used effectively, data-driven decision making can alert educators to strengths and weakness in content areas not only as a whole but also in student achievement sub categories as well (Schmoker, 2008-09). Well-developed data systems offer a tremendous opportunity to increase student achievement at every level of the educational process (Thompson & Barnes, 2007). The Aspen Institute research sponsored by the Commission on No Child Left Behind (2007) states that educators at all levels can benefit from data-driven instructional systems. Teachers can use data on student progress to plan lessons. Principals can use classroom data to gauge the effectiveness of instruction of the curriculum. Superintendents can explore school data to make decisions regarding resource allocations. State officials can use data to determine needs of targeted assistance more efficiently at the division level. Researchers can benefit from data by identifying meaningful trends and identify the programs that are most improving student achievement (Thompson & Barnes, 2007). Educators in high-performing schools are analyzing data from assessments and student information systems to alter curriculum,

instruction, classroom management, as well as other factors in the teaching and learning process (Schmoker, 2006; T.H.E. Journal, 2004).

When implementing any new instructional strategy, it is vital to enter in to the process wisely (Boudett & Steele, 2008-09). Implementing a data-driven school culture is no exception. By starting out small when learning to effectively use data and then gradually expanding to a level of competency and confidence in the data analysis process is crucial to creating a successful data-driven culture (Blair, 2006).

The research conducted in this dissertation revealed the process and development of how school administrators are successful in building data-driven instructional systems to guide instruction and improve student achievement. The study depicted a shift from a traditional analysis of student achievement from “gut feelings” to one that is very successful using data-driven decision making strategies. An inquiry was conducted of how four southwest Virginia middle schools used their data to successfully advance student achievement. Educators shared their struggles and successes in acculturating their school in the data-driven process. It is the researcher’s intent to showcase these experiences and help other administrators maneuver through the process of data-driven instruction with additional confidence. The four middle schools in southwest Virginia shared their experiences and various resources, both positive and negative, regarding their data-driven instructional systems and the impact their use of data continues to have on student achievement.

Purpose of the Study

The purpose of this multi-site case study is to investigate ways in which principals build and sustain successful data-driven instructional systems within their schools to improve student achievement. A description of the process involved with establishing successful data-driven instructional systems in four southwest Virginia school divisions is provided using a qualitative case study approach.

Multi-site case study research methodology was applied because it allowed the research questions to be answered in an authentic setting where multiple forms of data were utilized to improve student achievement (Merriam, 1998; Picciano, 2006; Yin, 1994). The results are portrayed in a discussion of themes and patterns. Data-driven instructional systems will be defined generally as using various forms of school data to plan instruction and meet the needs of individual students (Blink, 2007).

The objective of this multi-site case study is to gain a better understanding of how administrators initiate and successfully implement a school culture where data is used for instructional decision making. Anyone who is associated with schools, whether internally or externally, knows that the role of a principal is vital whenever it comes to modifying the school culture through pedagogical practice or any other instructional reform (Hord & Sommers, 2008). It was the researcher's intent for school administrators who are interested in establishing data-driven-instructional systems in their school to gain valuable knowledge on how the process should be implemented.

In the modern era of high-stakes accountability, test data have become much more than a simple comparison (Schmoker, 2006; Payne & Miller, 2009). The information provided in modern data reports is an invaluable tool to drive instruction in classrooms. However, there is a lack of good training for educators to evaluate data and translate findings into solid practices or approaches that can improve student learning (Blair, 2006; Dynarski, 2008; Payne & Miller, 2009). In addition, many administrators are overwhelmed with the amount of data they receive. Most administrators are drowning in the large quantities of data available to them (Ingram, Louis, & Schroeder, 2006; Popham, 2009; Reeves, 2008).

Regardless of the vast amounts of data available to schools, many educators still feel unequipped to analyze and use their school data effectively (Blair, 2006). "They are data rich, but information poor" (Ronka, Lachat, Slaughter, & Meltzer, 2008, p. 18). This lack of knowledge of how to use data effectively is also described by DuFour (2004a) as the DRIP (i.e. Data Rich/Information Poor) syndrome. Important information embedded in the data is often overlooked and consequently an unproductive tool for educators (Schmoker, 2006). Overlooking important data is primarily a result of the lack of training available for school personnel (Del Favero, 2009; Dynarski, 2008-09).

Design and implementation flaws when first establishing a schools' data-driven instructional system can also contribute to the unsuccessful use of data (Wells, 2009). Wells also states schools are often burdened with information that has no meaning for them. Some educators are good at collecting data, but often fall short at what to do once they have the disaggregated data in front of them. The reoccurring question of "now what?" often surfaces. It is the role of the principal to act as an instructional leader to empower teachers and provide the answer to the question of "now what?" (David, 2008). Wells (2009) states the key to better understanding data is to "harness the talents of teachers who are closest to the work of the

students, in analyzing student learning” (p.3). It is the responsibility of administrators as instructional leaders to help teachers identify groups of students who are making gains in student achievement and those who are not (Blair, 2006). Data-driven decision making and instructional leadership must work together hand in hand (Creighton, 2007).

A study on the use of evidence based instruction is needed to investigate how successful practitioners are using data to improve the quality of teaching and learning in classrooms with a particular emphasis on the role of a principal in this endeavor. Other educators who would benefit from the results of data research include division or central office personnel, educational leaders at the state and national levels, as well as teacher preparation and educational leadership programs at colleges and universities around the world. Good instructional practices are essential to a solid educational system whether the implementation occurs on a local or global level (Del Favero, 2009).

Research Questions

Administrators have a challenging mission as instructional leaders to insure student achievement is meeting, or exceeding, state and federal guidelines (Blair, 2006). As a result, administrators must reevaluate the way they are looking at data in their schools (Ronka et al., 2008-09; Hess 2008-09; Popham, 2008-09). Several educators have been successful at using data to improve and maintain a high level of academic achievement among their students (Light et al., 2005; Schmoker, 2008-09; Steele & Boudett, 2008-09) and their methods need to be investigated further. The following research questions were used to guide this multi-site case study on data-driven instruction:

- 1) What types of data do administrators consider essential to the success of their data-driven instructional programs?
- 2) How do administrators involve teachers and other stakeholders in the school’s data-driven instructional system?
- 3) How are administrators guiding teachers to use data to improve student achievement?

The variables relevant to the research questions above include the variety of demographic and academic performance data used to make the instructional decisions, the school processes used to disaggregate and analyze the data, as well as perceptions of the data-driven instructional system and stakeholder involvement.

Theoretical and Conceptual Framework

A framework was created for identifying the process involved with establishing successful data-driven-instructional systems in schools. Principals in Virginia are facing the overwhelming task of demonstrating increased student achievement for high stakes testing through increased accountability (Virginia Department of Education, n.d.). Principals across the nation are required to show improved student achievement through rising test scores (Blair, 2006). Principals in Virginia are no exception when it comes to being held accountable for showing improved student achievement through rising Standard of Learning (SOL) test scores. For the purpose of this dissertation, student achievement is defined as performance on the state accountability tests. As accountability pressures have increased, the collection, analysis, and reporting of data have become essential duties that challenge principals as instructional leaders of their schools (Pascopella, 2005; Schmoker, 2008-09).

There are several factors associated with the process of developing a data-driven instructional system (Bernhardt, 2004; Blair, 2006; Blink, 2007; Boudett et al., 2005; Boudett & Steele, 2007; Learning Point Associates, 2004). Figure 1 illustrates the four key factors identified by a review of relevant literature that are crucial to a successful data-driven instructional system.

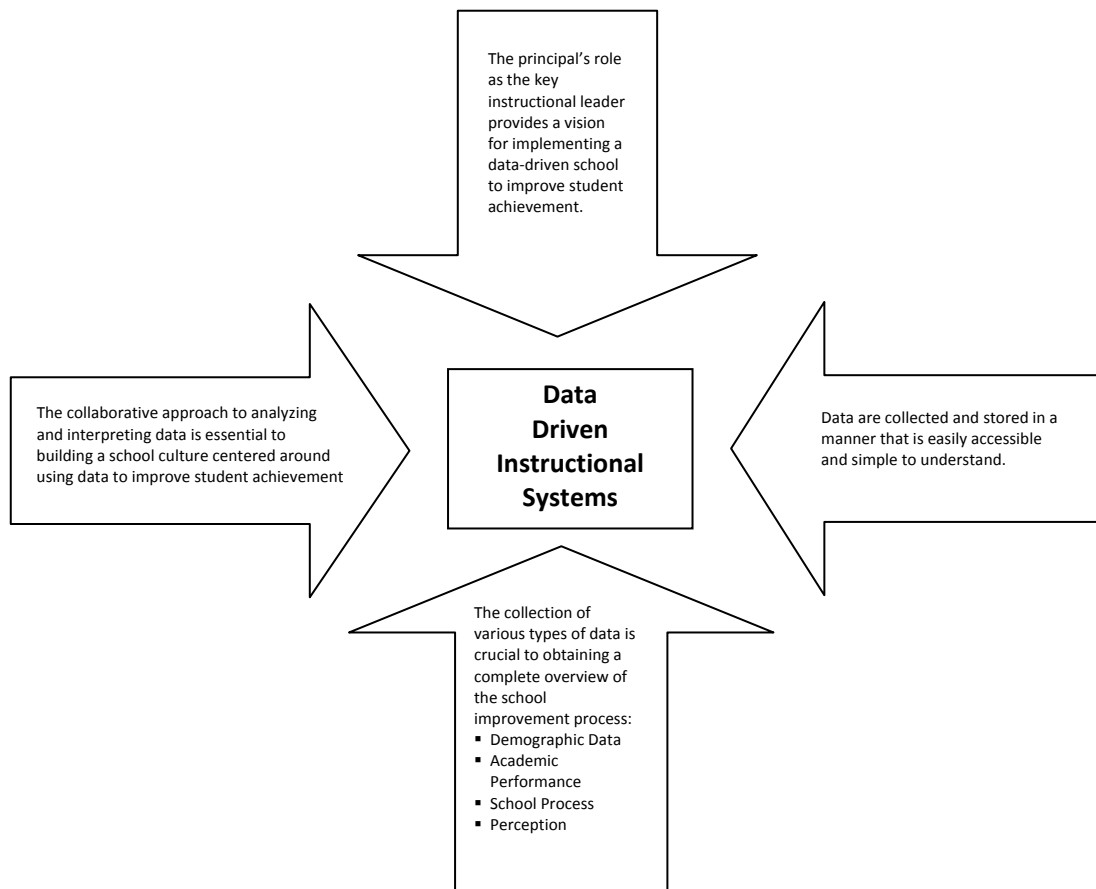


Figure 1. Theoretical framework for building data-driven instructional systems to improve student achievement.

The literature on data-driven instruction often focuses on school improvement (Bernhardt, 2004; Bernhardt, 2005, Boudett et al., 2005; Boudett & Steele, 2007; Wells, 2009). For example, data can help teachers identify weak student achievement that will ultimately lead to an impact on their instructional strategies. A review of the relevant literature reveals teacher preparation and in-service is crucial to the success of data-driven instructional systems (Bernhardt 2004; Bernhardt 2005; Blink, 2007; Creighton, 2007; Murnane et al., 2005; Streifer & Shumann, 2005). Del Favero (2009) also believes the training of future administrators should include learning the process of data analysis to focus on the school improvement process. However, many educators in a school lack the expertise and training to learn from assessment results (Del Favero, 2009; Murnane et al., 2005; Wells, 2009). As a result, there is a need to find out how educators are trained and what they need to look for when disaggregating and mining

their data. Figure 2 illustrates the conceptual idea that there is a fundamental breakdown in the crucial step of training educators to analyze school data and use the results to guide instruction.

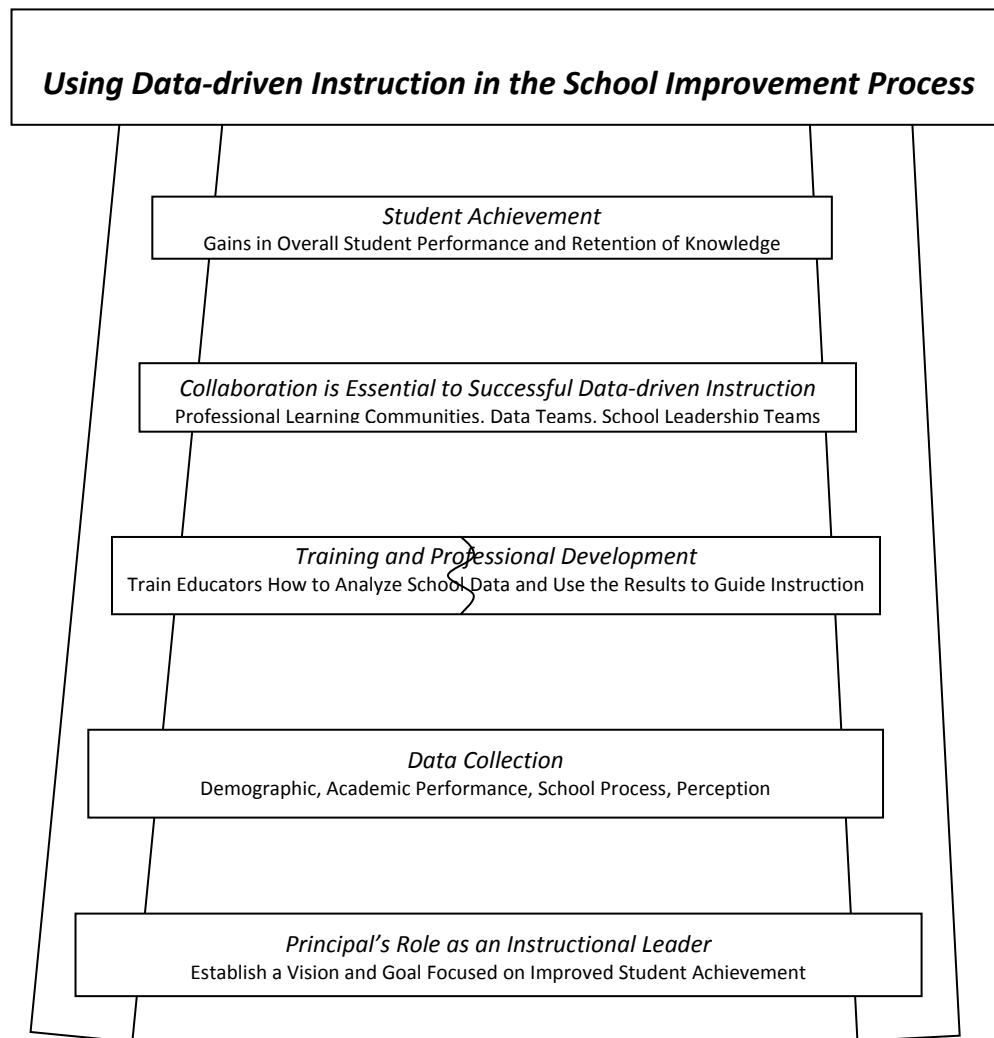


Figure 2. Conceptual framework for researching successful data-driven instructional systems. Note: When introducing Data-driven Instruction to the School Improvement Process, schools often experience a breakdown when it comes to training educators how to analyze data and use the results to guide instruction.

Accountability requirements involve a controlled top-down method of implementation while an inquiry process of the data-driven instructional process requires a bottom-up sense of empowerment among stakeholders (Light et al., 2005). Figure 2 also depicts how these top-down requirements rely on the process of the bottom-up inquiry. If there is a breakdown in any of these steps, the establishment of a data-driven culture is in jeopardy. This realization can be powerful

knowledge for educators at all levels. Understanding the crucial steps involved in the design of a data-driven school culture can lead to a stronger school improvement process.

Definition of Terms

The following definitions were established to create a common vocabulary and understanding of the terms utilized when discussing the use of data in an educational setting:

1. *Accountability* is a process by which educators are held responsible for performance or outcomes of educational programs such as the taught curriculum (Stack, 2003).
2. *Accredited with Warning* is a status given to schools in Virginia if their pass rates are below the achievement levels required for full accreditation. For example, middle schools who do not achieve an overall 70% pass rate in mathematics will receive an “Accredited with Warning” status. Schools in this category undergo academic reviews and are required to adopt and implement a school improvement plan. (Virginia Department of Education, n.d.)
3. *Aggregated data* contain sets of separate data gathered to form patterns, trends, and idea of the whole picture (Watkins & McCaw, 2008).
4. *Collaboration* is working jointly with others (i.e. teachers, administrators, aides, itinerant teachers, parents, students, community representatives, and numerous other stakeholders in the school) to improve the school program (Bernhardt, 2004).
5. *Data-driven Decision Making*, sometimes referred to as D³M, is the use of data analysis to inform when determining the course of action for policy and procedure (Picciano, 2006). D³M incorporates many different kinds of data collected at individual schools to help with decision making central to the goals and strategies created for school improvement. It helps identify groups of students who are improving and groups of students who are not and the reasons behind this fact (Creighton, 2007). D³M involves making decisions based on demographic, student learning perceptions, and school process data (Bernhardt, 2004).
6. *Data-driven Instruction* focuses on using data to plan instructional lessons and activities at the classroom level (Blink, 2007).
7. *Data Mining* refers to searching or “digging into” a given set of data seeking information to better understand a particular phenomenon (Picciano, 2006). It also

involves using techniques for finding patterns and trends in large data sets (Bernhardt, 2004).

8. *Data Warehousing* is a computerized process that is capable of storing and maintaining longitudinal data over a long period of time (Picciano, 2006). A data warehouse is designed to house data imported from many resources (Bernhardt, 2004).
9. *Disaggregated data* contain sets of data separated into component parts and used to determine a focal point for intervention (Watkins & McCaw, 2008). In education, this term refers to using students' test results sorted out by gender, economically disadvantaged, race and ethnic origins, disabilities, and English fluency. Looking at the data organized in this manner allows administrators and teachers to see how each student group is performing (Bernhardt, 2004).
10. *Effective Professional Development* provides opportunities to learn which should increase teachers' knowledge and understanding about the process associated with teaching and how students learn. Results of these efforts are centered on student achievement and the development of the whole-child (Watkins & McCaw, 2008).
11. *Instructional Leadership* involves facilitating collaborative efforts with teachers, establishing and supporting coaching relationships between teachers, using research to drive decision-making, knowing and using adult learning principles with teachers and support staff, and encouraging and facilitating the study of teaching and learning (Blase & Blase, 1999).
12. *Leadership* is defined as the process of acquiring knowledge, skills, understanding, and/or new behaviors (Bernhardt, 2004).
13. *Professional Development* opportunities are planned activities that help staff members, teachers and administrators improve the way they work when it comes to their decision making processes, analyzing skills, using data, planning, teaching, evaluating, approaching assessment, and any other method used to improve student achievement. (Bernhardt, 2004).
14. *Professional Learning Community (PLC)* can be described as an organizational approach among school faculty which stresses the importance of teacher commitment. This commitment is to a mission of guaranteeing student learning,

high levels of collaboration, and regular reflection on student and school data (DuFour, 2004a).

15. *Standardized Tests* are assessments which are uniform in content, administration, and scoring. They are used to make comparisons across classrooms, schools, school districts, and states (Bernhardt, 2004).
16. *Student Achievement* is defined as gains in overall performance on federal and state accountability assessments. For example, Virginia requires a 70% pass rate of student achievement in all core subject areas to be recognized an accredited school. (Virginia Department of Education, n.d.).

Organization of Study

A qualitative study was conducted to investigate how four middle schools in southwest Virginia have used data-driven instructional methods in their school improvement process to achieve full accreditation status. The purpose of this study was to investigate ways in which principals build and sustain successful data-driven instructional systems within their schools to improve student achievement. A multi-site case study was conducted to investigate the process associated with developing a data-driven instructional process to advance student achievement. A triangulation method was used to identify patterns and common themes among stakeholders using interviews, on-site visits, and document analysis.

This dissertation is comprised of six chapters, with Chapter 4 and 5 as prepared article publications. This option is approved by the Virginia Tech Graduate School and follows the suggested guidelines of the Educational Leadership Program. Chapter One introduces the topic of data-driven instruction while describing it as the driving force of student achievement in the emerging era of high-stakes accountability. Chapter Two contains a review of the relevant literature regarding the principal's role as an instructional leader in building data-driven instructional systems to guide instruction and improve student achievement. The review of the relevant literature was selected based on the 2001 passage of Public Law 107-110 known as No Child Left Behind (NCLB). The literature that was reviewed on data-driven-instruction was selected from studies published between 2001 and the present. The rationale behind this decision was based upon the tremendous impact the law has had on public education since its implementation in 2001. The impact of NCLB has caused educators to dig below the surface of expectations regarding student achievement. Chapter Three describes the methodology of the

study which includes the rationale for the research design, selection of the population and sample, instrumentation and data collection process, and the analysis procedures. Chapter 4 is a proposed state publication for the *Virginia Educational Leadership*, an online journal, sponsored by the Virginia Association for Supervision and Curriculum Development (VASCD). Chapter 5 is a prepared national publication for the National Council of Professors of Educational Administration's (NCPEA) *International Journal of Educational Leadership Preparation* (IJELP). Chapter 6 is a traditional chapter identifying common themes and patterns from the triangulation method used as well as discussions of conclusions, implications, and suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

The process used to identify the relevant literature pertaining to how schools use data to improve student achievement involved researching the selection of literature developed after the passage of Public Law 107-110 known as *No Child Left Behind*. The rationale behind the decision to focus on literature from 2001 to the present was based upon the tremendous impact NCLB has had on public education since its passage into law (AASA, 2002; Aspen Institute., 2007; Brunner et al., 2005; Light et al., 2005; Piccanno, 2006; Popham, 2008-09; Schmoker, 2008-09; Streifer & Shumann, 2005; Wells, 2009). The criteria for including literature on data-driven instruction after the passage of *No Child Left Behind* is a direct result of the impact the law has had on educators who now have to dig below the surface of state mandates when addressing the troublesome issue of student underperformance (Steele & Boudett, 2008-09).

The appeal of using data to positively impact student achievement has captivated school administrators, especially with the implementation of *No Child Left Behind* (Brunner et al., 2005; Streifer & Schumann, 2005; Picciano, 2006; Wells, 2009). “The growing interest in data-driven decision making tools is no doubt a direct response to [the] mounting pressures” of *No Child Left Behind* (Stringfield et al. as cited by Mandinach et al., 2006). As result of *No Child Left Behind*, accountability pressures have increased and the collection and reporting of data has become one of the crucial duties a principal is challenged with as an instructional leader (Pascopella, 2005; Schmoker, 2009). Vast amounts of school data are presented to educators and disaggregated in a variety of ways including data teams, data rooms, departmental teams, and grade-level teams to name a few examples. Data teams must mine the data to retrieve the important information needed to achieve school-wide goals while also focusing on the vision of the school (Boudett & Steele, 2007). When educators come together to make instructional decisions based on data, they are forming professional learning communities to improve student achievement. As a part of the professional learning community of the school, educators are expected to interpret the data, identify weaknesses, and ultimately create learning environments that make an impact on student achievement (DuFour, 2004; Graham, 2007; Hirsh & Hord, 2008; Hord & Sommers, 2008).

The literature review begins with a summary of the evolving role the public school administrator has as an instructional leader since the reauthorization of the Elementary and Secondary Education Act in 2001. Secondly, the review of the relevant literature describes the

philosophy of educating your adolescents and how the middle school concept is conducive to creating a data-driven culture. Next, the review of relevant literature provides an overview of the relationship between administrators' role in establishing data-driven decision making in conjunction with improved student achievement. The literature review continues with an exploration of the research in the field of data-driven decision making by examining schools that have established their own successful data-driven instructional systems and the process it took to get them there. The literature review will also summarize case studies and illustrate how data are analyzed by educators in a variety of ways including data teams, data rooms, departmental teams, and grade-level teams to name a few examples. The case studies show how school data teams must mine the data to retrieve the important information needed to obtain school-wide goals while also focusing on the vision of the school. Next, successful data-driven instructional systems are identified from the literature review as those schools who have worked collaboratively to build a school culture where data are used effectively to improve student achievement using the concept of a professional learning community. Finally, the literature review concludes by revealing cautions and possible barriers to establishing successful data-driven decision making strategies in schools.

Historical Context of a Principal's Evolving Role as an Instructional Leader

Instructional leadership has become an important role of a school administrator as a result of several educational landmark actions such as the 1983 *A Nation at Risk* report (National Commission on Excellence in Education, 1983) and the reauthorization of the Elementary and Secondary Acts of 1988, 1994, and 2001 (Pub. L. No. 107-110, § 115, Stat. 1425). Consequently, states have overhauled their accountability requirements to align with the latest 2001 reauthorization known as No Child Left Behind (Pub. L. No. 107-110, § 115, Stat. 1425). As a result, the appeal of using data to guide student achievement has intrigued school administrators, especially with the implementation of No Child Left Behind (Brunner, Fasca, Heinze, Honey, Light, & Mandinach, 2005; Streifer & Schumann, 2005; Picciano, 2006; Schmoker, 2009; Wells, 2009). The historical context of how a principal's role has evolved as an instructional leader is important to understanding why the effective use of data in schools has become increasingly crucial as well.

The Impact of No Child Left Behind on How Administrators Monitor Student Achievement

A study conducted by the National Commission on Excellence in Education in 1983, entitled *A Nation at Risk*, stated American schools were grossly behind the rest of the world (National Commission on Excellence in Education, 1983). This alarming report was followed by the reauthorization of the Elementary and Secondary Acts (ESEA) of 1988, 1994, and 2001. Public school reform in America has undergone dramatic changes since the reauthorization of ESEA. As a result of the educational shockwaves just mentioned, every state has increased graduation requirements, added standardized tests of student achievement and made qualifications for teachers more stringent over nearly the past three decades (Aspen Institute, 2007; Booher-Jennings, 2005; Bruner et al., 2005).

In January 2002, President George W. Bush signed into law the No Child Left Behind Act (NCLB) of 2001. This law contained the most comprehensive changes to the ESEA since it was enacted in 1965 (U. S. Department of Education, 2004). NCLB was enacted to focus on those subgroups of students who have lagging academic performance (Streifer & Schumann, 2005). For nearly a decade, the No Child Left Behind Act has attempted to lay the groundwork for closing achievement gaps and improving public schools. More than any other federal education law in history, NCLB has greatly impacted American families, classrooms, and school divisions where practically every facet of education has been affected by this statute (Aspen Institute, 2007).

According to the Aspen Institute research (2007), no aspect of public education has been left unaffected from what is taught in elementary, middle and high school classes to how teachers are hired and money is allocated. These changes have revolutionized the approach educators have taken to improve student achievement (Aspen Institute, 2007). Regardless of their opinions about the law, many agree that if the law were to be abandoned tomorrow, American schools would remain fundamentally transformed by the legislative actions of No Child Left Behind (Aspen Institute, 2007). The principal's role has been transformed from the primary role of a building administrator to that of a innovative instructional leader (Berube, 2004; Jefferson & Davis, 2000; Mackey et al., 2006).

As a result of NCLB legislation, there has been increased attention on the best practices of using data. "The marriage between the data-driven movement and No Child Left Behind instigated many positive actions, especially on behalf of low-performing subgroups" (Schmoker, 2009 p. 70). For example, training and professional development have been identified as crucial

components to successful data-driven instructional programs (Bernhardt, 2005; Blase & Blase, 1999; Blink, 2007; Creighton, 2007; Learning Point Associates, 2004; Murnane, et al., 2005; Streifer & Shumann, 2005). In addition, organization and technology play a key role in a successful data-driven instructional system (Biswas & Ghosh, 2007; Bernhardt, 2005; Booher-Jennings, 2005; Brown, 2006; Creighton, 2007; Strieffer & Shumann, 2005). However, the most widely utilized practice of incorporating successful data-driven instructional systems assimilates collaboration and teamwork into the school improvement process (Boudett et al. 2005 and 2007; Buhle & Blachowicz, 2008; David, 2008; Hord & Sommers, 2008; Ingram et al., 2004; Learning Point Associates, 2004; Morison, 2008; Wells, 2009).

The union between the data-driven movement and No Child Left Behind has placed a focus on how educators look at student performance (Creighton, 2005; Picciano, 2006; Schmoker, 2009; Wells, 2009). School principals are held accountable for the proficiency and participation of the following subgroups under the *No Child Left Behind* Act (NCLB): Five race and ethnic categories of American Indian/Alaskan Native, Asian/Pacific Islander, Hispanic, Black/African American, and White/Caucasian; low socio-economic status identified as students receiving free or reduced price lunches; students with learning disabilities; and students with limited English Proficiency (LEP). The recent federal legislation requires educators deviate away from their typical practices and lead from below the surface where more attention is placed on previously marginalized students (Creighton, 2005). NCLB has forced public school systems to increase their attention on the accountability measures of these subgroups by directing educators' attention to data and the process of data-driven decision making (Brunner et al., 2005; Streifer & Schumann, 2005; Light et al., 2005). After examining the historical context of accountability and its effect on the role of a principal, one can conceptualize how an administrator's role in educational leadership has dramatically shifted since the implementation of NCLB.

Middle Level Schools: The Philosophy of Educating Young Adolescents in an Environment Conducive to Establishing a Culture of Data-driven Instruction

Efforts to improve schooling at the middle school level have made considerable progress since the 1960's (Jackson & Davis, 2000; National Association of Secondary School Principals, 2006; NMSA, 2010). The cornerstones of middle school research include the National Middle School Association (NMSA) and publications such as *This We Believe* (NMSA, 1995, 2003,

2010), *Turning Points: Preparing Adolescents for a New Century* (Carnegie Corp., 1989), and *Turning Points 2000* (Jackson & Davis, 2000).

The National Middle School Association (NMSA) was formed in 1973 and has been a strong influence for middle school reform for young adolescents ages 10 – 15 in recent decades (NMSA, n.d.). Their efforts have spanned world wide to include the US, Australia, Canada, and Europe (NMSA, n.d.). The NMSA is best known in middle school reform for the ongoing position papers entitled *This We Believe* (1982), *This We Believe: Developmentally Responsive Middle Level Schools* (1995), *This We Believe: Successful Schools for Young Adolescents* (2003), and *This We Believe: Keys to Educating Young Adolescents* (2010).

All the NMSA *This We Believe* position papers have provided a vision for middle level educators responsible for improving the learning of young adolescents (NMSA, 2003). The first *This We Believe* publication in 1982 suggested ten “essential elements of a ‘true’ middle school” (NMSA, 1982), p. 10-15). These ten “essential elements of a ‘true’ middle school became a commonly cited standard for defining a middle school (Loundsbury, 1996):

- 1) educators are knowledgeable about and committed to young adolescents,
- 2) a balanced curriculum based on student needs,
- 3) a range of organizational arrangements,
- 4) varied instructional strategies,
- 5) a full exploratory program,
- 6) comprehensive advising and counseling,
- 7) continuous progress for students,
- 8) evaluation procedures compatible with the nature of young adolescents,
- 9) cooperative planning, and
- 10) positive school climate.

In an effort to create a model for middle-level reform where emphasis was placed on improved student achievement, the Center for Collaborative Education (CCE), upon request from the Carnegie Corporation, developed the Turning Points principles. *Turning Points 2000* (Jackson & Davis, 2000) is a comprehensive guide designed to help educators meet the diverse needs of young adolescents as they embark on the delicate transition between the childhood elementary stage and the young adult high school stage. Research by Jackson and Davis includes a decade of research and experience which focuses on data-based inquiry and teacher collaboration to improve student learning. As a result, Jackson and Davis discovered the middle

grades represent the most critical period in education because so many decisions made during this stage determine whether children will reach their full potential.

Middle schools are driven by the philosophy of ensuring success for all students (Jackson & Davis, 2000). In the era of high-stakes accountability, success of students is directly associated with student achievement. For example, in Virginia school accreditation ratings reflect student achievement on the Standards of Learning tests (VA Department of Education, n.d.). A Virginia school's state accreditation rating reflects overall achievement in English, history/social science, mathematics and science. Schools in which students meet or exceed achievement objectives established by the Virginia Board of Education in these four major content areas are rated as "fully accredited." As a result, schools with a "fully accredited" rating in the Commonwealth of Virginia are regarded as high-achieving schools.

Valentine, Trimble, & Whitaker pointed out in their research on the middle level practitioner (as cited by Jackson & Davis, 2000) that one of the most consistent findings in educational research is that high-achieving schools have strong, competent leaders. Jefferson and Davis (2000) pose the question of "how a middle school principal successfully leads a school community toward improved student achievement" (p. 156). Research suggests principals who create a school culture of data-driven instruction are the answer to leading a community toward improved student achievement. (AASA, 2002; Aspen Institute, 2007; Bernardt, 2004; Berube, 2004; Bling, 2007; Booher-Jennings, 2005; Boudett et al., 2005; Brown, 2006; Brunner et al., 2005; Buhle & Blachowicz, 2008; Creighton, 2007; Del Favero, 2009; Hirsh & Hord, 2008; Hord & Sommers, 2008; Learning Point Assoc., 2004; Light et al., 2005; Mandrich et al., 2006; Mackey et al., 2006; Morrison, 2008; Pascopella, 2005; Payne & Miller, 2009; Popham, 2008-09; Schmoker, 2008-09; Streifer & Schumann, 2005; Wells, 2009).

The essence of the Turning Points model (Jackson & Davis, 2000) is for schools to be committed to enabling all students to meet or exceed high academic expectations. "If student assessment data are not disaggregated, improvements in a school's average test scores may mask slower rates of improvement, or even a failure to improve among some groups of students" (p. 150). As data-driven decision making and instructional leadership work together hand in hand (Creighton, 2007), so must student achievement and the principal's use of school data.

The Role of an Instructional Leader: Principals' use of Data to Improve Student Achievement

School administrators enhance their role as instructional leaders when they work hard to maximize student learning and achievement while also identifying opportunities to encourage and support classroom-level teacher improvement (Graham, 2007). Since the 1990's, the idea of data-driven decision making continues to gain ground as a trend in education and as an indispensable tool for school improvement (Pascopella, 2005; Payne & Miller, 2009; Schmoker, 2008-09). The relationship between data-driven decision making and No Child Left Behind can lead to many positive changes in school improvement, especially among low-performing subgroups (Schmoker, 2008-09). However, there is a sparse amount of research and training about the actual process involved with establishing a data-driven decision making culture in schools (Learning Points, 2004; Light et al., 2005; Payne & Miller, 2009). Unfortunately, many educators have little or no experience in using data to inform their educational decisions for school improvement.

One reason for lack of experience in using data to inform educational decisions and improve instruction is simply fear. Creighton (2007) states educators fear statistical analysis because it is missing in the pre-training courses they receive. He further states statistical analysis is often viewed as mathematical theorem and not viewed as a useful tool for educators. He also suggests statistical analysis should be incorporated in principal preparation programs to prepare these future administrators for the data reporting, data analysis, and data-based decision making they will face as instructional leaders. Creighton recommends technology become incorporated into these programs as well as a management tool for the vast amounts of data these future administrators will encounter on a daily basis. The principal can serve as an instructional leader by using data to guide school improvement. "Data-driven decision making and instructional leadership must go hand in hand" (Creighton, 2007, p. 11).

In addition to administrators being trained in the use of data to analyze instruction, teachers must be trained as well. Teachers do not come out of their college programs with an understanding of how to use data to decide what and how they teach (Blink, 2007). It is up to administrators to provide teachers the opportunity to learn this skill in a very structured and supportive environment. Blink adds that training teachers to use data at the classroom level is crucial to school improvement and insists data-driven initiatives will fail without the proper teacher training.

The Role of an Instructional Leader: Principals' Use of Data in Establishing Professional Learning Communities to Improve Student Achievement

More and more, schools are inundated with vast amounts of data (Ingram, Louis, & Schroeder, 2006; Popham, 2008; Reeves, 2008). After receiving the vast amounts of data, educators often fail to analyze the data properly due to lack of training and the added stress of frustration. Because most educators are not trained in data-driven decision making and planning, it is necessary to begin with a foundation on which to build a school culture that uses data to improve instruction (Learning Point Associates, 2004). One approach to building such a foundation could be the collaborative approach known as professional learning communities or PLCs. The culture of professional learning communities is characterized by shared responsibility for student learning, collective thinking, collaborative work with data, and time for reflection (DuFour, 2004a; Graham, 2007; Hord & Sommers, 2008; Hirsch & Hord, 2009). Working collaboratively with data should become a part of a school culture where teachers are eager to engage in reflection of the data to not just see numbers, but meaning and purpose behind the numbers (Payne & Miller, 2009).

The professional learning community model, often referred to as PLC, is described as an organizational approach among school faculty which stresses the importance of teacher commitment to a mission of guaranteeing student learning, high levels of collaboration, and regular reflection on student and school data (DuFour, 2004a). When using the PLC model, a school administrator can focus on teacher improvement in a creative manner by promoting teacher collaboration, dialogue, and reflection on the job, rather than using traditional one time exposure to professional development workshops. According to DuFour, “the best staff development happens in the workplace rather than in a workshop” (DuFour, 2004b, p. 63). PLCs are formed when teachers work collaboratively to develop essential knowledge and skills their students need to acquire; when they develop common assessments to monitor student learning in a timely manner; when they work cooperatively to analyze those assessment results to identify strengths and weaknesses; and when they help one another to develop and implement strategies to improve student achievement (DuFour, 2004b). PLCs that match DuFour’s description have educators engaged in the kind of professional development that builds teacher aptitude and promotes school improvement.

Based on DuFour’s 2004 description of professional learning communities, Graham (2007) conducted a mixed method case study to investigate the relationship between a middle

school's implementation of professional learning community activities and teacher improvement. Graham used a variety of assessment measures such as surveys, teacher interviews, and a review of school documents to conduct his study. Graham's study investigated the structure of the professional learning community as an alternative approach to teacher improvement with a specific focus on the relationship between PLC activities and teacher improvement in a first-year middle school (Graham, 2007). Graham determined DuFour's emphasis on teacher collaboration aligned well with the middle school concept due to its philosophical teaming structure already in place.

Graham's 2007 study relied on both quantitative and qualitative data to determine the relationship between PLC activities and teacher improvement using the 2004-05 academic year from Central Middle School located in the Southeast. The PLC activities Central Middle School implemented encompassed both grade level team meetings and departmental team meetings. A common planning time was built into the master schedule to allow time for collaborative discussions to take place. Graham's evaluation of the PLC process involved asking sixth, seventh, and eighth grade core academic teachers to complete a survey concerning the professional learning community activities they had participated in. Graham conducted a descriptive study on these survey results.

Graham (2007) found a positive relationship existed between changes in teacher's knowledge and skills and changes in teaching practices as a result of the professional learning community activities. Notable differences across grade levels in terms of changes in teaching practices as a result of PLC activities were also found. Specifically, Graham discovered eighth grade teachers consistently reported lower occurrences of meaningful professional development and lower levels of professional improvement than did the sixth and seventh grade teachers. In an effort to help explain the variation between the perceptions of the eighth and the sixth and seventh grade teachers, Graham interviewed ten teachers and found that professional collaboration and support was a strong reoccurring theme. Graham also determined that the variations of perceptions in eighth grade could be attributed to the conflicts of those teachers who had not been required to work closely with colleagues in the past.

Upon the conclusion of his study, Graham (2007) proposed three key factors to describe the relationship between PLC activities and teacher improvement: 1) There are a variety of organizational levels and practices in leadership that facilitate good collaboration; 2) Team meetings serve as a foundation to good communication between teachers about good instruction;

and 3) The cyclical process of conversation, conflict resolution and support maintains a sense of community, which in turn has a positive impact on knowledge, skills, and teaching practices. Graham (2007) identified the primary strength of the PLC at Central Middle School to be the way in which teachers had the opportunity to learn from other teachers in their building. This is a contrast to the traditional professional development approach where educational expertise comes from the outside. Professional learning communities provide the improvement of teachers' knowledge, skills, and practices from within. Graham (2007) reported the practices of PLC activities were more professionally rewarding and effective than the traditional professional development they were accustomed to. Graham's findings should inform school administrators who are looking for ways approach the school improvement process using a collaborative approach.

Using data-driven instructional systems in a collaborative PLC format could provide educators a way to improve instruction by starting to take a look from within as opposed to looking from the outside (DuFour, 2004b; Payne & Miller, 2009). Hord and Hirsh (2009) suggest a key aspect of an effective PLC is using data for instructional decision making and that an array of data on student performance be made available in an easy-to-understand format for teachers. Hord and Hirsh (2009) also suggest training teachers to acquire the skills needed to interpret the data and make sound instructional decisions is also crucial to an effective learning community.

The Advantage of Establishing Data-driven Instructional Systems in Schools

Data-driven instructional systems where data can support instructional decisions are relatively new and gaining popularity among administrators in the field of education (Mandinach et al., 2006). In order to build data-driven systems to enhance student achievement, school districts are increasingly pushed to explore the topic of data based decision making. Schools who have explored data to make instructional decisions are now reaping the benefits of their inquiries (Bernhardt, 2005; Blair, 2006; Del Favero, 2009; Learning Points, 2004; Steele & Boudett, 2007). The rationale of data-driven decision-making requires that disaggregated data be turned into useful information to support wise choices and sound instructional decisions (Bernhardt, 2004; Learning Point Associates, 2004; Light et al., 2005).

Mandinach, et al. (2006) report all levels of the educational spectrum can use data to effect a positive change in student achievement. For example, educators can examine classroom

data to determine student achievement along with student comprehension of instruction on the taught curriculum. Superintendents and central office personnel can examine school data to determine where to allocate resources. State officials can ascertain where to allocate funds and provide assistance more efficiently (Aspen Institute., 2007). Higher education can benefit from the use of data-driven decision making in their principal preparation programs to train future administrators to become more effective instructional leaders of a school (Creighton, 2007; Payne & Miller, 2009).

Without data, educators may miss opportunities to help children they would have otherwise overlooked if they had not had access to data (Brown, 2006). It is the principal's responsibility as the primary instructional leader of the school to provide teachers with the access to the appropriate knowledge and skills necessary to improve student achievement through the use of data (Wells, 2009). Without the coaching and support teachers desperately need to begin the process of data-driven instruction, it is naïve to believe that teachers will independently use assessment data to inform instruction (Buhle & Blachowicz, 2008-09). A principal can coach teachers on using data to improve instruction, but if the principal empowers teachers to become coaches themselves, the use of data becomes even more powerful. Morrison (2008) predicts teachers will react positively to the initiative of self-coaching if school administrators guide them in implementing three essential changes in how they approach data. First, teachers must realize that good data collections go well beyond end-of-the-year standardized test scores. Second, teachers must view data collection as a way to investigate the many questions they may have about their students, questions they have about teaching practices, and questions they have about the learning taking place in the taught curriculum. Third, teachers must be good communicators and talk with one another about what the data reveals and how to build on those revelations. Establishing data-driven instructional systems in their buildings will help teachers guide their instruction and obtain the common goal of improving student achievement (Morrison, 2008,).

The principal's role as an instructional leader is the cornerstone to promoting and successfully using data based decision making in schools (Creighton, 2001; Payne & Miller, 2009). One key component of this success, according to Morrison (2008), is communication. As reported in the research conducted by Blase and Blase (1999) on teachers' perspectives of their principal's role as in instructional leader, talking with teachers about instruction was the key to effective instructional leadership. "When it comes to data, if teachers aren't talking about their data discoveries, no discoveries are happening" (Morrison, 2008, 16).

In 2002, the American Association of School Administrators (AASA) prepared a guide entitled *Using Data to Improve Schools: What's Working*. The guide was developed for school leaders to show how using data can lead to gains in student achievement and consequently, school improvement. The 2002 AASA guide reports data-driven school districts have superintendents who work collaboratively with teachers, principals, other administrators, and parents to make certain all children continually show academic achievement. The collaboration between the stakeholders begins with the initial training of educators on how to use the data. The AASA guide (2002) states, "If teachers are trained and have some knowledge of how to collect and analyze data, they can do some remarkable things in the classroom – without needing some decision from on high passed down telling them what to do" (*Using Data to Improve Schools: What's Working*, 2002; p. 47). The AASA (2002) guide shares numerous interviews with school leaders who have implemented successful data-driven instructional systems. One example from describes the efforts of the Plano Texas Independent School District which has created a system for continuous school improvement using data-driven decision making. Douglas Otto, Plano School Superintendent, says "meaningful school reform is probably more about using data effectively than about any other tool you can use" (p. 47). The Plano School District utilizes benchmarking data to monitor student performance. The school district also provides training and assistance to help educators use data more effectively. The 2002 AASA report provides school leaders a guide on how to use and report meaningful data to improve student and school district performance.

Strong instructional leadership skills will establish a solid foundation to the development of a data-driven school culture. Establishing and providing leadership direction to data teams, modeling effective data use, scheduling time for collaborative data-driven conversation, and connecting data analysis to an action plan will create a data-driven school culture (Learning Point Associates, 2004).

Building Data-Driven Instructional Systems to Enhance Student Achievement

As the gap continues to expand between low and high achieving students coupled with the implementation of high-stakes/performance-based accountability systems, the need for data to guide administrative and educational decisions, instead of relying on intuition, tradition, and convenience, becomes increasingly important (Learning Point Associates, 2004, p.1). Creighton (2001) suggests educators need to work with data collected from real classrooms which focus on

student instruction and assessment, attendance and dropout rates, as well as college entrance tests and the evaluation of instructional programs used in schools. Bernhardt (2005) confirms schools usually exercise two areas of data-driven decision making - at the school level and at the classroom level. The first leads to the second (Bernhardt, 2005). As school administrators are quickly moving to the crucial and vital role of an instructional leader, they are continually searching for ways to improve or increase student achievement (Booher-Jennings, 2005). Administrators want to know if instructional programs are working, whether intervention and remediation efforts are having an impact, and what are the most cost-effective methods to predicting such progress (Streifer & Schumann, 2005). Creating a data-driven instructional system could be the answer administrators are looking for. "If a school wants to improve student learning, it has to use data." (Bernhardt, 2005, p. 66.) Bernhardt is confident that the many school districts who have explored the topic of data-driven professional development are now reaping the benefits of their inquiries. The next section of the Literature Review will illustrate various examples of how educators have, in recent years, developed data-driven instructional systems which had a positive impact on student achievement.

Learning Point Associates published a guide in 2004 for educators to use as they held data retreats in their school divisions. The guide was made using Bernhardt's (2004) four key aspects of data to assist educational leaders in collecting the right type of data and make the right types of educational decisions. The four types of data are perception data, program data, demographic data, and achievement data. The purpose of the Learning Point Guide (2004) was to have educators understand the importance of using a variety of data to make informed decisions and obtain successful results toward improving student achievement.

Learning Point Associates (2004) warns the journey to the data-driven instructional process can be confusing and at times frustrating, but also rewarding. Learning Point states in their Guide to Using Data in School Improvement Efforts (2004) that collaboration and reflection are the cornerstone to this successful school improvement process and "data are the key to continuous improvement" (Learning Point Associates, 2004, p. 3). The guide advises educators to use the basic cyclical school improvement plan originally created by Shewhart (1939) of Plan, Do, Study, and Act when incorporating data in the school improvement process. In the "planning" process, the guide states educators must use data to provide a purposeful meaning to goals. In the "doing" process, the Guide suggests educators collect data to assess the impact and success of the goal implementation. Next, using collaborative reflection at this point

in the cycle allows educators to “study” their goals and determine what their next course of action will be, to stay the course or make changes (Learning Point Associates, 2004). Finally, the Guide recommends educators “act” to enhance their school improvement strategies and begin again with the “planning” process to move forward while continuing to use data to make their decisions.

Learning Point Guide (2004) emphasizes the importance of the school improvement cycle. However, the question still remains of “how” do educators use data to make their decisions? Learning Point’s 2004 Guide to Using Data in School Improvement Efforts provides instructions educators can use to answer this very question. The Guide lists the following eight steps to help educators move towards a system of effective data use:

1. Develop a Leadership Team
2. Collect various types of data
3. Analyze data patterns
4. Generate hypotheses
5. Develop goal-setting guidelines
6. Design specific strategies
7. Define evaluation criteria
8. Make the commitment (Learning Points, 2004, p. 6)

The Learning Points Guide (2004) suggests using these eight steps on a yearly basis can have a great impact on decisions made on the effectiveness of teachers and the quality of their instruction as student learning takes place.

Bernhardt (2005), an innovator on the topic of data use in schools, trains educators to use the following three data tools in order to become effective leaders in data usage: First, student information systems are large databases containing student information to link classrooms to the overall school database. These systems contain demographic, managerial, and academic information on student collectively for many years. Second, data warehouses allow school system to manage data across several databases including student information systems and testing. Schools use data warehouses to disaggregate data, look for patterns among student subgroups, and analyze longitudinal data such as the impact of instructional programs. Third, instructional management systems allow educators to analyze student performance with the content the teacher is presenting in the classroom. School systems can use instructional management systems to create curriculum based lesson plans as well as their own coordinating

assessments like benchmark testing. Bernhardt also suggests school systems invest in technological data tools which provide quick and easily accessible data to make the process of obtaining interpreting the data less complicated.

Streifer and Schumann (2005) researched the design and set up of data-driven instructional systems in schools using the practice of “data mining”. The researchers define data mining as “educators’ analysis and use of data”. Data mining is not to be confused as the process of looking for data. In fact, schools are inundated and often overwhelmed with the amount of data collected on students. Data mining is the search for patterns, information, trends, and knowledge adding to one’s understanding of students’ academic strengths and/or weaknesses according to Streifer and Schumann. In addition, these researchers realize the difficulty school leaders faced in mining their data and analyzing their effectiveness on improving student achievement. Streifer and Schumann examined if educators could predict student achievement from the numerous forms of information stored in what they refer to as “data warehouses” (Streifer & Schumann, 2005, p.282).

The concept of a data warehouse is thought of in terms of a collection and storage procedure (Picciano, 2006; Bernhardt, 2004). Data warehouses are the answer to K-12 educators’ problem of the recent surge to collect, process, and safely store the vast amounts of data school systems are now required to collect on their students as a result of NCLB (Brown, 2006). There are many benefits to creating a data warehouse for all school personnel to use. Data warehouses can contribute to academic achievement by making data easier and more accessible. As a result, teachers can interpret data down to individual students and their skill level (Renwick, 2007). Data warehouses can also be used to analyze student and teacher performance over a long period of time because the data contained in the warehouses are vast and contain a lot of historical data as well (Brown, 2006; Biswas & Ghosh, 2007). More and more school administrators are monitoring student progress more quickly and efficiently using data warehouses (Brown, 2006).

Merely creating data warehouses is not the answer to raising student achievement; it is the analysis of the data collected in the warehouses that provides the necessary tools to improve student achievement (Streifer & Schuman, 2005). Streifer and Schuman (2005) suggest administrators establish data warehouses and use the information to predict student achievement. They report that the goal of data mining is to merge all the variables associated with a student’s educational process into one analysis in order to develop a thorough and precise model to predict student achievement.

The purpose of Streifer and Schumann's (2005) quantitative study was twofold. First, Streifer and Schumann wanted to develop a process that could predict student achievement using all the information stored in the school's data warehouse. Second, they wanted to provide school leaders with a replicable process for them to use in order to design better instructional interventions. Streifer and Schumann created two sets of independent variables: All Data versus Academic Data. Within these sets, the researchers selected 24 of the most appropriate independent variables common among the three student groups or cohorts. The variables were identified as 1998-2003 attendance data, demographic data, and 1999-2003 assessment data from Gates, NHEIAP, and CAT. For each cohort, the dependent variable was the seventh-grade Gates-MacGinitie Reading Test NCE score with missing data replaced with a predictive value using the Neural Net predictive modeling technique. The researchers also ran a classification and regression tree (CART) to examine a predictive model which indicated the relative strength of the 24 dependent variables from each set of independent variables. In addition, Streiffer and Schumann also wanted to know how important each of the 24 dependent variables were to answering their research question, "What indicators in our data warehouse are the best predictors of success in reading comprehension as reported by the comprehension subtest [normal curve equivalent] NCE score on the seventh-grade Gates-MacGinitie Reading Test for the cohorts of students during [2001-2003]?"(p.286).

When conducting the CART across the three cohort groups, Streifer and Schumann (2005) discovered that Grade 4 was an important transition year because of the various academic areas in Grade 4 that showed up as indicators on their CART analysis table. Specifically, Grade 4 was identified as an important threshold year because students who scored well on the seventh-grade Gates-MacGinitie Reading Test also performed well in Grade 4 reading vocabulary, reading comprehension, language mechanics, math concept applications, math computations, and study skills predictor values. Upon discovering the correlation between Grade 4 and Grade 7, the researchers closely examined the areas in the curriculum that might be impacting the correlation. They were able to determine the superintendent's long range plans to provide interventions across grade levels to be more effective than the assistant superintendent's idea to only use additional resources in the seventh-grade where the dependent variable was measured.

Streifer and Schumann (2005) conducted a linear regression to predict the cohorts' performance on 2001, 2002, and 2003 achievement tests on the seventh-grade Gates-MacGinitie Reading Test. Upon conducting the linear regression, Streifer and Schumann calculated Pearson

r values to indicate the CART algorithm was directly associated as a predicted value for each student in fourth grade when compared to the actual score obtained by the same students in seventh grade. Their linear regression analysis determined there was a high correlation between the predicted independent variables identified in fourth grade and actual results on the seventh grade Gates-MacGinitie Reading test used as the dependent variable. All the Pearson r correlations were above $r = 0.806$ in the “All Data” and “Academic Data” categories with nothing less than $r^2 = 64.9\%$ of the variation in the dependent variable considered as being associated with the variation in the independent variable. In multiple regression, R^2 can be interpreted in the same way as simple regression; it is the amount of variation in the outcome variable that is accounted for by the model (Field, 2007).

In addition, Streifer and Schumann (2005) also conducted a regression analysis on the predicted and actual reading comprehension scores. Once again, they found a correlation between the two variables. When correlating the 2001 model to the 2002 achievement, results indicated a moderate degree of correlation of $r = 0.564$ with an $r^2 = 31.8\%$. Using the 2001 model to predict the 2003 achievement resulted in a high correlation of $r = .709$ with an $r^2 = 50.2\%$. Streifer and Schumann were able to use data-mining techniques by taking a set of variables and forming a predictor model for student achievement in Seventh-grade reading comprehension.

Blink (2007) based her qualitative research on Data-driven Instructional Systems (DDIS) using her personal journey within her school district to initiate a DDIS. She saw how her school district's efforts were making a difference in student achievement and wanted to develop a tool to share with other school districts who wanted to become data-driven. She developed a framework for her research that was cyclical in nature with one continuous process. Blink (2007) defines the first step in the DDIS process as Data Collection taken from Bernhardt's (2004) four lenses of data collection which include demographic data, perceptions data, student learning data, and school process data. Next, Blink (2007) describes the second step as Data Reflection which she deems as a critical component of the DDIS model and also the most difficult to structure. Blink (2007) says that it is imperative that school districts equip teachers with the necessary tools and time to analyze and reflect upon the collected data. Blink (2007) describes the third step in the DDIS process as Data Translation where data are translated into instruction and adjustments are made accordingly. When gaps or weakness are identified in Data Translation process, it will produce program or curricular changes. The fourth step Blink describes is the Data-Driven

Instructional Design which focuses on using data to inform instruction at the classroom level. The difference between step three and step four is that Data Translation focuses more on district and building changes and the Data-Driven Instructional Design focuses on what is happening in the classroom. Blink (2007) states the classroom level is where change is going to have the most impact on student achievement. “From the time teachers arrive in the morning until they leave at the end of the day, instruction and conversations about instruction must focus on the use of data for student learning” (Blink, 2007; p. 5).

The Collaborative Approach to Using Data to Improve Student Achievement

In addition to having efficient data tools, schools using the collaborative approach to analyzing school data will also be successful in the goal of improving student achievement (Steele & Boudett, 2007). However, creating the conditions for collaboration sometimes proves to be a difficult challenge (David, 2008). According to a study conducted by Ingram, Louis, and Schroeder (2004), teachers are more apt to gather and use data rationally when they have had the opportunity to work in a group. Teachers have a vested interest when using the collaborative approach. The qualitative research, conducted by Ingram, Louis, and Schoeder (2004), also discovered the importance of establishing a level of trust when it came to data discovery. Teachers tend to not trust data presented by someone else and may be reluctant to collect the data themselves. There is great value in the collaborative inquiry among teachers and administrators (David, 2008; Steele & Boudett, 2007; Wells, 2009).

Graduate students at the Harvard Graduate School of Education conducted case study research among public schools using assessment data to improve student learning (Boudett, et al., 2005). In 2005, a guide for administrators called *Data Wise: A Step-by-Step Guide to Using Assessment Results to Improve Teaching and Learning* emerged from this research (Boudett, et al., 2005). This publication featured two fictitious schools that shared common issues associated with implementing the *Data Wise* program. The fictional schools were based upon real schools with which the book’s many authors had worked. As a result of the immense popularity of the 2005 *Data Wise* publication among administrators, Steele and Boudett (2007) developed a sequel entitled *Data Wise in Action*. In the 2007 publication, the researchers used real schools in a case study approach to give educators a look into what it is like for eight schools using data wisely to improve student achievement. The common thread among all eight schools was their collaborative approach to data using the *Data Wise* process. When administrators are under

pressure to show improvement of student achievement, they may be tempted to analyze data themselves and react with directives in which teachers are not vested (Steele & Boudett, 2007; Wells, 2009). Through their research in the data-driven process, Steele and Boudett's discovered the value in the collaborative approach to disaggregating and using data to improve student achievement. Their collaborative approach involved not only the school principal, but teachers, support staff, parents and even students. The researchers have identified many schools whose students have benefited from a collaborative approach to using data.

The *Data Wise* improvement process involves a three-phase process with eight steps for schools to follow in order to use school data to measure, understand, and improve student learning.

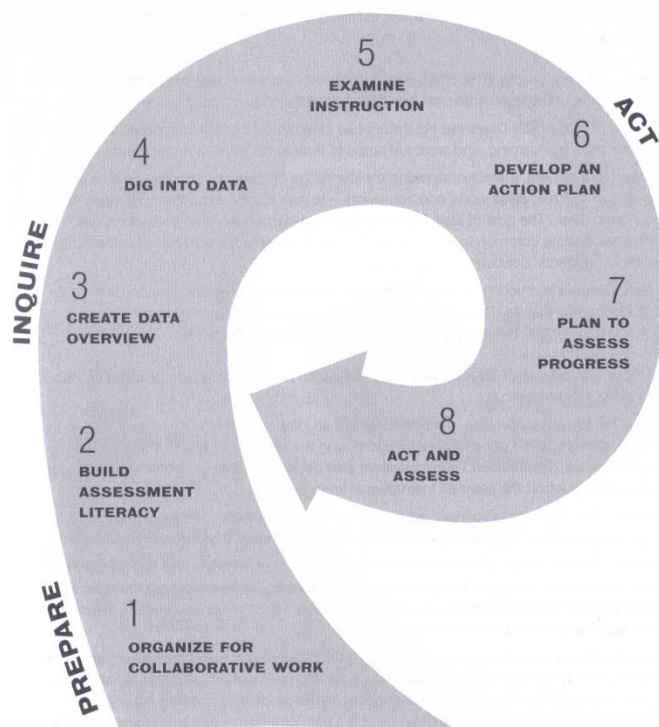


Figure 3. The *Data Wise* improvement process.

Note: Reprinted with permission from *Data Wise: A Step-by-Step Guide to Using Assessment Results to Improve Teaching and Learning*, edited by Kathryn Parker Boudett, Elizabeth A. City, and Richard J. Murnane, (Cambridge, MA: Harvard Education Press, 2005), pp. 5. For more information, please visit www.harvardeducationpress.org, or call 1-888-437-1437.

Prepare: Organizing for Collaborative Work: Boudett, Steele, et al. (2007) illustrate Phase I: *Prepare* by following the experiences of both elementary and high schools. Step One, *Organizing for Collaborative Work*, of Phase I was depicted in an elementary school, located in Maine, who had experienced data fatigue from an unsuccessful data initiative. Principal Eismeier

faced the challenge of carefully choosing a data team who could successfully engage their colleagues in yet another attempt of using data to improve the quality of the school's instruction. Once their data team was established the principal used the *Data Wise* suggestion of creating a Data Inventory for the school. After collectively brainstorming what had been used in the past, the new data team identified all the data resources available to the school. Following the identification of all the data available to the school, the principal worked hard at trying to make these data easily accessible to the teachers. The next part of their improvement process was to focus on what was relevant and move on to Step Two of Phase I, *Building Assessment Literacy*.

Prepare: Building Assessment Literacy: Boudett, Steele, et al. (2007) illustrate Step Two of Phase I, *Building Assessment Literacy*, using a high school from Massachusetts known for academic excellence. The first-year principal of this high school wanted to build a school culture where using data to improve instruction was a collaborative effort to help struggling learners. Principal Price's challenge was to make data seem relevant to teachers who were not used to working collaboratively in a data analysis process. Her first challenge was to form a data team who would work collaboratively to lead the school in identifying achievement gaps and strategize ways to close these gaps. After forming the data team for the school, the principal provided professional development where members of the data team were trained to talk about data and feel comfortable about data analysis. This data team was particularly interested in the concept of identifying predictors. The team defined the term "predictor" as "a characteristic or behavior that predicts or explains differences in the outcome variable" (Boudett, Steele, et al., 2007, p. 34). Examples of the data team's identified predictors include course grades, attendance, curriculum level, discipline, sports, transportation, ELL/ELP, free/reduced lunch, gender, race, special education, and zip code. The outcomes for these predictors included high school grades, SAT, and the state accountability test. By developing a clear understanding of data terminology such as outcomes and predictors, the data team was successful in moving through Phase I, Step Two *Building Assessment Literacy*.

Inquiry: Creating a Data Overview: Boudett, Steele, et al. (2007) illustrate the *Inquiry* of Phase II, Step 3 *Creating a Data Overview*, by using an urban K-8 school located in Massachusetts. Schools are often overwhelmed with vast amounts of data (Ingram et al., 2006; Popham, 2008; Reeves, 2008). A data overview focuses on exploring snapshots of student achievement using data from standardized test scores such as annual statewide tests. This K-8 school experienced a decline in its language arts scores which caused the school to not make

Adequate Yearly Progress (AYP) for two consecutive years. AYP is an individual state's measure of yearly progress toward achieving state academic standards (No Child Left Behind [NCLB], 2002). Adequate yearly progress is the minimum level of improvement that states, school districts, and schools must achieve each year, according to Public Law 107-110 legislation (NCLB, 2002). The novice principal used the *Data Wise* improvement process to identify the school's struggles particularly in language arts. Principal Abeyta led the school's data team in creating a strong data overview that used achievement data to reveal the truth behind what students know and what they are able to do. For example, Principal Abeyta had teachers create graphs and tables while also engaging them in meaningful conversation and discussions about what the data revealed. Phase II, Step 3 *Creating a Data Overview*, is where the new principal saw the biggest benefit to using data to improve instruction. Principal Abeyta led the way to the data team's discovery of a targeted approach to creating an overview of data. The ability to create a data overview that highlights students' strengths and weaknesses was a powerful way to present teachers a way to pursue meaningful questions about their instruction and its relation to student achievement. An effective data overview promoted a collaborative discussion and further inquiry about the school's instructional process.

Inquiry: Dig into Data: Boudett, Steele, et al. (2007) illustrate Phase II, Step 4 *Dig into Data* using a K-5 elementary school located in California. The faculty of this elementary school had already established an excellent rapport for good communication and collaboration with one another. They had also worked with data for years. However, they had not moved beyond status quo to seeing gains in individualized student achievement. The school had a vast amount of data to routinely examine, but teachers did not have a method for using the data to target the needs of individual students effectively.

As a result of implementing the *Data Wise* process, the data team followed the performance of a small number of individuals known as "focal students". The identification of "focal students" required each teacher to select a handful of students who would act as barometers for how well all students were learning the concepts being taught. The data team examined the data trends in order to dig into understanding the educational needs of each of these students by incorporating interim assessment data such as benchmark testing. Teachers went from trying to address broad problems students were experiencing to using interim assessment data to narrow their focus. Teachers were trained to use benchmark summaries, students' everyday work, and various other forms of formative assessment to tailor their

instruction to meet the unique needs of individual students. Sometimes re-teaching /remediation required whole-group instruction, and sometimes it meant small group pull-out sessions.

Not only were teachers becoming more vested in using data, Principal Ranii also wanted to students to dig into their own data. As a result, teachers collaborated together to develop Personal Education Plans (PEPS) for students. The PEPS outlined each student's educational goals for the year. Each student kept a portfolio of their progress which included samples of their own work. Students personally selected work samples that showed evidence of their success as well as their struggles. This portion of the *Data Wise* improvement process allowed students to become active participants in their learning while providing teachers with evidence in their data-driven instructional system. As a result, all stakeholders were involved in the process of digging into data.

Inquiry: Examining Instruction: Boudett, Steele, et al. (2007) illustrate Phase II, Step 5 *Examining Instruction* using a K-5 elementary school located in Boston where a strong climate of faculty collaboration existed. Murphy Elementary school used peer observations to strengthen teaching experiences as a means to improve instruction. This collaborative school culture did not magically come together instantaneously. It took Principal Mary Russo approximately seven years, using the *Data Wise* process, to develop a school climate conducive to improving student achievement through the use of data. The teachers at Murphy now look beyond test scores by not only collecting data on student work but also with gathering information about pedagogy through peer observations among teachers. This comprehensive approach to using data helped student at Murphy go from a 50% pass rate on the state accountability tests to an 85% pass rate since the seven years of implementation. Teachers at Murphy are very pleased with their students' growth as well as their own professional growth as a result of using a collaborative approach to using data and examining instruction to improve student achievement.

Act: Developing an Action Plan: Boudett, Steele, et al. (2007) illustrate Phase III *Act*, Step 6 *Developing an Action Plan* using a PK-5 public charter school located in Washington, D.C. As this new charter school was in its early stages of development, the leadership team at Two Rivers Public Charter School knew how essential it would be to train the teaching staff in using a structured data-driven process. The administrators began formulating a professional development plan centered on the collection and analysis of student assessment data. They developed a three-step process to help teachers use data and improve their own instructional process. First, teachers met as a grade-level team to set goals and develop strategies to meet their

goals. Next, teachers made an action plan to try out their strategies. Then, teachers were instructed to collect data about how the strategies worked in the classroom. The school administrators had teachers share their data in faculty meetings. Finally, teachers were given the opportunity to analyze the data they had collected in a collaborative manner. The administrators designed this three-step process to “loop” or cycle itself around so data from one strategy would be used to inform the development of a new or perhaps improved strategy. The school staff worked together to develop a school-wide structure of action planning. Their action plans were developed in a response to data about student learning which also focused on how to improve instruction all centered on a school-wide commitment.

Act: Planning to Assess Progress: Boudett, Steele, et al. (2007) illustrate Phase III, Step 7 *Planning to Assess Progress* using a K-5 public elementary school located in Boston. After Mason Elementary School created their action plan, school administrators were concerned how to monitor and test the effectiveness of the action plan. As a result, the school administrators had teachers at Mason work together to frequently interpret and act upon the data they collected. They collected data to assess whether students were learning with the implementation of their action plan. They also used the data to plan their future steps within the action plans. This strategy forced teachers to evaluate their own work when it came to student learning.

Act: Act and Assess: Boudett, Steele, et al. (2007) illustrate the final step in the *Data Wise* process in Phase III, Step 8 *Act and Assess* using a 9-12 public alternative school located in Boston. As one would imagine, the data that first appeared from this alternative school did not indicate a progression toward student achievement. The new administrator at Community Academy alternative school, Lindsa McIntyre, enrolled in the *Data Wise* course offered at Harvard University. She used the eight step philosophy in *Data Wise* to implement school improvement at Community Academy. Principal McIntyre organized a leadership/data team and immediately implemented the first step of the improvement process by structuring a collaborative work environment. Teacher input became an integral part to sustaining the school’s action plan for using data to raise student achievement. Data team members were invested in the idea that data should be the basis of their instructional reform efforts. One of the ideas generated from this collaborative approach to using data focused on increasing homework expectations. The data team involved teachers in the process of developing a thorough and concise action plan to address student achievement through homework. In addition, the faculty had come together to design a timeline for implementation. Throughout the first year of the new implementation

policy the faculty gathered data from various sources regarding its new homework policy. The progress of the action plan was assessed in multiple ways. Teachers examined how this new action plan affected student homework and what the ripple effect was for overall academic achievement. As a part of Step 8 *Acting and Assessing* Principal McIntyre developed a survey to evaluate the new homework action plan. Results indicated the average homework completion rate increased from 48% to 64%. The survey also provided important information as to what was and was not working. The action plan was modified to reflect the results of the survey data

Strategies for Successfully Implementing the Data Wise Process: In a follow-up to their 2007 research Boudett and Steele (2008) also identified three concrete strategies for administrators to use in the *Data Wise* process. These strategies were profiled in each of the eight schools and outlined the leadership initiative required for schools to obtain success in student achievement using the collaborative approach to using data. First, administrators must allocate time for collaboration. Teachers need a routine time to analyze the data and plan for improvement to their instruction (Steele & Boudett, 2008). Second, administrators must delegate who is going to manage the data. Well organized and properly planned meetings are another component to a successful collaborative approach to using data. Steele and Boudett discovered administrators who made the data easily accessible and appointed a data coordinator were the most effective in creating conditions that made ongoing collaboration a valuable part of their success. The third strategy identified by Steele and Boudett was the establishment of standards that foster trust among the stakeholders. The educators in each of the eight schools all took responsibility for their students' learning and had the eagerness to refine and develop their craft (Steele & Boudett, 2008). Teachers and administrators emphasized solving problems instead of passing judgment as they collaboratively labored through the use of their data.

Cautions and Barriers to forming Data-Driven Instructional Systems in Schools

Data are essential for making instructional decisions and increasing student achievement (AASA, 2002; Bernhardt, 2004; Blair, 2006; Blink, 2007; Boudett & Steele, 2007; Creighton, 2007; Del Favero, 2009; Dynarski, 2008-09; Learning Point Associates, 2004; Light et al., 2005; Mandinach et al., 2006; Morrison, 2008; Picciano, 2006; Popham, 2008-09; Ronka, et al., 2008-09; Schmoker, 2006; Streifer & Schumann, 2005). Therefore data, along with careful and thoughtful analysis, can be very powerful tools. However in some instances, certain schools use a more traditional approach by relying on good intentions, gut feelings, and personal opinions

rather than using data to guide instruction and decision making. Caution should be taken with these types of traditional approaches because they will not get to the root of underachievement. Schools who use these types of traditional approaches are not meeting the individual needs of students as mandated by state and federal regulations (Daggett, 2007).

In other situations, some schools are rich with data, but knowledge poor when it comes to knowing how to use the data (Streifer & Schumann, 2005; Dufour, 2004a; Payne & Miller, 2009; Ronka, Lachat, Slaughter, & Meltzer, 2009). It is the responsibility of administrators to be strong instructional leaders in order to know how to use the data while promoting the success of all students (Blasé & Blasé, 1999; Booher-Jennings, 2005; Boudett et al., 2005; Creighton, 2007; Ingram et al., 2004; Mackey et al., 2006; Streifer & Shumann, 2005). As the instructional leader of the school, it is also the responsibility for administrators to provide meaningful professional development on the use of data. “It is naïve to believe that teachers will use assessment data to inform instruction without the coaching and support they need to begin the process” (Buhle & Blachowicz, 2008-09, p. 43).

In the wake of NCLB (2001), standardized test scores are the most commonly used set of data to measure student achievement. One barrier to using such data in schools is the fear some teachers may have that a focus on assessment data could lead to negative teacher evaluations or a loss of autonomy (Payne & Miller, 2009). Another caution to forming data-driven instructional systems in schools is not to exclude students at the either ends of the learning curve. Educators must use data based decision-making in their schools to meet the needs of all students not just a select few (Booher-Jennings, 2005).

Booher-Jennings (2005) conducted a qualitative research study in an urban Texas school to examine how teachers and administrators responded to the demands of high-stakes testing and what strategies they used to alter or adapt their educational practices. Through observations, surveys, and interviews, Booher-Jennings discovered the school’s use of “educational triage” to separate students’ needs and to prioritize these needs. Specifically, she found that teachers at the school divided students into three groups: passers, bubble kids, and foundation kids based on benchmark test results.

Resources were rationed to those students who would most likely increase the school’s test scores, known as the “bubble kids” (Booher-Jennings, 2005). Bubble kids were those students who were on the brink of passing the Texas accountability tests by making 60%-69% on benchmark tests throughout the school year. Students who scored below 69% were identified as

a “foundation kids” or “remedial students”. After completing each practice test, teachers at Beck Elementary School were required to meet and discuss their practice test results and calculate the percentage of students passing. Next, the school district required teachers to set a goal of identifying a target number of students who will pass the next benchmark test by calculating the number of “bubble kids” who would transfer over to the status of a “passing kid”. Teachers focused their resources on those students who were suitable cases for passing the state’s tests and away from those students who were viewed as hopeless cases. Booher-Jennings argued that this system of using data to guide instruction was not rational because the lowest-scoring students were given the least amount of attention and resources. In particular, the special education students were not even given benchmark tests to compare their status in the educational triage. The school justified their method of “educational triage” because 13 out of 14 students in one classroom identified as “bubble kids” did end up passing the final test as did a small percentage of “remedial kids”.

Booher-Jennings (2005) argued that the data-driven practices did not predict student outcomes after all. Instead, she stated it identified students and placed them into certain groups based on their educational and academic status. The teachers and administrators referred to students as “accountables” and “non-accountables” when referring to their testing status. The “accountables” were students whose scores counted in the overall Texas Accountability System and where much of the school’s resources went. Booher-Jennings found that the educational triage used encompassed the identification of the following students: students who did not qualify for the state testing were unsuitable for intervention, the practice of focusing on the “bubble kids”, providing extra resources to the “accountables”, and decreasing the number of “accountables” by increasing the number of special education referrals who are alternatively assessed. Upon completion of this case study, Booher-Jennings concluded that the popularity of data-driven decision making will not dissipate any time soon and that its uses will focus on individual student needs. However, she does caution to not let data target some students at the expense of others.

In other research conducted by Ingram, Louis, and Schroeder (2004) evidence was found to show how the misuse or non-use of data could be very misleading when implementing instructional decisions. Specifically, they were able to identify mistakes being made when it came to perceptions of data usage. Conducting a longitudinal study of nine high schools who were nominated as leading practitioners in education and analyzing teacher responses to how

data would be used as an effective tool, their findings suggest many teachers are willing to use data, but have concerns regarding how it is used to judge colleague's performance and the effectiveness of their school. In the qualitative portion of their study, the researchers found a variety of resources which teachers used to make educational decisions. Teachers in this 2004 case study looked at test scores, but felt standardized test scores did not tell the whole story. Subjects in this study stretched the definition of data-based decision making beyond standardized testing to include grades, classroom tests, graduate surveys, teacher surveys, as well as systematical and anecdotal data.

By the conclusion of the research conducted by Ingram, Louis, and Schroeder (2004), the researchers found a disconnect between current educational policy and how teachers judge the effectiveness of the school as well as their own effectiveness in the classroom. Ingram et al. contribute this discovery to cultural attitude about how to use data. When describing the decisions made regarding teacher and school effectiveness, administrators and teachers often based their decisions on anecdotal records, intuition, and experience rather than systematic forms of concrete data. The reasons identified by Ingram et al. for the disconnect of using "gut feelings" instead of concrete data included mistrust of the data, lack of time to analyze the data, difficulties in measuring the data, and teacher efficacy. The researchers discovered the concept of data-based decision making for school improvement is ideal, but they felt it was unrealistic in the current conditions of the nine high schools. Ingram et al. suggested that much more work was needed "to translate theory into practice" (p. 1283). Most of mistrust and confusion about how to use the data to improve student achievement could be accomplished by creating conditions conducive to a systematic approach to using data similar to the *Data Wise* work of Boudett et al. (2005, 2007, 2008) discussed earlier.

Teachers must value the importance of data while taking a personal interest in the outcome of its use (Blink, 2007). For example, if teachers do not view assessment data in a timely manner, or if they feel the data does not accurately measure student learning, teachers will not use the data set before them (David, 2008). Teachers must also be given enough time to collect and analyze data to make decisions (Blink, 2007; Steele & Boudett, 2007; Wells, 2009). Teachers often experience frustration when they feel their valuable time is used up collecting data and interfering with their teaching (Ingram et al., 2004).

Summary

The review of the relevant literature on how schools are using data to improve student achievement has described how the role of a principal has rapidly changed to require strong instructional leadership skills. Since the implementation of No Child Left Behind, school administrators are required to possess different skills than their historical predecessors who were traditionally school managers (Berube, 2004; Mackey et al., 2006). The review of the relevant literature has depicted how the impact of NCLB has required school administrators to closely monitor student achievement using data while providing an environment conducive to using data in a collaborative manner. Research on the middle school concept and professional learning communities has emphasized the important benefits of using collaborative planning time to discuss the progression of student achievement.

In addition to the evolving role of a school administrator and the impact of NCLB, the review of literature also described topics on what is already being done in regards to how schools use data to improve student achievement. For example, there are significant practices administrators use to request, collect, and prepare data to guide teaching and learning. Booher-Jennings (2005) found the advantage to data-driven-instructional use could help target specific students in need of additional specialized instruction. Boudett et al. (2005) used a case study method to show how collaboration is the best way to approach implementation of the data-driven instructional process with the stakeholders of a school. The research conducted by Ingram et al. (2004), DuFour (2004 a, b), and Hord and Sommers (2008) illustrated how a collaborative approach to using data was an excellent way to enhance student achievement using the concept of PLCs. The PLC process is a good way to promote communication and collaboration to prevent a breakdown in the data-driven process. A number of schools have mastered the craft of identifying these inhibiting obstacles by using data to improve student achievement, as the review of the relevant literature has depicted. Appendix A illustrates patterns found throughout the literature review regarding the overlap of the categories deemed important to establishing successful data-driven instructional systems.

The common theme within all the research studies listed in Appendix A illustrates how building principals use their instructional leadership skills to establish successful procedures such as a collaborative approach to analyzing data. The instructional leaders built successful data-driven systems that enhanced student achievement. However, there is still much to learn

about the step-by-step procedures used to establish a school culture where the use of data to make decisions is both revered and established as an integral part of the instructional process.

Upon review of the literature and research on how principals build data-driven instructional systems to improve student achievement, it is clear that school administrators at any level are inundated with massive amounts of data. The key, however, is for administrators to know what portions of the data will help them reach their goal of excelling academic achievement. There is also still much to learn about what types of data are determined to be the most useful in making instructional decisions. Using data wisely to make sound instructional decisions and to monitor student achievement is the main feature of setting up a school culture where data is used to drive instruction and progress toward excelling academic achievement. Educators must be knowledgeable in how to apply the evidence presented in the data into practice in order to affect school change and improve student achievement (Blair, 2006; Del Favero, 2009).

CHAPTER 3

METHODOLOGY

The purpose of this multi-site case study was to investigate ways in which principals build successful data-driven instructional systems within their schools to guide instruction and improve student achievement. The constant variable was identified as data-driven instructional strategies used in middle schools with an “Accredited with Warning” status two consecutive years in the Commonwealth of Virginia. The primary data on the constant variable were triangulated by conducting interviews and on-site visits with eleven middle school educators including district supervisors, principals, and teachers from southwest Virginia. The researcher chose the middle school level because of the recent phenomena occurring in math performance at the sixth and seventh grade in Virginia. From 2005 to 2008 many middle schools across the Commonwealth lost their full state accreditation status upon the implementation of sixth and seventh grade math SOL tests.

Assumptions and Rationale for a Case Study Design

The purpose of this multi-site case study was to investigate ways in which principals built and sustained successful data-driven instructional systems within their schools to improve student achievement. Additional information is needed about the step-by-step procedures used to establish a school culture where the use of data to make decisions is both revered and established as an integral part of the instructional process. The researcher sought to learn about the variables associated with the use of data by school administrators as they provide instructional leadership for their school. The researcher also sought to find out what types of data were deemed the most useful in making instructional decisions.

Case studies are qualitative research which require seeing, hearing, and experiencing activities in their natural environments (Picciano, 2006). A case study investigation was conducted to gain information from four southwest Virginia middle school principals who led their schools to full state accreditation by creating data-driven instructional systems to improve student achievement. Yin (1994) defines a qualitative case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (p. 23). Recalling real-life accounts as well as viewing and

experiencing data-driven instructional activities in their natural environments provided insight into how a successful data-driven culture was established and successfully maintained.

A multi-case or multi-site study occurs when researchers use more than one case study to research a phenomenon (Merriam, 1998). A multi-site study was conducted because the data-driven cultures of more than one school were investigated. Merriam describes the multi-site process as collecting and analyzing data from several sources. The use of multiple data sources is highly desirable in any data collection activity (Picciano, 2006) Therefore, the multi-site case study of four southwest Virginia middle schools was used to investigate how the various schools used data to support instructional decision making in a data enriched school culture.

A multi-site case study approach was employed because the researcher wanted to describe the interesting phenomenon of how data were used in schools to positively impact student achievement. There were certain characteristics the data-driven schools possessed which needed to be explored in their natural setting. Describing these phenomena in a multi-site case study provided a comprehensive descriptive study depicting complex social processes and understandings through detailed description seeking to display deep insight (Rossman & Rallis, 2003) into the data-driven culture of once struggling middle schools in southwest Virginia.

The multi-site case study produced data from multiple sources. The popular qualitative tools used in this qualitative research included observation, structured interviews, and document analysis (Picciano, 2006). An investigation was conducted to identify comparisons between cases which highlighted common issues and central themes in a process called triangulation (Richards, 2005). Triangulation is a term used for research designs where a variety of methods of handling data are used to answer the research questions and to collect data on the same item of analysis (Picciano, 2006; Richards, 2005). The need for triangulation arises from the ethical need to confirm the validity of the process (Yin, 1994). For the purpose of this dissertation research, the items analyzed and the processes needing validation were the data-driven methods struggling middle schools in southwest Virginia used to improve student achievement in math.

Research Questions

Additional information was needed about the specific step-by-step data-driven instruction procedures four southwest Virginia Middle schools were using to improve student achievement. Information was gathered from three main stakeholders of middle school supervisors, principals,

and teachers. Information was sought on how their school improvement process used data to improve instruction resulting in higher student achievement.

The multi-site case study research methodology was used to identify the characteristics of these variables because it allows the research questions to be answered in an authentic setting. The research methodology provided information regarding how multiple data sources were used to improve student achievement. The same research questions that guided the Literature Review also guided the multi-site case study:

1. What types of data do administrators consider essential to the success of their data-driven instructional programs?
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?
3. How are administrators guiding teachers to use data to improve student achievement?

In order to obtain information on the specific step-by-step data-driven instruction procedures the four southwest Virginia middle schools utilized, an inquiry was made on the variables associated with educators' use of data to improve student achievement. Particular attention was focused on the use of data by the school administrators as they provided instructional leadership for their school's data-driven culture. The variables relevant to the research questions above included the variety of demographic and academic performance data used to make the instructional decisions, the school processes used to disaggregate and analyze the data, as well as perceptions of the data-driven instructional system and stakeholder involvement. Data-driven-instructional systems were defined generally as using school data to plan instructional lessons and activities at the classroom level (Blink, 2007). The results were portrayed in a discussion of themes and patterns. A comparison between cases can highlight similar issues and central themes (Richards, 2005) that stand out in all the middle schools' data-driven cultures.

Research Design

A multi-site case study approach was chosen to investigate the interesting phenomena of how four middle schools in southwest Virginia were using data to positively impact student achievement. As Yin (1994) suggests, the multi-site case study obtains multiple sources of information to insure the reliability of the case study is well established. In addition, Yin's six

primary sources of evidence were also obtained in this multi-site case study: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts. The subsequent sections will reveal the methodology used in the multi-site case studies illustrating the school improvement process used to create a data-driven culture in the selected southwestern Virginia middle schools.

Population and Sample Selection

In the 2005-2006 school-year, the Commonwealth of Virginia expanded its Math Standards of Learning testing requirements to include sixth and seventh grade math for school accreditation status. This expansion of testing more students was a direct result of the requirements set forth in the 2001 ESEA Act, *No Child Left Behind*. “ESEA requires annual testing in grades 3-8 and at least once in high school to measure student progress in reading and mathematics” (Virginia Department of Education, n.d.). Consequently, many middle schools across the Commonwealth of Virginia had their accreditation status changed in 2006 from “Fully Accredited” to “Accredited with Warning”. Seven schools received “Accredited with Warning” status in 2005-2006 which was the first year of implementing the sixth and seventh grade math SOL assessments. It is important to note Virginia allows its schools to use a three-year average as another means of determining accreditation status (Virginia Department of Education, n.d.).

Even though many middle schools fell short of meeting the 70% benchmark in the first year of testing sixth and seventh grade math, their accreditation status was protected because of their three-year average in 2005-2006 and did not fall below the 70% benchmark. However, the numbers dramatically rose in 2006-2007 with 98 schools receiving the “Warning” status as a result of the second-year implementation of the sixth and seventh grade math tests. Not much progress was made in 2007-2008 when 95 schools still held the status of “Warning” due to the lack of progress on their middle school math scores. The Virginia Department of Education responded to this crisis by sending Academic Review teams into the struggling middle schools across the Commonwealth to examine the culture of the schools, how they were aligning their curricula and using data to improve student achievement. Schools were asked to develop new school improvement plans to address the identified weaknesses in these crucial areas and data had to be the leading force behind these efforts. As a result of this intervention, the number of middle schools in the “Warning” status decreased to 42 in 2008-2009 and continued to significantly decline in 2009-10 with only 11 middle schools continuing to receive the

“Warning” status. Figure 4 shows the dramatic shift in the middle schools who received the “Accredited with Warning” status as a result of the implementation of the sixth and seventh grade math SOL tests.

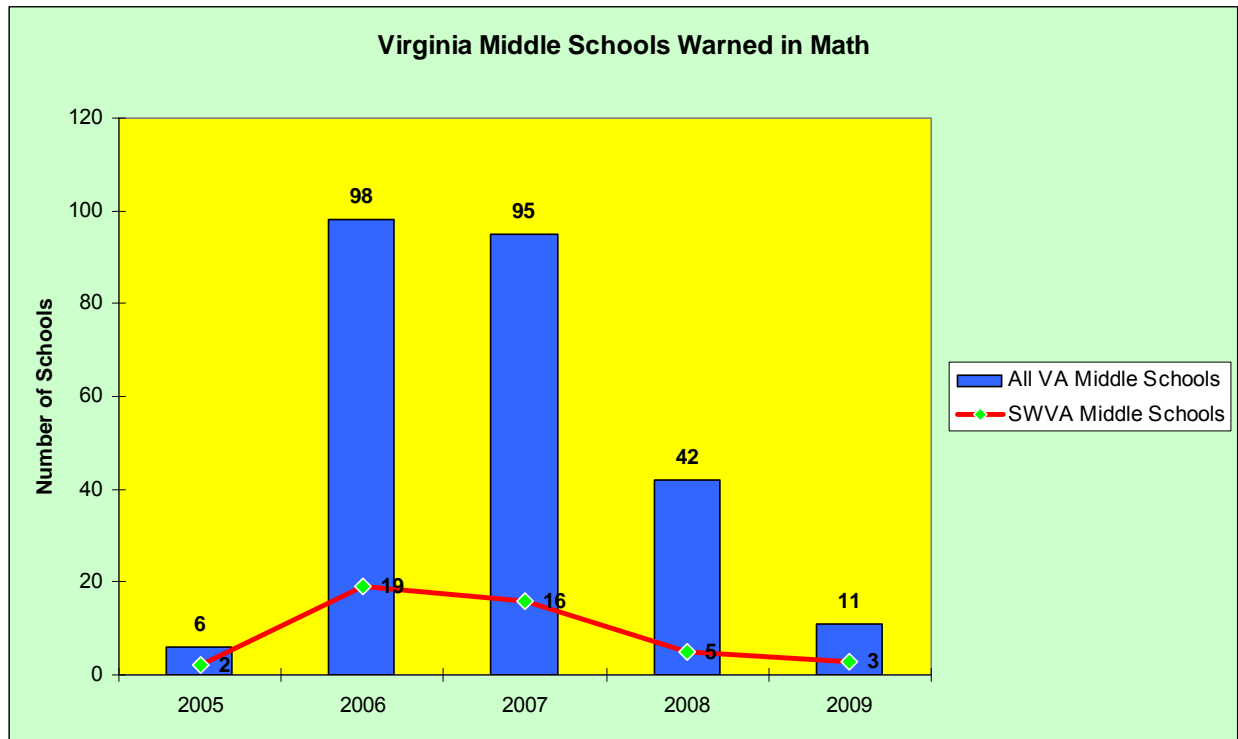


Figure 4. Virginia middle schools receiving “accredited with warning” status since the implementation of the sixth and seventh grade math tests from 2006 to 2009.

The population selection for the proposed study was taken from middle schools located in southwest Virginia who went through the Academic Review Process as a result of their two consecutive years with an “Accredited with Warning” status. The parameters included Virginia middle schools in Regions 6 and 7 located west of Roanoke County where the schools were able to show improvement and become fully accredited within two years of implementing the school improvement process.

Following the identification of the eleven schools in Regions 6 and 7 located west of Roanoke County, the selection process was refined based on the shared characteristics of population, SOL scores, and AYP status. Some schools were eliminated from the study because of the outliers identified as a high population of the English Language Learners subgroup and much larger student populations than the other middle schools in the region. One school was also

eliminated from the study due to the researcher’s personal association with the school. Table 1 depicts the remaining eight schools considered for on-site visits.

Table 1

Southwest Virginia Middle Schools Receiving 2-year “Accredited with Warning” Status from 2005-2008 Characterized by Population, SOL scores, and AYP status

Common Characteristics									
<ul style="list-style-type: none"> ▪ 6-8 Middle Schools ▪ “Accredited with Warning” status for two consecutive years because of low math scores in grades 6-7 ▪ Southwest VA Middle Schools located west of Roanoke County ▪ Not Title I Middle Schools ▪ Population of less than 600 students 									
No.	Region	School Division	Middle School (6-8)		Year “Acc. with Warning”	Made AYP/ Math SOL Score			
			Name	Population (2009)		2007	2008	2009	
1	6	D	D1*	271	2005	Yes	Yes	Yes	
					2006	78	79	85	
2	6	D	D2	213	2006	No	Yes	Yes	
					2007	60	81	81	
3	7	C	C1	553	2006	No	Yes	Yes	
					2007	58	75	78	
4	7	C	C2*	470	2006	No	Yes	Yes	
					2007	62	74	83	
5	7	A	A1	599	2006	Yes	Yes	No	
					2007	66	86	*English 87	
6	7	A	A2*	499	2006	No	Yes	No	
					2007	67	80	*English 84	
7	7	B	B1	295	2006	No	Yes	No	
					2007	67	81	*Math 79	
8	7	B	B2*	460	2006	Yes	Yes	Yes	
					2007	62	75	85	

Interview/On-site Visit Selection Process

The next step in the selection process was to narrow the number of schools represented in each school division to one. Requests were made to conduct on-site visits from four rural southwestern Virginia middle schools who had established a data-driven culture in their schools. The middle school supervisors from school divisions A, B, C, and D were contacted to seek their opinion on which middle schools in their division had established a productive data-driven culture through the school improvement process. The results of this inquiry are indicated by an * in Table 1.

Data Collection Process

Qualitative Procedures for Planning the Research

Qualitative research investigates people or things in their natural setting while interpreting the phenomena being studied (Creswell, 1998; Yin, 2004). The process of qualitative research involves the collection of a variety of data using observations and interviews to draw a holistic picture of the topic being studied (Creighton, 2007). A multi-site case study was conducted to collect a variety of information using observations and interviews to illustrate how four southwest Virginia middle schools overcame deficits in student achievement by using data to improve instruction. A qualitative descriptive research study was chosen because the researcher wanted to describe the interesting phenomenon of how data was used in schools to positively impact student achievement. The multi-case study approach provided mini snap-shots of what data-driven school cultures look like by using an interview process, on-site visits, and collections of relevant documents.

Development of the Interview Questions

The interview questions were derived from the Essential Actions used by the VA Department of Education for Academic Reviews. The Essential Actions are divided into eight categories. Four of those categories target the establishment of a data-driven instructional process. Those categories are Curriculum Alignment (CA), Using Data for Making Instructional and Planning Decisions (D), Professional Development (PD), and Systems and Process (SP).

The interview questions were also correlated to the review of relevant literature of Berhardt (2004). The Literature Review produced many relevant connections between leadership and the use of data to improve student achievement (Blair, 2006; Bruner et al., 2005; Light et al.,

2005; Schmoker, 2008; Streifer & Schuman, 2005). Appendices A and B illustrate how the interview questions correlated to the literature, to the experts in the field of data-driven instruction, and to the national expectations of the Educational Leadership Constituent Council (ELCC) standards. As a result, the interview questions were grounded in the literature, national standards, and experts in the field providing internal consistency to the interview questions.

Content and Construct Validity

Triangulation strengthens reliability and internal validity by using a variety of data collection and analysis (Merriam, 1998; Picciano, 2006). One of the three forms of data collection used in the triangulation was an interview process. In addition to correlating the interview questions to the review of relevant literature, the interview questions were also set up in symbolic-logic matrices to improve the inner-item correlations and construct validity. Symbolic-logic matrices are used “to verify that each descriptor logically agrees with others measuring the same construct. A symbolic-logic matrix resembles a correlation matrix but allows individual items to be compared according to verbal construction by subjecting them to ‘if/then’ statements” (Creighton, Coleman, & Adams, 1997, p. 10.) For example, when using the symbolic-logic matrix to strengthen correlation between the descriptor in interview question #2 and the descriptor in interview question #3 using the category of *Using Data for Making Instructional and Planning Decisions*, two-way agreements were desired. Table 2 illustrates how three of the interview questions were analyzed using the symbolic-logic matrix process.

Table 2

Sample Symbolic Logic Matrix of Interview Questions for Division Level Middle School Instructional Supervisors

<i>D = Using Data for Making Instructional and Planning Decisions:</i>	2.	3.	4.
2. Does your school division provide training/professional development for teachers on the analysis and use of data to select instructional strategies? (D4)	X	A	A
3. Does your school division provide training on the analysis and use of data to determine students' strengths and weaknesses? (D7)	A	X	A
4. Does your school division provide training on the analysis and use of data to develop remediation/intervention activities? (D5)	.	A	X

Note: "When making a correlation between two questions, an "if/then" statement is created. An X is placed in the cell where the descriptor correlates with itself ... If the statement is agreed to, an "A" is placed in the cell representing the [two-way] agreement. If the statement is not agreed to, a 'dot' is placed in the cell representing one-way disagreement. Next, the evaluator moves on to the third cell across the first row, until each item serves as the consequence to the original item serving as the antecedent." (Creighton, et al., 1997, p.12).

Two-way agreements such as the ones between questions #2 and #3, as well as between #3 and #4 best predict high inter-item correlation (Creighton et al., 1997, p. 10). As a result, interview questions with either the two-way agreement or one-way agreement will be kept and deemed acceptable by using the symbolic-logic parameters. A summary of the Symbolic-Logic Matrix for all three sets of interview questions is located in Appendix B.

Interview Process

Structured interviews are carefully scripted tools for gathering data and should be very well organized (Picciano, 2006). First, the division level middle school supervisor was interviewed to gain insight on the process of data-driven-instruction at the division level. The objective of the interview was to determine the range of involvement at a higher level of school administration. The division level middle school supervisor was also asked their recommendation of a good on-site visit to the middle schools in their division who had established a productive data-driven culture. Next, the building principals of the recommended schools were contacted by phone to gain insight on their role as the instructional leader of the school's data-driven school culture. A request for an on-site visit was also made. An on-site visit

was conducted with each of the four selected middle schools to obtain information on the establishment of the data-driven culture in its natural setting. While conducting the onsite visit, the building principal was engaged in a more in-depth interview. Teachers involved with the data-driven process were also interviewed. A copy of the interview questions is located in Appendix B. Richards (2005) states qualitative studies may be better if they have more than one form of data collection using triangulation for systematic comparisons when looking at the data. More than one form of data collection was established by obtaining information from the division level supervisor, the building principal, the teachers, in conjunction with additional supporting documents and evidence of a data-driven culture. Using various forms of data collection and analysis, triangulation strengthens reliability and internal validity (Merriam, 1998).

Observation Process

The on-site visit involved a direct observation of the data-driven process the middle schools were using to improve student achievement. The multi-site case study approach required observations of data usage activities in a natural setting of a school. Notes were taken based on the conversations educators had and artifacts were collected while observing the data driven process in its natural setting. In-person observations allowed the data-driven instructional activities to be scanned extensively for relevant behaviors and context (Picciano, 2006).

Qualitative Data Collection and Recording

The formal interviews were audio taped and then transcribed. In addition, field notes were taken for the on-site visits and documents relevant to disaggregating school data were compiled. Upon the collection of these records, facts were examined and common themes were identified. Themes were established based on particular ideas or practices that keep reoccurring and had embedded themselves as a part of the school's data-driven culture. For example, the review of relevant literature depicted collaboration was an essential piece to successful data-driven school cultures (Boudett et al., 2005; Buhle & Blachowicz, 2008; David, 2008; Ingram et al., 2004; Morrison, 2008; Steele & Boudett, 2007; Wells, 2009). To obtain more robust data on the concept of collaboration, on-site visits and interviews provided more insight on the process of collaboration in a data-driven instructional setting.

Triangulation of the Multi-site Case Study

Data were gathered from three sources of interviews, observations and document collection and analyzed from three view points of the division's middle school supervisor, building principals, and classroom teachers. Triangulation is a term used for research designs where a variety of methods and sources of handling data are used to answer the research questions (Merriam, 1998; Picciano, 2006; Richards, 2005). The three viewpoints from stakeholders in the triangulation were obtained through an interview process, direct observations, and the collection of supporting documents relevant to the process of using data to improve student achievement. Figure 5 represents the triangulation process and sources used to gather information on the middle schools' data-driven culture.

These sources were used to identify common themes and patterns of each school's data-driven culture. Multiple data collection techniques, such as triangulation, are encouraged; because they help researchers corroborate findings and determine a course of action to take (Picciano, 2006) in order to replicate the phenomena.

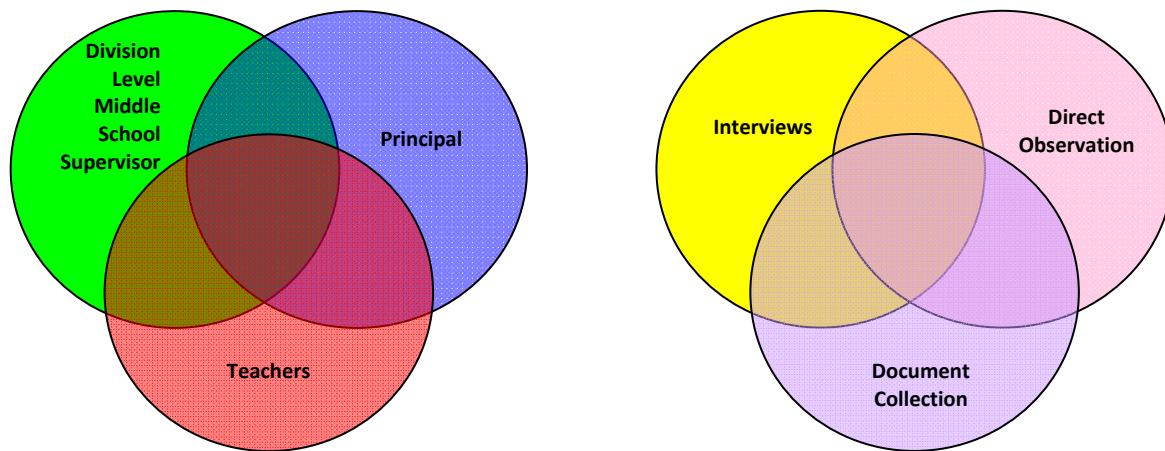


Figure 5. Triangulation of sources used to gather information on a school's data-driven culture.

Case Study Protocol

Following the identification of the eight middle schools which showed improvement after undergoing Virginia's Academic Review Process (Virginia Department of Education, n.d.), the superintendents and then administrators were contacted via telephone to ask for their cooperation in participating in the proposed study. A sample of the superintendents' permission letters is located in Appendix C. After obtaining permission from the superintendent to proceed with the conduct of the study in their school division, middle school supervisors were contacted via

telephone to seek their participation by being interviewed. A copy of the Instructional Supervisor Interview Questions can be found in Appendix B. Following the supervisor's interview, each Instructional Supervisor was asked to recommend a middle school that used data to improve student achievement. The principals of each of the recommended middle schools were contacted next via phone to confirm their willingness and cooperation to participate in the study as well. The transcripts in Appendices D, E and F were used during the telephone interviews to insure the maintenance of good verbal communication and a professional tone (Salant & Dillman, 1994). The principal was asked questions about his/her Academic Review Process such as was their school asked to incorporate the use of data more effectively as a result of the Academic Review Process or were they provided training on the analysis and use of data as a result of the Academic Review Process? Appointments for on-site visits were then made to see first-hand how the data-driven process worked at each of the four middle schools. Copies of the on-site interview questions for principals and teachers can be found in Appendix B while the on-site transcript for teachers can be found in Appendix F.

Qualitative Data Analysis Procedures

Upon completion of the follow-up interviews, on-site visits, and collection of relevant documents, the researcher examined the triangulated results by comparing the data-driven instructional processes of each of the four middle schools. Common concepts and themes were identified using a matrix to display the themes reoccurring among the different schools. The frequency of occurrences tables found in Appendices G, H, and I aided in analyzing the qualitative data to determine what methods and procedures were successful in establishing data-driven instructional systems with the school cultures. The interview responses were grouped and matched based on the themes and patterns that emerged through the analysis process. A total of nine themes were identified with supporting evidence from the interviews and on-site visits. By referring back to the original research questions, a framework was provided to summarize and organize the findings into common themes and patterns. Appendices G, H, and I illustrate the relationships of research questions and emerging themes.

CHAPTER 4

ARTICLE 1: TWO ARTICLE DISSERTATION - STATE

Note: This article was prepared for submission to the Virginia Association for Supervision and Curriculum Development (VASCD), upon approval from the Dissertation Committee. The VASCD is an affiliate of the Association for Supervision and Curriculum Development. The article will be submitted for possible publication into the VASCD online journal of *Virginia Educational Leadership*, which is scheduled for publication in the spring of 2011. The next publication will center on the theme, *Advancing Excellence in Teaching, Learning, and Leadership*. The VASCD encourages authors to submit articles on a wide range of topics including:

- Strides Toward Excellence: Examples of successful professional development implementations, meaningful collaborations, or other positive transformations.
- In Practice: What school and classroom practices help students reach higher levels of success?
- Research: Share the results of studies that relate to teaching, learning, and leadership.

The prepared article, *Acculturating Schools to Use Data-driven Instruction for Improved Student Achievement*, applies to all three of the above mentioned categories. The deadline for submission of materials for the next issue is December 15, 2010. Manuscripts should be typed, double-spaced, with Times New Roman 12 point font. Section titles should be bold and italicized with Times New Roman 12 point font. Tables should be in MS Excel format. References should be in hanging indent format with Times New Roman 9 point font. As a result, the style of the following article abides by the specified guidelines of the publications and is consistent with the Virginia Tech Educational Leadership Program Area requirements.

Acculturating Schools to Use Data-driven Instruction for Improved Student Achievement

As educators we are instinctively inspired by other schools' success and crave the knowledge that led to that success. In the face of adversity, effective educators will accept the challenge and confront the obstacles standing in the way of increasing student achievement. The tricky part is identifying those obstacles. A number of schools have mastered the craft of identifying these inhibiting obstacles by using data to improve student achievement. Those schools are making sound instructional decisions based on factual evidence from school data rather than using guesswork based on gut feelings. Educators have much to learn from the schools that have successfully used data to drill down to individual students and prescribe an educational improvement plan based on students' specific needs.

The Intrigue of Using Data-driven Instruction to Close Achievement Gaps

Using data to improve student achievement has gone from being viewed as a good notion to establishing itself as the backbone of an increasing number of school districts in recent years.

With the modern era of high-stakes accountability, collections of school data have quickly become a fundamental component of how schools are making curriculum and instructional decisions. As public schools in America are approaching the ten year anniversary of the 2001 Public Law 107-110, more commonly known as *No Child Left Behind* (NCLB), the appeal of using data to guide student achievement continues to grow for school administrators (Brunner, et al., 2005; Streifer & Schumann, 2005; Picciano, 2006; Schmoker, 2009; Wells, 2009). Yet, there is still much to learn about the process administrators use to acculturate their schools in the practice of data-driven instruction.

With the new reauthorization of *No Child Left Behind* quickly approaching, the necessity of using data to drill down and measure individual student achievement is greater than ever. By way of the 2001 implementation of Public Law 107-110, “the marriage between the data-driven movement and *No Child Left Behind* instigated many positive actions, especially on behalf of low-performing subgroups”(Schmoker, 2009 p. 70). This trend will continue to progress as educators are now receiving a glimpse of how the NCLB reform will impact their schools. According to the document *A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act* published by the U.S. Department of Education in March 2010, the purpose of the NCLB revision centers on preparing students to become college and career ready. The newly proposed NCLB performance targets are based on whole-school and subgroup growth in achievement. Additional focus on graduation rates guide improvement toward the goal of having all students graduate or on track to graduate from high school ready for college and a career by 2020. “States, districts and schools will look not just at absolute performance and proficiency, but also at individual student growth and school progress over time” (p. 9). According to the proposed NCLB reauthorization, school districts will be required to implement data-driven interventions to support those students who are farthest behind and close the achievement gap in schools where students are not performing well.

With almost a decade of experience implementing federal NCLB mandates, administrators know by now that data can be a powerful tool within their schools. However, the most prevalent question remains, “How do we get there?” Schools are inundated with various forms and sources of data (Ingram, Louis, & Schroeder, 2006; Popham, 2008; Reeves, 2008). Despite the vast amounts of data available to schools, many educators still feel unequipped to analyze and use their school data effectively (Blair, 2006). They have what is known as the DRIP (i.e., Data Rich/Information Poor) syndrome (Ronka, et.al, 2008). Schools can be very good at

collecting data, but often fall short at deciding what to do once they have the data in front of them. The recurring question of “now what?” often surfaces. It is the responsibility of the school administrator to step up as the instructional leader and provide the answer.

School Data: The Leading Force Behind Improving Student Achievement in Virginia’s Middle School Math Classrooms

Since 2006, the road to improved student achievement in Virginia’s middle school math classrooms has been a bumpy ride to put it mildly. Many middle school educators in Virginia were alarmed at uncovering large achievement gaps in math when their accreditation status was put in jeopardy. The reality of the crisis deepened in 2006 when 98 of the 339 middle schools across the Commonwealth received a “Warning” status due to poor test scores resulting from the recent implementation of the sixth and seventh grade math Standards of Learning tests. Not much progress was made in 2007 when 95 schools still held the status of “Accredited with Warning”. The Virginia Department of Education responded to this crisis by sending Academic Review teams into the struggling middle schools to examine the culture of the schools and how they were aligning their curricula and using data to improve student achievement. Schools were asked to develop new school improvement plans to address the identified weaknesses in these crucial areas, and data had to be the leading force behind these efforts. As a result of the intervention, the number of middle schools in the “Accredited with Warning” status decreased to 42 in 2008-2009 and continued to significantly decline in 2009-10, with only 2 middle schools continuing to receive the warning status for math. Figure 6 shows the dramatic decline in the middle schools’ academic performance across the Commonwealth prompting reform.

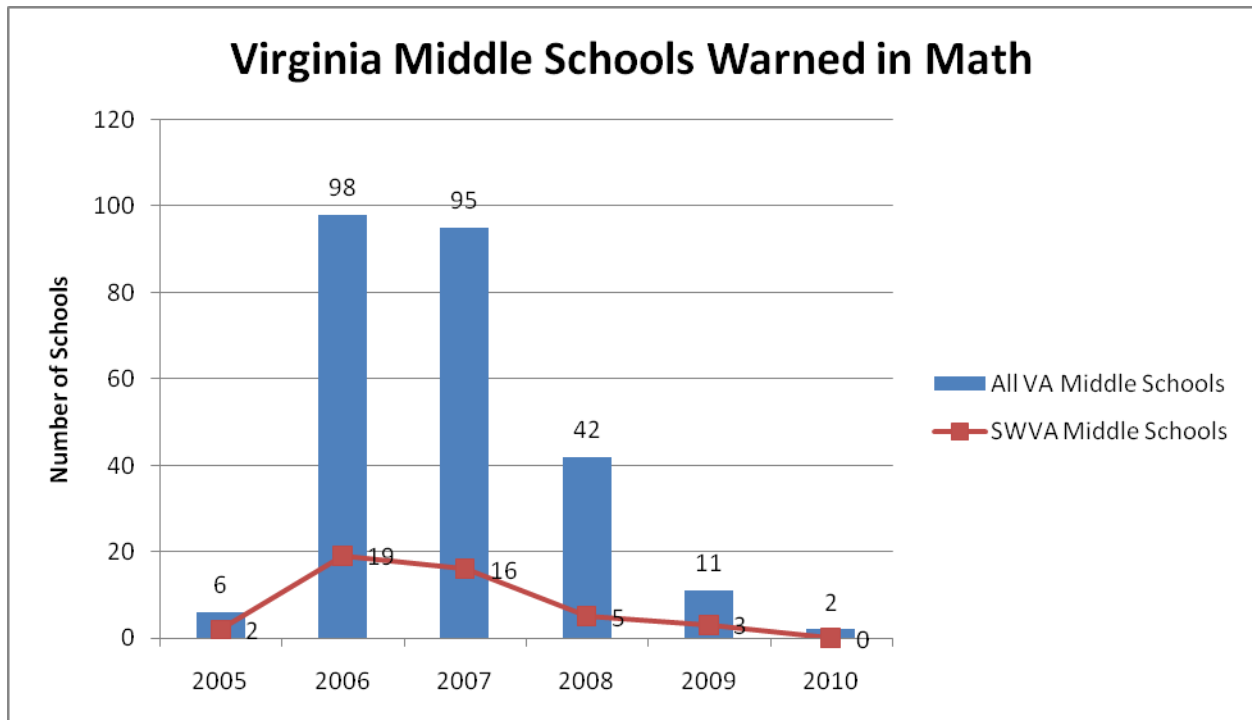


Figure 6. Virginia middle schools receiving “accredited with warning” status since the implementation of the sixth and seventh grade math tests from 2005 to 2010.

A Systematic Approach for Implementing an Effective Data-driven Instructional Model

In the face of adversity, students benefit when educators can collaborate and share their experiences with one another. A multi-site case study was conducted to investigate how the successful middle schools in southwest Virginia used data to improve student achievement within two years. The four southwest Virginia middle schools portrayed in this multi-site case study were very successful and regained their accreditation status using data to identify specific weaknesses in math. They were all very eager to share their experiences using school data. In the quest to find a successful way to implement a data-driven instructional model for schools, three research questions guided the multi-site case study:

1. What types of data do administrators consider essential to the success of their data-driven instructional programs?
2. How do administrators involve teachers and other stakeholders in the school’s data-driven instructional system?
3. How are administrators guiding teachers to use data to improve student achievement?

Phone interviews with division level instructional supervisors, on-site visits, face-to-face interviews with principals and teachers, along with collections of artifacts led to discovering how the four middle schools were building and sustaining successful data-driven instructional systems to improve student achievement.

Which Data Matter Most?

Schools are inundated and often overwhelmed with the amount of data collected on students (Ingram, Louis, & Schroeder, 2006; Popham, 2008; Reeves, 2008). After receiving the vast amounts of data, educators often fail to analyze the data properly due to lack of training along with the added stress of frustration. The real challenge is not collecting the data; the real challenge is for administrators to know what type of data will help them reach their goal of igniting academic achievement. Administrators from the four southwest Virginia middle schools met this challenge and discovered which data mattered the most in the quest to improve student achievement.

In the pursuit to find out key components to their successful data-driven instructional process, the common thread found among all four middle schools was the use of individual student performance data. There are two types of data reports the middle schools used to track student achievement. The Student Performance by Question (SPbQ) data reports and the implementation of nine-week benchmark assessments were held in high regard by all the administrators participating in this study.

The SPbQ data were used at the beginning of the year to develop the curriculum and provide targeted assistance to those students who showed a deficiency in achievement on the Standards of Learning (SOL) assessment. One principal described the SPbQ Student Report as “The Golden Package,” meaning the report allowed them to extract on an individual basis what students were struggling to master. The SPbQ School Report also allowed the schools to determine how well the taught curriculum was aligned with the state SOL test.

Implementation of the nine-week benchmark tests allowed all four middle schools to track individual student progress throughout the school year. Each middle school had a benchmark testing procedure in place where student achievement was formally assessed every nine weeks throughout the school year. The philosophy behind benchmarking was to monitor student mastery of the Commonwealth’s Standards of Learning Objectives throughout the year. The schools provided student remediation as needed during the year rather than identifying

weaknesses after the SOL tests had been administered. In the words of Principal D, “*Real-time data is more important to us as the year progresses.*” Even though all four school divisions used different methods of collecting benchmark data, all agreed the assessments must provide detailed reports on each individual student’s skill level. It did not matter what type of formal benchmark assessment was being administered to students. The benchmark data became a valuable tool to all four middle schools as long as it was aligned with the curriculum and provided detailed reports of student achievement based on individual skill level. All administrators relied on the data reports produced by their benchmark testing software to monitor teachers’ curriculum alignment and individual student achievement. Upon reflecting on her experience with implementing a new data-driven school culture, Principal A advised that the “*benchmark data reports have the capability to be developed quickly and produce easily accessible data.*” Principal D supports the concept of benchmarking by stating, “*You want real-time data to base your [instructional decisions] on.*” It is a necessity for efficient benchmark programs to have the capability to produce quick and easy reports to make data disaggregation less stressful and more effective.

Involving Teachers and Other Stakeholders in the School’s Data-Driven Instructional System With Collaboration and Time for Reflection

Collaborating for student success begins with the initial training of educators receive on how to use the data. Teachers are more apt to gather and use data rationally when they have had training and the opportunity to work in a group (Ingram, Louis, & Schroeder, 2004). Instructional Supervisor D and a teacher from School A both shared the belief that the process of learning how to analyze data and altering instruction based on the data is a methodical process that does not happen quickly overnight. As Principal A recalled, “*We are now data-driven, but I can’t say that we have always been.*” Administrators from all four school districts were provided training along with their teachers on the analysis of student data. Teachers were also provided routine time to analyze the data and plan for improvement in their instruction as Boudett & Steele (2007) suggest in their *Data Wise* model.

The task of analyzing data was not a chore delegated to someone else in any of the four middle schools. Administrators were in the trenches with teachers digging into the data and evaluating student progress as active participants in the data-driven instructional process. For instance, Instructional Supervisor A regularly collaborated alongside the principal and her

teachers in their bi-monthly data team meetings. Teachers were also expected to be active participants in collaborative discussions held with administration and fellow colleagues on a regular basis. If teachers are not talking about their data discoveries, then no discoveries are happening (Morrison, 2008,). A math teacher from school C found collaboration had an impact on his school's instruction and stated:

Looking at the data in a collaborative manner allows you to 'cut to the chase' and provides teachers the opportunity to teach what students really need to know. We talk all the time, even outside of our departmental meetings to share ideas and find out what's really working.

Administrators from each of the four middle schools also provided support to teachers by giving them the gift of time. Blink (2007) found it imperative that school districts equip teachers with the necessary tools and time to analyze and reflect upon the collected data. In accordance with this notion, administrators from all four middle schools saved teachers time by having the "housekeeping" part of the data process done for the teachers. For example, the Instructional Technology Resource Teachers (ITRTs), guidance counselors, data chairperson, or the administrators themselves print out the data reports for teachers. Schools in Division C went so far as to appoint a "data person" for each school who was responsible for reviewing the school division's data and was the "go to person" for the principal to access their school data. The "data person" for each school was paid an extra stipend to work alongside administrators to compare the division and school data, collaborate with teachers, and help administrators plan staff development based on identified weaknesses. Consequently, the less time teachers spend obtaining the data, the more time they have to analyze it and provide remediation to those students who are not achieving as expected. In the words of a math teacher from School C,

Time is a harsh thing to come by. To me, correct data analysis takes a whole lot of time. But when administration has gone through the effort of putting together all of your results for you, then it is a whole lot easier to have access to [the data]. We then take the prepared data sheets and look for strengths and weaknesses. When I have made a lot of highlights [of poor performance on my data sheet], I know it's not a student problem, it's an instructional problem.

Principal A reiterated this point by commenting,

A Teacher's time is valuable and the less they have to worry with the grading and reporting factor, the more time they can spend actually looking at the data and making better informed decisions based on the real data and not gut feelings.

Collaboration and reflection are the cornerstones to a successful school improvement process (Learning Point Associates, 2004). Having time to reflect on the data and develop an action plan to address weaknesses was another way administrators involved teachers and other stakeholders in the school's data-driven instructional system. When an instructional problem was identified in data team meetings, it was discussed and a solution was proposed in a collaborative manner. This collaboration and reflection time was also an attribute of the four schools' success in improving student achievement. Teachers from school A reiterated this point for their school by commenting:

What started out as more collaboration using data in math has "bled out" into other core areas. We are more united and more aware of expectations and how to get there. We rely on one another now more than ever. The process didn't happen overnight. It takes growth and nurturing to get you pointed in the right direction.

The most widely utilized practice of incorporating successful data-driven instructional systems assimilates collaboration and teamwork into the school improvement process (Blase & Blase, 2005; Boudett et al. 2005, 2007; Buhle & Blachowicz, 2008; David, 2008; Hord & Sommers, 2008; Ingram et al., 2004; Learning Point Associates, 2004; Morison, 2008; Wells, 2009). All four middle schools had implemented a collaborative approach to analyzing their data and credited this team effort as a vital component to raising student achievement.

Administrators Guide Teachers with High Expectations in the Process of Using Data to Improve Student Achievement

Accountability requirements involve a controlled top-down method of implementation while an inquiry process of the data-driven instructional process requires a bottom-up sense of empowerment among stakeholders (Light et al., 2005). Using data-based instruction to improve student achievement is also a cyclical process that requires a commitment from all stakeholders. School administrators from the four southwest Virginia middle schools approached the data-driven process in a well thought out manner and coordinated their efforts in a top-down method of implementation. This top-down leadership approach was necessary because the practice of using data to drive instruction was relatively new and stakeholders needed guidance to get it

started. Principal A reported she would not have successfully implemented data-driven instruction strategies without the guidance from the instructional coach assigned to their school by the VA Department of Education. Once the data-driven goal was set, administrators from each the four middle schools made the expectation clear of their school improving student achievement through the use of data. Not only did building level administrators commit to the goal of being data-driven educators, but central office instructional supervisors were also directly involved in the process alongside the teachers. Once the vision of data-driven instruction was implemented by administrators, the inquiry phase of the process evolved into empowering the teachers to use the data through collaboration.

Figure 7 illustrates the top-down method of implementing the data-driven instructional process and sustaining it with a bottom-up sense of empowerment. First, during the Academic Review Visits, the Virginia Department of Education identified the common weakness of the middle schools not using data effectively to meet the needs of individual students. Next, the central office set the expectation for the building administrators to address the lack of data usage by mandating a routine be established to use school data on a regular basis to monitor curriculum alignment and track student achievement. The building level administrators passed this expectation along to teachers. Principals established a clearly defined vision and set high expectations for their schools to use data to improve student achievement. They developed a method for teachers to have easy access to their data and provided training on how to analyze and disaggregate their data reports. It was then up to each school to address the academic deficiencies identified in their data. The district then provided instructional support to address the schools' identified weaknesses. As a result of this collaborative effort in acculturating their schools with the process of using data to improve student achievement, thousands of students in southwest Virginia are now reaping the benefits from the extraordinary efforts of data-driven educators.

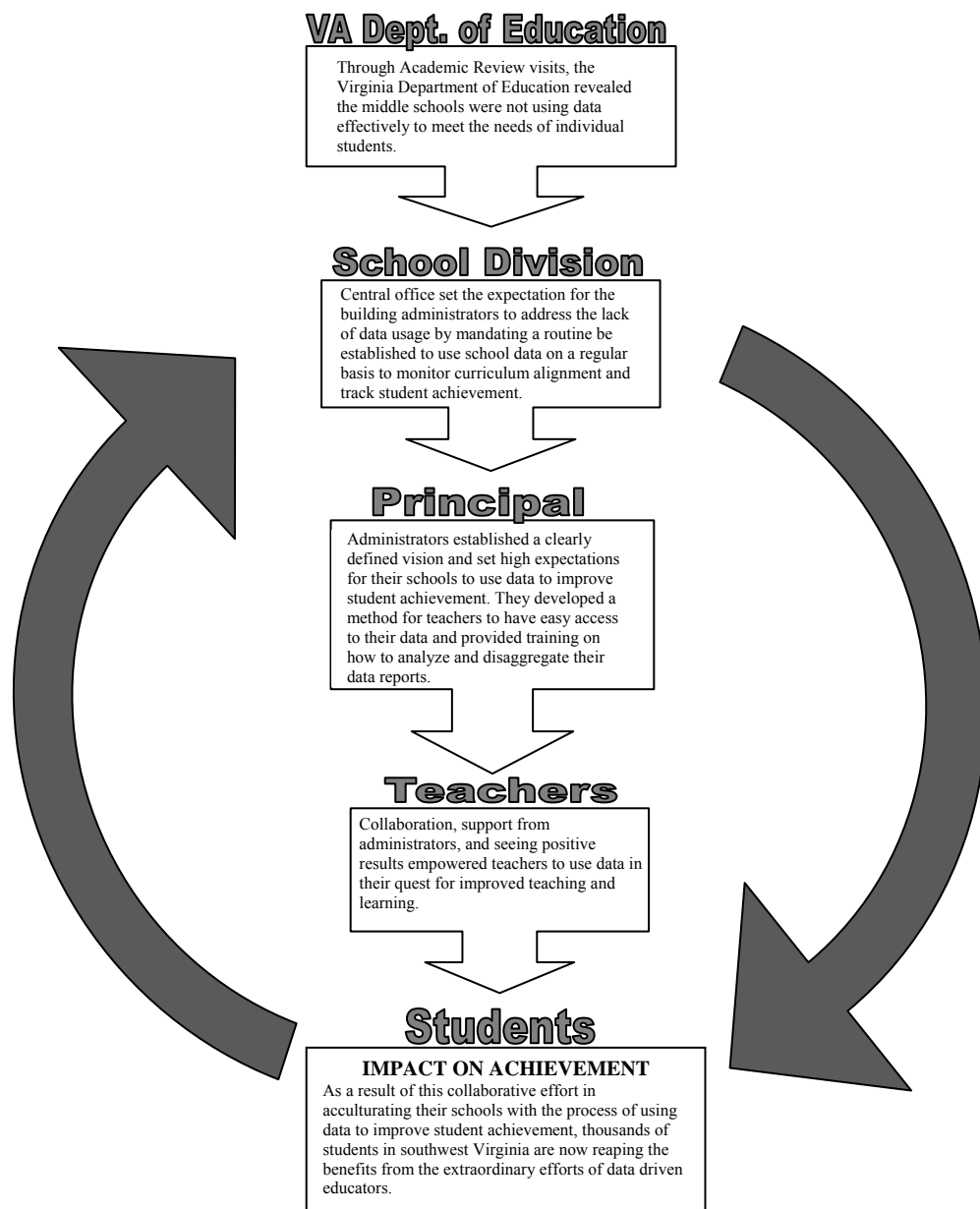


Figure 7. The top down method used to implement the data driven instructional process for school improvement.

Note: A top-down management style, embedded with collaboration, was used to implement the data-driven process and improve student achievement in a cyclical routine.

Using data-based instruction to improve student achievement is a cyclical process that requires a commitment from all stakeholders. School administrators from the four southwest Virginia middle schools approached the data-driven process in a well thought out manner and coordinated their efforts in a top-down method of implementation. Efforts were sustained with a

bottom-up sense of empowerment once stakeholders became familiar and comfortable with the data-driven instructional process.

One of the key components to building a culture of data-driven instruction in all four middle schools was to support the expectation by providing professional development and training on how to analyze the data. Because most educators are not trained in data-driven decision making and planning, it is necessary to begin with a foundation on which to build a school culture that uses data to improve instruction (Learning Point Associates, 2004). Administrators followed through with the expectation for a data-driven culture by holding teachers accountable for using their data training to impact instruction.

As a constant reminder an, “in your face” approach to data was used at each of the four middle schools with the intention of keeping the data constantly visible. The assistant principal from School B kept a desktop chart of all the students’ current achievement scores and shared it regularly with teachers as it was updated. School A created data walls to hold teachers accountable for using their data. Each student’s name and current performance level was placed on a card located on Principal A’s office wall. As soon as you walked into her office, there was the diligent reminder of how students were progressing in both math and reading. Teachers updated their data wall after each benchmark to track the progress of individual students. One teacher from school A found the Data Wall to be a more intimate approach to looking at data which forced teachers to look at their students in a different light:

Once you get kids on the wall, you begin to see patterns. It’s very evident when [students] are upon the wall. [The Data Wall] lets you know specifically which kids are in need of extra help. Every time we look at our Data Wall, we are forced to look at these specific kids who are struggling.

Additionally, the administrators from school C shared the leadership roles using data in their school. The assistant principal was the “data keeper” and the principal was the “data discussor.” The assistant principal from school C kept a thorough longitudinal data analysis spreadsheet with historical data for every student in the school. Based on the historical data collected on each student (which teachers students have had, reading levels, achievement scores since third grade, what supplemental programs students are in, etc.), the assistant principal from school C color coded the students with green-passing, yellow-progressing, and red-failing to achieve. A pre and post-discussion instrument was then used by the Principal C during faculty

meetings to collaboratively reflect on what was successful and what was not. Plans were then made to correct what was not successful.

Similarly, Instructional Supervisor D prepared a historical data spreadsheet for middle school teachers allowing them to examine student performance scores from as far back as the third grade. Teachers were asked to compare students' past achievement scores to their middle school achievement scores. Again, a color coded method was used to identify weaknesses in student achievement. After analyzing this set of data, teachers realized the content they were teaching did not match the curriculum Virginia used to assess student achievement. Once they realized the taught curriculum did not match the assessed curriculum, teachers adjusted their pacing guides accordingly. In the words of Instructional Supervisor D, *"When the data is constantly staring you in the face all the time, it's hard to ignore."* Educators from all four southwest Virginia middle schools continually used data to adapt teaching in order to meet the unique needs of individual learners.

Consequently, administrators who use data to improve student achievement should not embark on a "one size fits all" approach to the data-driven process. This was particularly evident when discussions about student data were observed to be unique in all the four middle schools. Although all four schools considered the Student Performance by Question (SPbQ) reports and benchmark data reports to be most essential to the data-driven process, the manner in which each school utilized and discussed their data varied from school to school.

For instance, School A relied heavily on their data walls to monitor individual students at-risk of failing their SOL tests. One teacher from school A described the link between data and instruction as:

Before you start implementing instructional strategies like inclusion, differentiated instruction, Marzano, etc., you need to start with the data and use that to figure out where you want to go from there. Before you decide what differentiated instruction ideas to use, you need to look at the data to decide what strategies will best fit individual student's needs.

Likewise, school B relied on the SPbQ and math pre-test data at the beginning of the school year to guide their instruction where the focus was on student engagement. Principal B describes their school culture as,

We used data to adjust instruction and implement a school culture where students are actively engaged. Central Office also set this expectation. When [Instructional

Supervisors] came to visit and collect observation data, they wanted to see students engaged. It was a school wide investment. The whole school has bought in to it and because of this all subject areas have improved, not just math.

Meanwhile, school division C focused on implementing a data-driven culture division wide. Principals were trained on the data-driven process and then asked to present it to their faculties. As Instructional Supervisor C described the division's professional development initiative on data, "*It's allowed everyone to become more data decision oriented.*" Assistant Principal C explained their data-driven school culture as a process of constant inquiry. Principals from school division C were encouraged to go back to their faculties and ask "Now what do we do with this?" Principal C had teachers use benchmark data to answer questions like:

How did each student perform? (using item analysis)

How much instructional time was spent on each item?

Which SOL [standard] did students perform poorly on?

What are we going to do to improve it?

The administrator's role in this case was not to provide the answers to these questions, but to ask teachers to collaboratively reflect on the answers. Having teachers maneuver through the inquiry process and search for the "now what" answers on their own allowed them to internalize a personal interest in finding solutions to improving student achievement. A teacher from school C reported after looking at benchmark results, teachers instinctively asked each other, "*What did you do that I didn't do? What can we all do differently?*" Working collaboratively with data should become a part of a school culture where teachers are eager to engage in reflection of the data to not just see numbers, but meaning and purpose behind the numbers (Payne & Miller, 2009).

Using the same strategy of personal inquiry as was employed in School C, Instructional Supervisor D describes the division's data-driven process as:

We are setting expectations for principals to look and analyze the data. We are not telling them necessarily what they have to look for, but they have to go look and report back on what they find and what they are going to do about it. It is up to the school to identify the weaknesses they want to work on. After asking teachers to work together and sort SPbQ data, one of the most powerful things we've discovered is not to tell teachers what to look for, but just to be there and help them look. By approaching it this way, the teachers tend to set the bar pretty high when it comes to student achievement expectations.

Administrators may be tempted to analyze data themselves and react with directives in which teachers are not vested in when they are under pressure to show improvement of student achievement (Steele & Boudett, 2007; Wells, 2009). Luckily, administrators from all four middle schools did not succumb to this temptation. Each school implemented a collaborative method to analyzing data and collectively developed a plan to improve student achievement.

Acculturating Their Schools with the Process of Using Data to Improve Student Achievement

Upon completion of the multi-site case study on four southwest Virginia middle schools, similar ideas and concepts among the schools emerged into four common themes. The four themes were established based on particular ideas or practices that kept reoccurring and had embedded themselves as a part of the school's data-driven culture.

1. Administrators established a clearly defined vision and set high expectations for their schools to use data to improve student achievement.
2. Administrators took an active role in acculturating their schools with the process of using data to improve student achievement.
3. Administrators made data easily accessible for stakeholders.
4. Administrators devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.

Administrators attributed the initiatives above as having the most impact on using data to raise student achievement. As a result, teachers from the four middle schools became more masterful at managing and analyzing the data in a collaborative manner. Teachers autonomously relied on the data which also empowered them to better plan their instruction and identify individual student strengths and weaknesses. Teachers' and administrators' trust in the data-driven process was solidified when student achievement rose and schools regained their accreditation status. When a systematic approach was used to acculturate a school with an effective data-driven instructional model, educators became more masterful at managing and analyzing the data, especially when collaboration was used to continually seek improvement of the individual child.

When schools embark on implementing a successful data-driven process, there is a progression of growth that must take place. Good educators are constantly looking for ways to improve learning and data-driven-instruction is no exception. Principals and teachers should continually reflect on the data-driven process unique to their school. It is imperative they make

adjustments based on the positive and negative experiences they have had sifting through the data to make instructional decisions. Persistence is also a key factor in the success of a data-driven school culture. Educators should research the data-driven process and collaborate with other educators on their experiences of using data as well. The data-driven process is cyclical in nature and adjustments should be made to insure better teaching and learning are taking place.

CHAPTER 5

ARTICLE 2: TWO ARTICLE DISSERTATION (TAD) - NATIONAL

Acculturating Schools to Use Data-driven Instruction for Improved Student Achievement

Note: This article was prepared for submission to the National Council of Professors of Educational Administrators (NCPEA) for consideration of publication. All submissions to the NCPEA and the *International Journal of Educational Leadership Preparation (IJELP)*, the *NCPEA Yearbook*, and *Education Leadership Review* are subjected to "Double-Blind Review" by reviewers who are professors of education administration and practitioners from the field. The manuscript submission will be delegated first to an Editor or Assistant Editor who has the experience and expertise in the specific topic area of Curriculum, Instruction, and Technology Leadership (Research Methods, Learning Theory, Curriculum, and Technology Leadership). The Editor then selects/assigns two reviewers (who also have identified expertise areas) to the manuscript. The purpose of this procedure is to make certain that an author's submission receives an appropriate review by reviewers who have a command of the subject area. If there is disagreement between the two reviews, the submission is sent to a third reviewer before a final decision is made. The author receives copies of the reviews, with no names attached, in all cases of acceptance or rejection. There is a 49% acceptance rate for articles based on the last seven issues of IJELP. Upon approval from the Dissertation Committee, the article will be submitted for consideration to the IJELP Volume 6, Number 1 (January-March 2011) online publication. The style follows the specified guidelines of the publications and is consistent with the Virginia Tech Educational Leadership Program Area requirements.

Introduction

With the modern era of high-stakes accountability, collections of school data have quickly become a fundamental component of how schools are making curriculum and instructional decisions. As public schools in America are approaching the 10-year anniversary of the 2001 Public Law 107-110, more commonly known as *No Child Left Behind* or NCLB, the appeal of using data to guide student achievement continues to intrigue school administrators (Brunner, Fasca, Heinze, Honey, Light, & Mandinach, 2005; Streifer & Schumann, 2005; Picciano, 2006; Schmoker, 2009; Wells, 2009). Yet, there is still much to learn about the process administrators use to acculturate their schools in the practice of data-driven instruction especially with the new reauthorization of *No Child Left Behind* quickly approaching. The necessity of using data to drill down and measure individual student achievement is greater than ever as the U.S. Department of Education plans to have schools prepare students to become college and career ready by 2020 as stated in the newly proposed NCLB performance targets (U. S. Department of Education, 2010). According to the anticipated NCLB reauthorization requirements, school districts must implement data-driven interventions to support those students

who are farthest behind and close the achievement gap in schools where students are not performing well.

However, the burning question remains, “How do I get there?” Schools are inundated with various forms and sources of data (Ingram, Louis, & Schroeder, 2006; Popham, 2008; Reeves, 2008). Despite the vast amounts of data available to schools, many educators still feel unequipped to analyze and use their school data effectively (Blair, 2006). They have what’s known as the DRIP (i.e., Data Rich/Information Poor) syndrome (Ronka, et.al, 2008). Some schools are even good at collecting data, but often fall short at what to do once they have the data in front of them. The reoccurring question of “now what?” often surfaces. It is the responsibility of the school administrator to step up as the instructional leader and help provide the answer to the question of “now what?” This article will take you on the journey of how four middle schools in southwest Virginia have labored to find answers to “now what?” and how they ultimately improved student achievement along the way.

The Insight Behind the Study

Since 2006, the road to improved student achievement in Virginia’s middle school math classrooms has been a bumpy ride to put it mildly. My school, along with many middle schools in Virginia, were alarmed at uncovering large achievement gaps in math that put our accreditation status in jeopardy. The reality of the crisis set in when 98 middle schools failed to maintain full state accreditation requirements from the implementation of the sixth and seventh grade math state mandated tests in 2006. Not much progress was made in 2007 when 95 schools still failed to reach state accreditation standards because of their middle school math scores. The Virginia Department of Education responded to this crisis by sending Academic Review teams into the struggling middle schools across the Commonwealth to examine the culture of the schools, how they were aligning their curriculum and using data to improve student achievement. Schools were asked to develop new school improvement plans to address the identified weaknesses in crucial areas and data had to be the leading force behind their efforts. As a result of this intervention, the number of middle schools regaining their full accreditation status significantly increased over the next three years.

My experience as the building principal in one of these struggling middle schools was extremely challenging, as it took my school longer than most middle schools in

Virginia to regain our full accreditation status. It wasn't until we implemented systematic approach to using data to improve student achievement that we began to see positive results. Knowing that data was important in the school improvement process, it was not the forefront of our efforts until the 2009-2010 school year. As I researched the process of implementing data-driven instruction through Bernhardt (2004, 2005), Blink (2007), Boudett & Steele (2007), Creighton (2007), Light et al. (2007), Schmoker (2008-09), and many others, I began to realize how important data could be to improving student achievement at our school. The data-driven instructional process combined with the collaborative concepts of Dufour (2008) and Hord & Sommers (2008) were the cornerstone to building a data-driven culture at my school. Visiting other southwest Virginia middle schools and collaborating with other educational leaders who had been where we were and implemented successful data-driven instructional systems allowed me to obtain first-hand knowledge about the process and begin to answer the "now what?" question when it came to using data to improve student achievement.

In the face of adversity, students benefit when educators can collaborate and share their experiences with one another. The leading forces behind the success of my school's significant gains in student achievement were a direct result of all the collaboration efforts that took place. The Virginia Department of Education's support in providing Instructional Coaches combined with support from instructional supervisors, teachers' positive attitudes toward using data, and advice from four southwest Virginia school divisions all played a major role in the significant gains we accomplished in raising student achievement.

The Journey to Better Teaching and Learning Begins

The four southwest Virginia middle schools portrayed in this multi-site case study were very successful and regained their accreditation status within 2 years of identifying weakness in math instruction, as indicated in the data. Eleven administrators and eight teachers were all very eager to share their experiences using school data with me. In my quest to find a successful way to implement a data-driven instructional model for my school, three research questions guided the multi-site case study:

1. What types of data do administrators consider essential to the success of their data-driven instructional programs?

2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?
3. How are administrators guiding teachers to use data to improve student achievement?

Phone interviews with division level instructional supervisors, on-site visits, face-to-face interviews with principals and teachers, along with collections of artifacts led to discovering how the four middle schools were building and sustaining successful data-driven instructional systems to improve student achievement.

The Four Key Elements Found on the Journey to Acculturating Schools with Using Data-driven Instruction for Improved Student Achievement

The four elements were thematically established based on particular ideas or practices that kept reoccurring as a part of each school's data-driven culture.

1. Administrators established clearly defined goals and set high expectations for their schools to use data to improve student achievement.
2. Administrators took an active role in acculturating their schools with the process of using data to improve student achievement.
3. Administrators made data easily accessible for stakeholders.
4. Administrators devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.

The four common themes emerged from this study should become the standard practice administrators use when establishing a data-driven culture in their school. Establishing and providing leadership direction to data teams, modeling effective data use, scheduling time for collaborative data-driven conversation, and connecting data analysis to an action plan will create a data-driven school culture (Learning Point Associates, 2004).

Element 1: Administrators Established Clearly Defined Goals and Set High Expectations for Their Schools to Use Data to Improve Student Achievement.

It is necessary for principals and teachers to analyze student data that will help them reach school goals and raise student achievement (Bernhardt, 2004; Blink, 2007; Del Favero, 2009; Learning Point Associates, 2004; Morrison, 2008; Picciano, 2006; Schmoker, 2006; Steele & Boudett, 2008). When central office administrators and building principals realized data was going to be an integral part of their school improvement process, they made it a high

priority. The administrators from each the four middle schools made clear their expectation of their school improving student achievement through the use of data. Not only did building level administrators commit to the goal of being data-driven educators, but central office instructional supervisors were also directly involved in the process alongside the teachers.

A top-down management style, embedded with collaboration, was used to implement the data-driven process in the four middle schools. First, Academic Review Visits, conducted by the VA Department of Education, identified a common weakness in all four middle schools where they were not using data effectively to meet the needs of individual students. Next, central office set the expectation for the building administrators to address the lack of data usage by mandating a routine be established to use school data on a regular basis to monitor curriculum alignment and track student achievement. The building level administrators passed this expectation along to the teachers and developed a method for teachers to have easy access to their data and provided training on how to analyze and disaggregate their data reports. It was then up to each school to address their weaknesses identified in their data. The district then provided instructional support to address the schools' identified weaknesses. As a result of this top-down management style, embedded with collaboration, administrators were successful in acculturating their schools with the process of using data to improve student achievement. Thousands of students in southwest Virginia are now reaping the benefits from the extraordinary efforts.

One of the key components to building a culture of data-driven instruction in all four middle schools was to support the expectation by providing professional development and training on how to analyze the data. Because most educators are not trained in data-driven decision making and planning, it is necessary to begin with a foundation on which to build a school culture that uses data to improve instruction (Learning Point Associates, 2004). Administrators followed through with the expectation for a data-driven culture by holding teachers accountable for using their data training to impact instruction for students. In the words of Instructional Supervisor D, *“When the data is constantly staring you in the face all the time, it’s hard to ignore.”* As a result, educators from the four middle schools continually used data to adapt teaching in order to meet the unique needs of individual learners.

A constant reminder, “in your face” approach to data was used at each of the four middle schools with the intention of keeping the data very visible. The assistant principal from School B kept a desktop chart of all the students' current achievement scores and shared it regularly with teachers as it was updated. While School A used data walls to hold teachers accountable for

using their data. Each student's name and current performance level was placed on a card located on Principal A's office wall. As soon as you walked into her office, there was the persistent reminder of how students were progressing in both math and reading.

Just as Bernhardt (2004) suggests, school districts who explore the topic of data-driven professional development will reap the benefits of their inquiries. That is exactly what happened in the four southwest Virginia middle schools in this study once they realized their state accreditation status was jeopardized by declining math SOL scores. The expectation was set and plans were implemented to use data to plan instruction and monitor student achievement closely through the data collections. As a result, each of the four middle schools created a system for continuous school improvement using data-driven decision making.

Element 2: Administrators Took an Active Role in Acculturating Their Schools With the Process of Using Data to Improve Student Achievement.

The principal's role as an instructional leader is the cornerstone to promoting and successfully using data based decision making in schools (Creighton, 2001; Payne & Miller, 2009). Being active participants in the data-driven process is essential to the role administrators' play in acculturating their school with using data to improve student achievement. District Instructional Supervisors as well as building level administrators at all four middle schools were instrumental in the early stages of establishing the data-driven culture in the schools. Administrators from both the district level and building level were active participants in the data training, data analysis process, and data team meetings to formulate instructional plans. Actively participating in the data-driven process coincides with what the 2008 Hirsh and Hord research suggests about how school principals should establish themselves as strong instructional leaders where they have the opportunity to become an engaged learner and not just a facilitator of the data-driven process.

Administrators may be tempted to analyze data themselves and react with directives in which teachers are not vested in when they are under pressure to show improvement of student achievement (Boudett & Steele, 2007; Wells, 2009). Using the same strategy of personal inquiry, Instructional Supervisor D describes their division's data-driven process as:

We are setting expectations for principals to look and analyze the data. We are not telling them necessarily what they have to look for, but they have to go look and report back on what they find and what they are going to do about it. After asking teachers to work

together and sort data, one of the most powerful things we've discovered is not to tell teachers what to look for, but just to be there and help them look. By approaching it this way, the teachers tend to set the bar pretty high when it comes to student achievement expectations.

Luckily, administrators from all four middle schools did not succumb to the temptation of reacting to the data as a directive. Instead, each school implemented a collaborative method to analyzing data and collectively developed a plan to improve student achievement. Through collaborative efforts practitioners were able to identify defects in the educational process. Administrators played an essential part in forcing conversations that at times were uncomfortable, but ultimately beneficial to improving student achievement. The forced reflection about school data is what ultimately brought about change.

Recognizing the importance of effectively using data to guide instruction is a major way principals can impact student learning (Schmoker, 2006). Administrative leaders in the four middle schools changed the culture to be more data-driven which increased student achievement on the Virginia's NCLB performance mandates. Since the implementation of their data-driven instructional systems, all four middle schools have sustained success by maintaining full accreditation status from the Commonwealth of Virginia.

Element 3: Administrators Made Data Easily Accessible for Stakeholders

Bernhardt (2005) suggests schools utilize two areas of data-driven decision making – school data and classroom data. Administrators in all four middle schools provided a method of obtaining school data which was easily accessible at both the school and classroom level. All four school divisions had implemented a benchmark system to monitor and collect student achievement data on a nine weeks basis. The purpose of benchmark testing was to monitor and collect student performance data to identify weaknesses in the curriculum and student achievement. With the collection of additional benchmark data, administrators recognized the need to make the benchmark data easily accessible for teachers or else the data would not be used wisely.

Ingram et al. (2004) discovered teachers often experience frustration when they feel their valuable time is used up collecting data and interfering with their teaching. This was not the case with the four middle schools in the multi-site case study because administrators designed a systematic way to easily obtain student performance data and discuss it in a collaborative

manner. Teachers participating in the multi-site case study appreciated the support administrators were able to provide them as their principals and instructional supervisors guided them through the process of data-driven instruction. Consequently, the less time teachers spent obtaining the data, the more time they had to analyze it and provide remediation to those students who are not achieving as expected. In the words of a math teacher from School C,

Time is a harsh thing to come by. To me, correct data analysis takes a whole lot of time. But when administration has gone through the effort of putting together all of your results for you, then it is a whole lot easier to have access to [the data]. We then take the prepared benchmark data sheets and look for strengths and weaknesses. When I have made a lot of highlights [of poor performance on my data sheet], I know it's not a student problem, it's an instructional problem.

The more involved administrators were in the data-driven process, the more teachers were empowered to use data to improve instruction to meet the needs of individual students. As a result, the data became more powerful as well.

Organization and technology play a key role in a successful data-driven instructional system (Bernhardt, 2005; Biswas & Ghosh, 2007; Booher-Jennings, 2005; Brown, 2006; Creighton, 2007; Striefer & Shumann, 2005). Although each school division used different benchmark software, all benchmark data were easily accessible and presented in a disaggregated format, saving valuable time for all teachers and administrators. Streifer & Schumann (2005) describe data mining as the search for patterns, information, trends, and knowledge adding to one's understanding of students' academic strengths and/or weaknesses. Teachers from the southwest Virginia middle schools valued how their school administrators invested in technology that disaggregated the data for them providing enough time to analyze data and collaboratively plan for improvement to their instruction.

Element 4: Administrators Devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.

The most widely utilized practice of incorporating successful data-driven instructional systems assimilates collaboration and teamwork into the school improvement process (Boudett et al. 2005,2007; Buhle & Blachowicz, 2008; David, 2008; Hord & Sommers, 2008; Ingram et al., 2004; Learning Point Associates, 2004; Morison, 2008; Wells, 2009). Administrators from all four middle schools utilized this practice by providing time at the beginning of each school year

to collaboratively analyze school data. Instructional data from the previous school year as well as achievement data from the teachers' new classes of students were instrumental in planning instruction for the upcoming school year. Teachers could also identify students in need of individual targeted assistance from day one rather than wasting time for teachers to get to know their new students several weeks into the new school year.

Talking with teachers about instruction was the key to effective data-driven instructional leadership. Principals from three of the four middle schools scheduled time on a regular basis for teachers and administrators to collaboratively talk about their data in departmental meetings. Principals were active participants in these discussions. A math teacher from school C found collaboration had an impact on his school's instruction by stating:

Looking at the data in a collaborative manner allows you to 'cut to the chase' and provides teachers the opportunity to teach what students really need to know. We talk all the time, even outside of our departmental meetings to share ideas and find out what's really working.

In the words of Morrison (2008, p. 16), "When it comes to data, if teachers aren't talking about their data discoveries, no discoveries are happening" As the year progressed, teachers and administrators discovered the benchmark tests became the best way to monitor student achievement. The most recent benchmark data soon took precedence over previous years' scores as the decision making tool for instruction.

Collaboration at the middle school level is crucial to the development and success of young adolescents. Jackson's and Davis's (2000) research on the educating adolescents in the 21st Century focuses on data-based inquiry and teacher collaboration as the key to improved student learning. Their theory was apparent in this multi-site case study as well. Principals cultivated data-based inquiries by making the data very visible to teachers through the use of data walls, color-coded data reports, and data notebooks. These items were used in routine data team meetings where teachers looked at the visibly appealing data and discussed student progress toward curriculum goals. Teachers from School A updated their data wall after each benchmark to track the progress of individual students. Student progress as indicated on the data wall was discussed with the principal on a regular basis. One teacher from School A found the Data Wall to be a more intimate approach to looking at data which forced teachers to look at their students in a different light:

Once you get kids on the wall, you begin to see patterns. It's very evident when [students] are upon the wall. [The Data Wall] lets you know specifically which kids are in need of extra help. Every time we look at our Data Wall, we are forced to look at these specific kids who are struggling.

Collaboration and reflection time was also credited with the four schools success in improving student achievement. Teachers from School A reiterated the point for their school by commenting:

What started out as more collaboration using data in math has “bled out” into other core areas. We are more united and more aware of expectations and how to get there. We rely on one another now more than ever. The process didn't happen overnight. It takes growth and nurturing to get you pointed in the right direction.

Administrators credited the high levels of collaboration and regular reflection on student and school data as a vital component to the school improvement process.

The Journey of Data Exploration Takes Commitment and Should be Implemented as a Cyclical Process

In my quest to find a successful way to implement a data-driven instructional model for my school, conducting this multi-site case study provided me with a foundation to acculturate my school with the data-driven instruction process. The collaborative journey was worthwhile and very rewarding as we regained our accreditation status and met all NCLB requirements for the first time in three years. As the “now what” questions were answered, it took commitment from all stakeholders as we trekked through our school data. The journey was well worth it as student achievement significantly improved as a result of implementing a data-driven culture at our school. However, the journey is not over as we are continuing our commitment to improve teaching and learning through the use of data-driven instruction.

It is the administrator's responsibility to make sure stakeholders are committed to the process of using data to make informed instructional decisions. Administrators must insure teachers have a vested interest and are empowered to use data to improve instruction and meet the needs of individual students. Ultimately, teachers' devotion to data exploration will lead to better teaching and learning which in turn, will lead to increased student achievement.

When schools embark on implementing a successful data-driven process, there is a progression of growth that must take place. Good educators are constantly looking for ways to

improve learning and data-driven-instruction is no exception. Principals and teachers should continually reflect on the data-driven process unique to their school. It is imperative they make adjustments based on the positive and negative experiences they have had sifting through the data to make instructional decisions. Persistence is also a key factor in the success of a data-driven school culture. Educators should research the data-driven process and collaborate with other educators on their experiences of using data as well. The data-driven process is cyclical in nature and adjustments should be made continuously to insure better teaching and learning are taking place.

CHAPTER 6

DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study is to investigate ways in which principals build and sustain successful data-driven instructional systems within their schools to improve student achievement. The study was guided by the following research questions: 1) What types of data do administrators consider essential to the success of their data-driven instructional programs? 2) How do administrators involve teachers and other stakeholders in the school's data-driven instructional system? 3) How are administrators guiding teachers to use data to improve student achievement?

A qualitative multi-case study approach was applied in four southwest Virginia middle schools. Eleven administrators shared their leadership and management method in establishing data-driven instructional systems. Eight teachers shared their experience with the school improvement processes and how they evolved into better educators by implementing effective data-driven instructional models. This research utilized a triangulation approach with structured interviews, on-site visits, and document reviews from instructional supervisors, middle school principals, and teachers. Common themes and patterns were identified as essential components principals used to implement data-driven instructional systems within their schools leading to improved student achievement. This chapter begins with a discussion of the conclusions drawn from the common themes and patterns which emerged from the multi-site case study. Following this discussion, implications and recommendations for practitioners are described, and recommendations for future research are shared.

Discussion of Findings

The objective of this research was to provide administrators with a template or model to use when they have a vast amount of data in front of them and need to implement a data-driven instructional program to improve student achievement. Despite the vast amounts of data available to schools, many educators feel unequipped to analyze and use their school data effectively (Blair, 2006). Some schools are good at collecting data, but often fall short at what to do once they have the data in front of them. Based on the results of the multi-site case study conducted, using data to drive instruction does not have a “one-size-fits-all” solution. When the decision is made to acculturate a school into becoming “data-driven” there appear to be aspects of the process that should be standard practice and other aspects that need to be unique to the

school and its individual needs. The triangulation process applied in this study provided the researcher with multiple sources of information taken from various viewpoints leading to the research results (Merriam, 1998; Picciano, 2006; Richards, 2005). Triangulating the sources of information from each of the selected middle schools, combined with the viewpoints of administrators and teachers, brought forth four common themes within each of the middle schools. The analysis of the qualitative data collected revealed four themes:

1. Administrators established a clearly defined vision and set high expectations for their schools to use data to improve student achievement.
2. Administrators took an active role in acculturating their schools with the process of using data to improve student achievement.
3. Administrators made data easily accessible for stakeholders.
4. Administrators devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.

The four common themes emerged from this study should become the standard practice administrators use when establishing a data-driven culture in their school. The four themes derived from this study directly paralleled the 2004 study conducted by Learning Point Associates. Establishing and providing leadership direction to data teams, modeling effective data use, scheduling time for collaborative data-driven conversation, and connecting data analysis to an action plan will create a data-driven school culture (Learning Point Associates, 2004).

Administrators established a clearly defined vision and set high expectations for their schools to use data to improve student achievement.

It is necessary for principals and teachers to analyze student data that will help them reach school goals and raise student achievement (Bernhardt, 2004; Blink, 2007; Del Favero, 2009; Learning Point Associates, 2004; Morrison, 2008; Picciano, 2006; Schmoker, 2006; Steele & Boudett; 2008). When central office administrators and building principals realized data was going to have to be an integral part of their school improvement process, they made it a high priority. Teacher preparation and in-service is crucial to the success of data-driven instructional systems (Bernhardt 2004; Bernhardt 2005; Blink, 2007; Creighton, 2007; Murnane et al., 2005; Streifer & Shumann, 2005). Administrators from all four schools collaborated within their own school division to provide professional development training and establish a data collection

process that was easy to use. Just as Bernhardt (2004) suggests, school districts who explore the topic of data-driven professional development will reap the benefits of their inquiries. That is exactly what happened in the four southwest Virginia middle schools in this study once they realized their state accreditation status was jeopardized by declining math SOL scores. The expectation was set, a vision was created, and plans were implemented to use data to plan instruction and monitor student achievement closely through the data collections. As a result, each of the four middle schools created a system for continuous school improvement using data-driven decision making.

Administrators took an active role in acculturating their schools with the process of using data to improve student achievement.

The principal's role as an instructional leader is the cornerstone to promoting and successfully using data based decision making in schools (Creighton, 2001; Payne & Miller, 2009). Being active participants in the data-driven process is essential to the role administrators' play in acculturating their school with using data to improve student achievement. District instructional supervisors as well as building level administrators at all four middle schools were instrumental in the early stages of establishing the data-driven culture in the schools. Administrators from both the district level and building level were active participants in the data training, data analysis process, and data team meetings to formulate instructional plans. Actively participating in the data-driven process coincides with what Hirsh and Hord (2008) research suggests about how school principals should establish themselves as strong instructional leaders where they have the opportunity to become an engaged learner and not just a facilitator of the data-driven process.

Teachers also appreciated the support administrators were able to provide them as the principals and instructional supervisors guided them through the process of data-driven instruction. The more involved administrators were in the data-driven process, the more teachers were empowered to use data to improve instruction to meet the needs of individual students. As a result, the data became more powerful as well.

Recognizing the importance of effectively using data to guide instruction is a major way principals can impact student learning (Schmoker, 2006). Administrative leaders in the four middle schools changed the culture to be more data-driven which increased student achievement on the Commonwealth's Standards of Learning tests. The success of the middle schools has been

sustained since the implementation of their data-driven instructional systems. All four middle schools have maintained their full accreditation status from the Commonwealth of Virginia.

Administrators made data easily accessible for stakeholders

Bernhardt (2005) suggests schools utilize two areas of data-driven decision making – school data and classroom data. Administrators in all four middle schools provided a method of obtaining school data which was easily accessible at both the school and classroom level. All four school divisions had implemented a benchmark system to monitor and collect student achievement data on a nine weeks basis. The purpose of benchmark testing was to monitor and collect student performance data to identify weaknesses in the curriculum and student achievement. Ingram et al. (2004) discovered teachers often experience frustration when they feel their valuable time is used up collecting data and interfering with their teaching. This was not the case with schools in this study because administrators designed a systematic way to easily obtain the data and discuss it in a collaborative manner.

Organization and technology play a key role in a successful data-driven instructional system (Bernhardt, 2005; Biswas & Ghosh, 2007; Booher-Jennings, 2005; Brown, 2006; Creighton, 2007; Striefer & Shumann, 2005). Although each school division used different benchmark software, all benchmark data were easily accessible and presented in a disaggregated format, saving valuable time for all teachers and administrators. Streifer and Schumann (2005) describe data mining as the search for patterns, information, trends, and knowledge adding to one's understanding of students' academic strengths and/or weaknesses. It is essential for school administrators to provide teachers with a timely effective way to mine their data. Blink (2007) maintains it is imperative school districts equip teachers with the necessary tools and time to analyze and reflect upon the collected data. Principals in all four middle schools believed in these practices. Teachers were also given enough time to collect and analyze data to plan for improvement to their instruction as the research indicated.

Administrators devoted time on a regular basis to collaboratively analyze data and formulate a plan to increase student achievement.

The most widely utilized practice of incorporating successful data-driven instructional systems assimilates collaboration and teamwork into the school improvement process (Boudett et al. 2005, 2007; Buhle & Blachowicz, 2008; David, 2008; Hord & Sommers, 2008; Ingram et al., 2004; Learning Point Associates, 2004; Morison, 2008; Wells, 2009). Administrators from all

four middle schools utilized collaboration and teamwork effectively by providing time at the beginning of each school year to collaboratively analyze school data. Instructional data from the previous school year as well as achievement data from the teachers' new classes of students were instrumental in planning instruction for the upcoming school year. Teachers could also identify students in need of individual targeted assistance from day one rather than wasting time for teachers to get to know their new students several weeks into the new school year.

As reported in the research conducted by Blase and Blase (1999) on teachers' perspectives of their principal's role as in instructional leader, talking with teachers about instruction was the key to effective instructional leadership. Principals from three of the four middle schools scheduled time on a regular basis for teachers and administrators to collaboratively talk about their data in departmental meetings. Principals were active participants in these discussions. In the words of Morrison (2008, p. 16), "When it comes to data, if teachers aren't talking about their data discoveries, no discoveries are happening." Through collaborative efforts practitioners were able to identify defects in the educational process. Administrators played an essential part in forcing conversations that at times were uncomfortable, but ultimately beneficial to improving student achievement. The forced reflection about school data is what ultimately brought about change.

Collaboration at the middle school level is crucial to the development and success of young adolescents. The Jackson and Davis research (2000) on the educating adolescents in the 21st Century focuses on data-based inquiry and teacher collaboration as the key to improved student learning. Their theory was apparent in this multi-site case study as well. Principals cultivated data-based inquiries by making the data very visible to teachers through the use of data walls, color-coded data reports, and data notebooks. These items were used in routine data team meetings where teachers looked at the visibly appealing data and discussed student progress toward curriculum goals. Administrators credited the high levels of collaboration and regular reflection on student and school data as a vital component to their school improvement process.

Commentary

Each of the four themes became increasingly evident with each school visit and interview conducted throughout the multi-site case study. The following data-driven practices observed

among the four southwest Virginia middle schools were supported in the literature review from leading researchers on the use of data to improve student achievement (see Appendix A):

- The principal's role as instructional leader in the data-driven process is more important than ever with the modern era of high stakes accountability testing as required by NCLB.
- There are great benefits to principals empowering teachers to use data and improve student achievement.
- Training and professional development are crucial to a successful data-driven instructional system.
- Collaboration of stakeholders is essential to a successful data-driven instructional system.

The implementation of a data-driven instructional process in the four middle schools selected for this multi-site case study has positively impacted student success on Virginia's Standards of Learning. The data-driven practices have helped sustain the level of full accreditation for the four southwest Virginia middle schools over the past three years.

Conclusion

Administrators who use data to improve student achievement should not embark on a "one size fits all" approach to the data-driven process. However, there do seem to be recurrent themes that reflect features for a principal to consider when implementing a data-driven culture in a school. *First*, administrators should make sure all stakeholders are involved with the data-driven process. *Second*, administrators should provide support and be actively involved in the process of using data to make informed instructional decisions. *Third*, administrators need to develop a method of collecting and analyzing student data in a quick and easy manner. *Fourth*, administrators should provide teachers time to work collaboratively on analyzing data and formulating a plan to address weaknesses identified in the data. *Finally*, using data-based instruction to improve student achievement is a cyclical process that requires a commitment from all stakeholders. School administrators from the four southwest Virginia middle schools approached the data-driven process in a well thought out manner and coordinated their efforts in a top-down method of implementation while sustaining their efforts with a bottom-up sense of empowerment.

Accountability requirements involve a controlled top-down method of implementation while an inquiry process of the data-driven instructional process requires a bottom-up sense of empowerment among stakeholders (Light et al., 2005). Using data to improve student achievement is now a necessity to comply with the mandates of *No Child Left Behind* (2001). Teachers in this multi-site case study had little to no experience taking the approach of designing instruction for their students and much less experience using data to drill down to individual student's needs. Efforts to acculturate the schools into becoming data-driven would not have been made if it had not been for the vision set forth by school administrators. However, once teachers were empowered and able to experience firsthand the power data can have on student achievement, they were eager to lend their support behind the effort of using data in the school improvement process. As a result, administrators had a positive impact on the rise in student achievement by acculturating their schools to use data-driven instruction.

Implications and Recommendations

The purpose of this multi-site case study was to investigate ways in which principals build and sustain successful data-driven instructional systems within their schools to improve student achievement. The following implications and recommendations for practice may be valuable to schools or school divisions who are interested in establishing or enhancing the data-driven culture in their schools. The triangulation method used in this multi-site case study provided information the researcher sought on the step-by-step procedures of using data to improve student achievement. Based on the findings of this multi-site case study, the researcher recommends administrators follow these 10 steps when attempting to acculturate their school or school division with data-driven instruction process:

1. *Involve all Stakeholders with the Goal of Becoming a Data-Driven School.*

Administrators should be very vocal with their expectations of where the school, or school division, is heading with the data-driven process. The common goal of making instructional decisions based on data should be made clear from the beginning. Stakeholders should make a solid commitment to implementing a data-driven instructional within their schools.

2. *Decide on the Routine Procedures Stakeholders Will Use in the Data-Driven Process.* Administrators need to make sure to use more than end of the year performance data in their data-driven process. Schools need to use more than one source of data to make decisions. For example, 9-weeks benchmark testing cycle provides current achievement data on students as

the school year progresses. Reading inventory, math skills, and tutoring data can also be used to make informed instructional decisions. When deciding routine procedures, administrators also need to determine how often data will be collected and adhere to this timeline.

3. *Select a Data Warehouse and Data Mining Method that is User-Friendly and Not Time-Consuming for Teachers.* Administrators need to choose a data management program that holds vast amounts of historical data on students. More often this type of decision needs to be made at the division level due to the cost involved. The program needs to be able to link classroom data with school data. The data warehouse must be capable of providing disaggregated data in a timely manner so educators can look for patterns among student subgroups and analyze longitudinal data. Being able to have easy access to the data mining process will allow teachers more time to focus on making sound instructional decisions based on data rather than gut-feelings.

4. *Provide Professional Development Training on the Process of Data-Driven Instruction.* It is important how administrators present the process teachers will use to obtain, analyze and make decisions using data. Training must be provided on how to access, examine, and evaluate the data once administrators determine which data will be used in their school or school division. Teachers need to be trained with real data that is applicable to their subject matter. As soon as training has been provided, administrators need to provide follow-up support for teachers to avoid frustration and apprehension about the data-driven process.

5. *Use the Data-Driven Process to Identify Learning Goals at the Beginning of a New School Year.* Student achievement data has a dual purpose when starting a new school year. First, administrators must provide teachers with historical data to make curriculum instruction decisions as well as individual student achievement decisions. Teachers must identify trends and patterns to support a connection of curriculum alignment to student performance. Both school and classroom data must be used to make these determinations. If weaknesses are identified in either place, adjustments to instruction must be made. Second, teachers must use student performance data to identify individual student's strengths and weaknesses as well. It used to take teachers several weeks to get to know their new students' limitations when embarking on a new school year. Now that schools are provided with substantial amounts of historical data on individual students, teachers can decipher where their students stand academically and provide immediate support and intervention to struggling students from the beginning.

6. *Devote Time on a Regular Basis to Collaboratively Discuss School Data with Stakeholders.* Holding data team meetings on a regular basis is the best way to insure teachers are talking about data and making discoveries about student achievement. As the instructional leader of the school, the principal must be an active participant in the data team meetings. It is important for the principal to not tell teachers what to look for in the data, but to merely guide them through the process of self-discovery. Teachers will be more apt to take a personal interest in data decision making when they take ownership in the process and are collaboratively making sound instructional decisions based on the data. Students should not be left out of the discussion about their own data either. Students must also be provided time to reflect on their own academic progress and set personal learning goals toward improvement. It is important to the success of the data-driven process for all stakeholders to work collaboratively towards improving student achievement.

7. *Make Data Visible, Tangible, and Easily Accessible.* When establishing a data-driven culture, schools need to devote an area or space to display school data. Visibility of school data will provide a constant reminder of goals and where the school is in the process of obtaining those goals. Data rooms, data walls and data boards are effective ways to visibly observe trends and patterns evident in school data. As teachers and administrators collaboratively sift through data, a tangible method of handling the data should be developed. The method should incorporate a way in which data can be physically manipulated by teachers. For example, when data boards are utilized teachers must be the ones who physically update achievement scores and place them in the appropriate category. Students should be identified and provided targeted assistance based on their progress towards curriculum goals.

8. *Once Students' Individual Strengths and Weaknesses are Identified, Plans for Intervention Can Be Implemented.* Once school data has been analyzed the answer to “now what?” can be answered. Having teachers maneuver through the data themselves and search for the “now what” answers in a collaborative manner allows teachers to devote a personal interest in finding solutions to improving student achievement. It is imperative for educators to use school data and not “gut feelings” to determine a focal point for intervention. In a successful data-driven culture teachers tailor their instruction to meet the unique needs of individual students. Together administrators and teachers can decide from data if intervention and remediation efforts are having an impact on improving student achievement.

9. *Make a Commitment to Seeing the Data-Driven Process Through.* It is the administrator's responsibility to make sure stakeholders are committed to the process of using data to make informed instructional decisions. Administrators must insure teachers have a vested interest in the data-driven process. Ultimately, teachers' devotion to data exploration will lead to better teaching and learning which in turn, will lead to increased student achievement.

10. *Start the Data-Driven Process Over Again Making Adjustments with Lessons Learned.* When schools embark on implementing a successful data-driven process, there is a progression of growth that must take place. Good educators are constantly looking for ways to improve learning and data-driven-instruction is no exception. Principals and teachers should continually reflect on the data-driven process unique to their school. It is imperative they make adjustments based on the positive and negative experiences they have had sifting through the data to make instructional decisions. Persistence is also a key factor in the success of a data-driven school culture. Educators should research the data-driven process and collaborate with other educators on their experiences of using data as well. The data-driven process is cyclical in nature and adjustments should be made to insure better teaching and learning are taking place.

Implications for University Principal Preparation Programs

The implications of data-driven research are vastly important to principal preparation programs across the United States as future administrators will be responsible for implementing individual growth plans to track student achievement. The appeal of using data to guide student achievement continues to intrigue school administrators (Brunner, Fasca, Heinze, Honey, Light, & Mandinach, 2005; Picciano, 2006; Schmoker, 2009; Wells, 2009; Streifer & Schumann, 2005). As public schools in America are approaching the 10-year anniversary of the 2001 NCLB law along with the new reauthorization of *NCLB* on the horizon, the necessity of using data to drill down and measure individual student achievement is greater than ever. The newly proposed NCLB performance targets are based on whole-school and subgroup growth in achievement. Additional focus on graduation rates guide improvement toward the goal of having all students graduating or on track to graduate from high school ready for college and a career by 2020. According to the proposed NCLB reauthorization, school districts will be required to implement data-driven interventions to support those students who are farthest behind and close the achievement gap in schools where students are not performing well. As a result, principal preparation programs across the United States will need to incorporate basic data analysis

techniques into their curricula to equip future administrators with the necessary data analysis skills to implement or sustain data driven instruction in their schools. Current educational programs have shifted focus to prepare principals for instructional leadership roles, but additional concentration needs to be placed how to look at a given set of data and diagnose instructional weaknesses. Del Favero (2009) also believes the training of future administrators should include learning the process of data analysis to focus on the school improvement process. There is not a substantive attempt to increase teachers' and administrators' understanding of data analysis or the use of analysis to improve real teaching and learning in principal preparation programs (Creighton, 2007). As a result of the triangulated findings in this multi-site case study, the researcher recommends principal preparation programs utilize practitioners from the field to prepare future administrators in the process of using data to improve teaching and learning. Practitioners are an important resource for future administrators to use when learning how to acculturate schools into using data-driven instruction to improve student achievement.

Recommendations for Future Research

With almost a decade of experience implementing Federal NCLB mandates, administrators know by now that data can be a powerful tool within their school. The four southwest Virginia middle schools portrayed in this multi-site case study recognized just how powerful data can be when they regained their accreditation status within 2 years of implementing a data-driven instructional process in their schools. Administrators took a systematic approach to acculturating their schools with the practices of data-driven instruction. However, there are additional aspects of the data-driven process that still needs investigating.

The next step in the exploring the process of data-driven instruction comes with the following recommendations for future research:

- Expand the study to include high performing middle schools.
- Investigate how high schools are using data-driven procedures to monitor drop-out rates.
- Examine how special education classes are using data to monitor student achievement of IEP goals and objectives.
- Explore the various ways schools are displaying their data to find out which method is most user-friendly and easy to read.
- Expand the research study to include middle schools outside of Virginia.

These issues are worthy of additional consideration for future research. Exploring these concerns would directly benefit educators and enhance research on the prominent topic of using data-driven instruction to improve student achievement. According to the anticipated NCLB reauthorization requirements, school districts must implement data-driven interventions to support those students who are farthest behind and close the achievement gap in schools where students are not performing well (U. S. Department of Education, 2010). To clearly reach those students who fall the farthest behind administrators are going to have to look beyond the obvious and lead from below the surface (Creighton, 2005). School divisions across the United States will have to look not only at surface data in overall proficiency, but also below the surface where the progression of individual student growth must be demonstrated as well. Acculturating schools with the data-driven process will ultimately improve teaching and learning and guide educators to meet the needs of individual students.

REFERENCES

- Aspen Institute, Washington, D. C. (2007). *Beyond NCLB: Fulfilling the promise to our nation's children*: Aspen Institute, The.
- Bernhardt, V. (2004). *Data analysis for continuous school improvement*. Larchmont, NY: Eye on Education.
- Bernhardt, V. (2005). Data tools for school improvement. *Educational Leadership*, 62(5), 66-69. Retrieved April 25, 2009 from <http://web.ebscohost.com.ezproxy.lib.vt.edu:8080/ehost/pdf?vid=23&hid=115&sid=5a1b26a-302e-4c37-b142-9d866e0f46e4%40sessionmgr104#db=ehh&AN=15969572>
- Berube, W., Gaston J., & Stephans J. (2004). The role of a principal in teacher professional development. *NOVAions*, 2004(1).
- Biswas, P., & Ghosh, S.K. (2007). A novel approach to define performance metrics for students' and teachers' evaluation. *Electronic journal of e learning*, 5(2), 87-101.
- Blase, J., & Blase, J. (1999). Principals' instructional leadership and teacher development: Teachers' perspectives. *Educational Administration Quarterly*, 35(3), 349-378.
- Blair, L. (2006). Creating a culture of data. *Southwest Educational Development Laboratory Letter*, 28(2), p.2. Retrieved October 13, 2009 from http://www.sedl.org/pubs/sedl-letter/v18n02/SEDLetter_v18n02.pdf
- Blink, R. (2007). *Data-driven instructional leadership*. Larchmont, NY: Eye on Education.
- Booher-Jennings, J. (2005). Below the bubble: "Educational Triage" and the Texas accountability system. *American Educational Research Journal*, 42(2), 231-268.
- Boudett, K.P., City, E.A., Murnane, R.J., et al. (2005). *Data wise: A step-by-step guide to using assessment results to improve teaching and learning*. Cambridge, Massachusetts: Harvard Education Press.
- Boudett, K.P., Steele, J., et al. (2007). *Data wise in action: Stories of schools using data to improve teaching and learning*. Cambridge, Massachusetts: Harvard Education Press.
- Brown, J. (2006). Too much information. *T.H.E. Journal*, 33(15), 40-46.
- Brunner, C., Fasca, C., Heinze, J., Honey, M., Light, D., Mandinach, E., et al. (2005). Linking data and learning: The grow network study. *Journal of Education for Students Placed at Risk*, 10(3), 241-267.

- Buffum, A., DuFour, R., Erkens, C., Hinman, C., Huff, S., et al. (2008). The collaborative administrator: Working together as a professional learning community. *Bloomington, IN: Solution Tree.*
- Buhle, R., & Blachowicz, C. (2008-2009). The assessment double play. *Educational Leadership*, 66(4), 42-46.
- Carnegie Corp. of New York, N. (1989). Turning points: Preparing American youth for the 21st century. The report of the Task Force on Education of Young Adolescents. Waldorf, MD: Carnegie Council on Adolescent Development.
- Creighton, T. B. (2001). Data analysis in administrators' hands: An oxymoron?(an argument for the use of statistical data, rather than intuition, in school administration), *The School Administrator*, 58(4). Retrieved September 12, 2009 from <http://global.factiva.com.ezproxy.lib.vt.edu:8080/ha/default.aspx>
- Creighton, T. B. (2005). *Leading from below the surface: A non-traditional approach to school leadership*. Thousand Oaks, CA: Corwin Press.
- Creighton, T. B. (2007). *Schools and data: The educator's guide for using data to improve decision making* (2 ed. Vol. 2). Thousand Oaks, CA: Corwin Press.
- Creighton, T. B., Coleman, D. G., & Adams, R. C. (1998) Using symbolic-logic matrices to improve confirmatory factor analysis techniques. Retrieved November 30, 2009 from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/15/0a/54.pdf
- Creswell, J. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Daggett, B. (2007). Exploring the need for data-driven decision making in CTE. *Techniques: Connecting Education & Careers*, 82(6), 10-11.
- David, J. L. (2008-09). Collaborative Inquiry. *Educational Leadership*, 66(4), 87-88.
- Del Favero, F. (2009). Using data to affect school change: A critical leadership skill serving as the keystone of the school improvement process. Retrieved September 20, 2009 from <http://cnx.org/content/m32036/1.1/>
- DuFour, R. (2004a). What is a "professional learning community"? *Educational Leadership*, 61(8), 6-11. Retrieved August 8, 2009 from http://www.ascd.org/publications/educational_leadership/may04/vol61/num08/EL_Study_Guide~Schools_as_Learning_Communities.aspx

- DuFour, R. (2004b). Leading edge: The best staff development is in the workplace, not in a workshop. *Journal of Staff Development*, 25(2). Retrieved August 8, 2009 from <http://www.nsd.org/library/publications/jsd/dufour252.cfm>
- Dynarski, M. (2008-09). Researchers and educators: Allies in learning. *Educational Leadership*, 66(4), 48-53.
- Graham, P. (2007). Improving teacher effectiveness through structured collaboration: A case study of a professional learning community. *Research in Middle Level Education Online*, 31(1), 1-17. Retrieved August 8, 2009, from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=32831982&site=ehost-live&scope=sitehttp://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=32831982&site=ehost-live&scope=site>
- Herman, J., & Gribbons, B. (2001). *Lessons learned in using data to support school inquiry and continuous improvement: Final report to the Stuart Foundation*. Los Angeles, CA: Center for the Study of Evaluation.
- Hess, F. M. (2008-2009). The new stupid. *Educational Leadership*. 66(5), 22-23.
- Hirsh, S., & Hord, S. (2008). Leader and learner. *Principal Leadership*. 9(4), 26-30.
- Hord, S., & Hirsh, S. (2009). The principal's role in supporting learning communities. *Educational Leadership*. 66(5), 22-23.
- Hord, S., & Sommers, W. (2008). *Leading professional learning communities: Voices from research and practice*. Thousand Oaks, CA: Corwin Press.
- Ingram, D., Louis, K. S., & Schroeder, R. G. (2004). Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *Teachers College Record*, 106(6), 1258-1287. Retrieved February 7, 2009, from <http://web.ebscohost.com.ezproxy.lib.vt.edu:8080/ehost/pdf?vid=10&hid=13&sid=eee1cd31-ebbd-4408-9820-092ded38d986%40sessionmgr3>
- Jackson, A. W., & Davis, G. A. (2000). *Turning points 2000: Education adolescents in the 21st century*. New York, NY: Teachers College Press.
- Learning Point Associates (2004, December). Guide to using data in school improvement efforts: A compilation of knowledge from data retreats and data use at learning point associates. Retrieved July 16, 2009, from <http://www.learningpt.org/pdfs/datause/guidebook.pdf>

- Light, D., Wexler, D., & Heinze, J. (2005). *Keeping teachers in the center: A framework of data-driven decision-making*. New York: Center for Children and Technology. Retrieved June 29, 2008 from http://www.grownetwork.com/assets/research/GrowNYC_LightWexlerHeinze2005.pdf
- Loundsbury, J. (1996). *Key characteristics of middle level school*. ERIC Clearinghouse on Elementary and Early Childhood Education: Urbana IL. Retrieved on January 8, 2010 from http://www.eric.ed.gov.ezproxy.lib.vt.edu:8080/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/14/c4/4f.pdf
- Mackey, B., Pitcher, S., & Decman, J. (2006). The influence of four elementary principals upon their schools' reading programs and students' reading scores. *Education*, 127(1), 39-55.
- Mandinach, E. B., Honey, M., & Light, D. (2006, April). A theoretical framework for data-driven decision making. Paper presented at the annual meeting of AERA, San Francisco, CA.
- Merriam, S. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey Bass, Inc.
- Morrison, J. (2008) Why teachers must be data experts. *Educational Leadership*, 66(4). Retrieved January 30, 2009, from http://www.ascd.org/publications/educational_leadership/dec08/vol66/num04/Why_Teachers_Must_Be_Data_Experts.aspx
- Murnane, R., Sharkey, N., & Boudett, K. (2005) Using student-assessment results to improve instruction: Lessons from a workshop. *Journal of Education for Students Placed at Risk*, 10(3), 269-280. Retrieved August 3, 2008, from <http://web.ebscohost.com.ezproxy.lib.vt.edu:8080/ehost/pdf?vid=43&hid=2&sid=8d46484f-ffac-40db-beb7-df0683d73c56%40sessionmgr7>
- National Association of Secondary School Principals. (2006). *Breaking the ranks in the middle: Strategies for leading middle level reform*. Reston, VA: EEI Communications.
- National Commission on Excellence in Education, (1983). *A nation at risk: The imperative for educational reform*. Washington, D.C.: U.S. Department of Education.

- National Middle School Association. (1995). *This we believe: Developmentally responsive middle level schools*. Retrieved on January 8, 2010 from http://www.eric.ed.gov.ezproxy.lib.vt.edu:8080/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/14/51/6c.pdf
- National Middle School Association. (2003). *This we believe: Successful schools for young adolescents*. Westerville, OH.
- National Middle School Association. (2010). *This we believe: Keys to educating young adolescents*. Westerville, OH.
- National Policy Board for Educational Administration (2002). *Standards for advanced programs in educational leadership for principals, superintendents, curriculum directors, and supervisors*. Retrieved on August 29, 2010 from <http://www.npbea.org/ncate.php>
- No Child Left Behind (NCLB) Act of 2001, Pub. L. No. 107-110, § 115, Stat. 1425 (2002).
- Pascopella, A. (2005). Search & rescue. *District administration*, 41(3), 72-78.
- Payne, M., & Miller, M. (2009). A collaborative approach to assessment: The assessment and improvement management system (AIMS). *Issues in Teacher Education*, 18(1), 149-160. Retrieved September 5, 2009, from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ehh&AN=43740471&site=ehost-live&scope=site>
- Picciano, A. G. (2006). *Data-driven decision making for effective school leadership*. Upper Saddle River, NJ Pearson Merrill Prentice Hall.
- Popham, J. (2008-09). Anchoring down the data. *Educational Leadership*, 66(4), 85-86.
- Reeves, D. (2008-09). The learning leader. *Educational Leadership*, 66(4), 89-90.
- Renwick, L. (2007). Taming the data beast. *District administration*, 43(8), 28.
- Richards, L. (2005). *Handling qualitative data: A practical Guide*. Thousand Oaks, CA: SAGE Publication Inc.
- Ronka, D., Lachat, M. A., Slaughter, R., & Meltzer, J. (2008-09). Answering the questions that count. *Educational Leadership*, 66(4), 18-24.
- Rossmann, G., & Rallis, S. (2003). *Learning in the field: An introduction to qualitative research* (2 ed.). Thousand Oaks, California: Sage Publications, Inc.
- Salant, P., & Dillman, D. A. (1994). *How to conduct your own survey*. New York, NY: John Wiley and Sons, Inc.

- Schmoker, M. (2006). High-leverage data analysis in schools: Keep it simple. *Southwest Educational Development Laboratory Letter*, 28(2), 10-13. Retrieved October 13, 2009 from http://www.sedl.org/pubs/sedl-letter/v18n02/SEDLetter_v18n02.pdf
- Schmoker, M. (2008-09). Measuring what matters. *Educational Leadership*, 66(4), 70-74.
- Stack, C. (2003). *A passion of proof: Using data to accelerate student achievement*. Westerville, OH: National Middle School Association.
- Steele, J., & Boudett, K. P. (2008-09). The collaborative advantage. *Educational Leadership*, 66(4), 54-59.
- Streifer, P. A., & Schumann, J. A. (2005). Using data mining to identify actionable information: Breaking new ground in data-driven decision making. *Journal of Education for Students Placed at Risk*, 10(3), 281-293.
- T.H.E. Journal* (2004, July 1). Data-driven decision-making introduction. Retrieved January 22, 2008, from <http://thejournal.com/articles/2004/07/01/datadriven-decisionmaking-introduction.aspx>
- U. S. Department of Education. (2004). Helping families, schools and communities understand and improve student achievement. Retrieved July 6, 2008, from <http://www.ed.gov/print/nclb/accountability/ayp/testingforresults.html>
- U. S. Department of Education (2010). A blueprint for reform: The reauthorization of the elementary and secondary education act. Retrieved July 11, 2010, from <http://www2.ed.gov/policy/elsec/leg/blueprint/blueprint.pdf>
- Using data to improve schools: What's working*. (2002). Arlington, VA: American Association of School Administrators.
- Virginia Department of Education. (n.d.) *Essential actions for use in academic reviews*. Retrieved on October 12, 2009 from www.doe.virginia.gov/VDOE/SchoolImprovement/essential_actions.doc
- Virginia Department of Education. (n.d.) *Virginia school report card: School accreditation status*. Retrieved on September 21, 2009 from <http://www.doe.virginia.gov/VDOE/src/accred-descriptions.shtml>
- Wells, C. (2009). *Leadership, quantum mechanics, and the relationship with professional learning communities*. Retrieved June 23, 2009 from <http://cnx.org/content/m24349/1.1/>
- Watkins, S., & McCaw, D. (2008). *Accountability for results: The realities of data-driven decision making*. Lanham, Maryland: Rowman & Littlefield Publishing Group, Inc.

Yin, R. K. (1994). *Case study research: Design and methods*. Applied social research methods series, v. 5. Thousand Oaks: Sage Publications.

APPENDIX A

LITERATURE REVIEW AND VARIABLE MATRIX

	Principal's Role as an Instructional Leader is More Important Than It has Ever Been in Educational History	NCLB has Increased Administrator's Attention on Accountability and Using Data	There are Benefits to Principals Empowering Teachers to Use Data to and Improve Instruction	Training and Professional Development are Crucial to a Successful Data-Driven Instructional Program	Organization and Technology Play a Key Role in a Successful Data-Driven Instructional System	Collaboration of Stakeholders is Essential to a Successful Data-Driven Instructional System	Misuse of Data Can Lead to an Unsuccessful Data-Driven Instructional System
AASA 2002		X	X			X	
Aspen Institute 2007		X	X				
Bernhardt 2004, 2005			X	X	X	X	X
Berube 2004	X		X				
Biswas & Ghosh 2007					X		
Blair 2006	X		X	X			
Blink 2007			X	X	X	X	
Booher-Jennings 2005	X		X		X		X
Boudett et al. 2005	X		X	X		X	
Boudett & Steele 2007	X		X	X		X	
Brown 2006			X		X		
Brunner et al. 2005		X	X				
Buhle & Blachow 2008						X	
Creighton 2007	X		X	X	X		
David 2008-09	X		X			X	
Del Favero 2009			X	X		X	

(continued)	Principal's Role as an Instructional Leader is More Important Than It has Ever Been in Educational History	NCLB has Increased Administrator's Attention on Accountability and Using Data	There are Benefits to Principals Empowering Teachers to Use Data to and Improve Instruction	Training and Professional Development are Crucial to a Successful Data-driven Instructional Program	Organization and Technology Play a Key Role in a Successful Data-driven Instructional System	Collaboration of Stakeholders is Essential to a Successful Data-driven Instructional System	Misuse of Data Can Lead to an Unsuccessful Data-driven Instructional System
DuFour 2004a, 2004b	X					X	
Dynarski 2008-09				X	X		X
Graham 2007			X			X	
Herman & Gibbons 2001				X		X	
Hess 2008-09	X						X
Hirsh & Hord 2008			X	X		X	
Hord & Sommers 2008	X		X	X		X	
Ingram et al. 2004	X					X	X
Learning Point Associates 2004			X	X	X	X	
Light et al. 2005		X	X				
Mandrich et al. 2006		X	X				
Mackey et al. 2006	X		X				
Morrison 2008			X		X		
Murnane, et al. 2005			X	X			
Pascopella 2005			X	X			
Payne & Miller 2009	X		X			X	
Picciano 2006		X		X	X		
Popham 2008-09	X	X		X			X
Schmoker 2006, 2009		X	X				
Streifer & Schumann 2005	X	X	X	X	X		
Wells 2009	X	X		X		X	

APPENDIX B
CORRELATION OF THE INTERVIEW QUESTIONS

Column 1:

VA DOE Essential Actions KEY (Virginia Department of Education, n.d.):

- CA = Curriculum Alignment
- D = Using Data for Making Instructional and Planning Decisions
- PD = Professional Development
- SP = Systems and Processes

Column 2:

Educational Leadership Constituent Council ELCC Standards (National Policy Board for Educational Administration, 2002):

- 1.1 Develop a Vision
- 1.2 Articulate a Vision
- 1.3 Implement a Vision
- 1.4 Steward a Vision
- 1.5 Promote Community Involvement in the Vision

Column 3:

Correlation to Bernhardt (2004) Research:

The collection of various types of data is crucial to obtaining a complete overview of the school improvement process (Bernhardt, 2004):

- Demographic Data
- Academic Performance
- School Process
- Perception

Column 4:

Symbolic Logic Matrix (Creighton, et al., 1997):

“When making a correlation between two questions, an “if/then” statement is created. An X is placed in the cell where the descriptor correlates with itself ... If the statement is agreed to, an “A” is placed in the cell representing the [two-way] agreement. If the statement is not agreed to, a ‘dot’ is placed in the cell representing one-way disagreement. Next, the evaluator moves on to the third cell across the first row, until each item serves as the consequence to the original item serving as the antecedent.” (p.12)

Case Study Interview Questions for Division Level Middle School Instructional Supervisors:

Interview Questions	VA DOE Essential Actions	ELL Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>1. Does your school division use data to determine professional development needs for staff?</p> <p>a. What type of data are collected to determine the appropriate professional development?</p> <p>b. How often are these data collected?</p>	PD14	1.4	3.	School Process	Yes
<p>2. Does your school division provide training/professional development for teachers on the analysis and use of data to select instructional strategies?</p> <p>a. How often is the training provided?</p> <p>b. Who conducts the training?</p> <p>c. Please describe the training provided to administrators.</p> <p>d. Please describe the training provided to teachers.</p>	D4, PD7, PD8, PD12	1.5	2.	School Process	Yes
<p>3. Does your school division provide training on the analysis and use of data to determine students' strengths and weaknesses?</p> <p>a. How often is the training provided?</p> <p>b. Who conducts the training?</p> <p>c. Please describe the training provided to administrators.</p> <p>d. Please describe the training provided to teachers.</p>	D7	1.1 1.5	3.	Academic Performance	Yes
<p>4. Does your school division provide training on the analysis and use of data to develop remediation/intervention activities?</p> <p>a. How often is the training provided?</p> <p>b. Who conducts the training?</p> <p>c. Please describe the training provided to administrators.</p> <p>d. Please describe the training provided to teachers</p>	D5	1.4	3.	School Processes	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>5. Do middle schools in your district use student performance data to identify curriculum strengths and those areas needing improvement?</p> <p>a. What types of student performance data are available to identify curriculum strengths?</p> <p>b. What types of student performance data are available to identify curriculum areas needing improvement?</p> <p>c. How often are the data analyzed?</p> <p>d. In your opinion, what type of student performance data has had the greatest impact on identifying curriculum strengths?</p> <p>e. Please describe this process.</p> <p>f. In your opinion, what type of student performance data has had the greatest impact on identifying curriculum areas needing improvement?</p> <p>g. Please describe this process</p>	CA30	1.1 1.4 1.5	1. 2.	Academic Performance School Processes	Yes
<p>6. Does your school division identify student performance data that will be used to identify effective strategy implementation?</p> <p>a. What types of student performance data has your division found most useful?</p> <p>b. Is there a timeline established for this process?</p>	D12	1.1 1.2 1.3	1. 2. 3.	Academic Performance School Processes	Yes

Case Study Interview Questions for Middle School Principals:

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>1. Does your school use data to determine professional development needs for staff?</p> <p>a. What types of data are collected to determine the appropriate professional development?</p> <p>b. How often are these data collected?</p>	PD14	1.4	3.	School Process	Yes
<p>2. Does your school provide training/professional development for teachers on the analysis and use of data to select instructional strategies?</p> <p>a. How often is the training provided?</p> <p>b. Who conducts the training?</p> <p>c. Please describe the training provided to administrators.</p> <p>d. Please describe the training provided to teachers.</p>	D4, PD7, PD8, PD12	1.5	2.	School Process	Yes
<p>3. Does your school provided training for teachers on the analysis and use of data to select instructional materials?</p> <p>a. How often is the training provided?</p> <p>b. Who conducts the training?</p> <p>c. Please describe the training provided to administrators.</p> <p>d. Please describe the training provided to teachers.</p>	D8, PD7, PD8, PD12	1.4	2.	School Process	Yes

Interview Questions	VA DOE Essential Actions	ELLCC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
4. Is training provided on the analysis and use of data to determine students' strengths and weaknesses? a. How often is the training provided? b. Who conducts the training? c. Please describe the training provided to administrators. d. Please describe the training provided to teachers.	D7	1.1 1.5	3.	Academic Performance	Yes
5. Is training provided on the analysis and use of data to develop remediation/intervention activities? a. How often is the training provided? b. Who conducts the training? c. Please describe the training provided to administrators. d. Please describe the training provided to teachers.	D5	1.4	3.	School Process	Yes
6. Has your school developed an efficient method for collecting and recording data at the classroom level? a. What types of data are collected?	SP5	1.5	1.	School Process	Yes
7. Are the data organized by grade level, subject level, classroom level, or all of these? a. How often are these data collected? b. Please describe this process.	SP5	1.1	2.	Demographic Data	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>8. Does your school use student performance data to identify curriculum strengths and those areas needing improvement?</p> <p>a. What types of student performance data are available to identify curriculum strengths?</p> <p>b. What types of student performance data are available to identify curriculum areas needing improvement?</p> <p>c. How often are the data analyzed?</p> <p>d. In your opinion, what type of student performance data has had the greatest impact on identifying curriculum strengths?</p> <p>e. Please describe this process.</p> <p>f. In your opinion, what type of student performance data has had the greatest impact on identifying curriculum areas needing improvement?</p> <p>g. Please describe this process.</p>	<p>CA30, SIP8, IMP2</p>	<p>1.1 1.4 1.5</p>	<p>1. 2.</p>	<p>Academic Performance School Process</p>	<p>Yes</p>

Interview Questions	VA DOE Essential Actions	ELL Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>9. Does the school analyze available student performance data to determine students' skill/content strengths and weaknesses?</p> <p>a. What types of student performance data are available?</p> <p>b. How often are the data analyzed?</p> <p>c. In your opinion, what type of student performance data has had the greatest impact on analyzing student achievement at your school?</p> <p>d. Please describe this process.</p>	CA25, SIP8, IMP14	1.1	3.	Academic Performance	Yes
<p>10. Does the school use Student-Performance-By-Question SPBQ data to identify patterns needing attention?</p> <p>a. How is this data used to improve student achievement?</p> <p>b. Can you give a specific example?</p>	D9, IMP14	1.5	1. 2. 3.	Academic Performance	Partial
<p>11. Does your school disaggregate data by student subgroups?</p> <p>a. Please describe this process.</p>	D2, SIP5, IMP14	1.1	1. 2. 3.	Demographic Data	Yes
<p>12. Does your school use student subgroup data to identify patterns needing attention?</p> <p>a. How often are the data analyzed?</p> <p>b. Please describe this process.</p>	D2, SIP5, IMP14	1.1 1.5	1. 2. 3.	Demographic Data	Partial

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
13. Does the school use data to identify and provide remediation/ intervention strategies for students who are unsuccessful? a. What types of data are used? b. Please describe this process. c. Can you think of any specific examples that illustrate this process from start to finish where the use of data had a positive impact on student achievement?	CA24, IMP14	1.4 1.5	3.	Academic Performance	Yes
14. Does your school identify student performance data that will be used to identify effective strategy implementation of the school improvement plan? a. What types of student performance data has your school found most useful? b. Is there a timeline established for this process?	D12, SIP8, IMP2	1.4 1.5	3.	Academic Performance School Process	Yes
15. Are teachers provided the opportunity to work collaboratively to share student data with staff across the curriculum? a. How often are teachers given this opportunity? b. Please describe this process.	SP6	1.2	1. 2.	School Process	Yes
16. Have procedures been developed for tracking individual student progress toward mastery of SOL content and skills on a regular basis? a. Please describe this process.	SP7	1.1 1.5	1. 2.	Academic Performance	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
17. Have instruments been utilized for tracking individual student progress toward mastery of SOL content and skills on a regular basis? a. Please describe the instrument(s) being utilized.	SP7	1.1 1.5	3.	Academic Performance	Yes
18. Have procedures been developed for tracking individual student progress toward mastery of SOL content and skills from grade to grade? a. Please describe this process.	SP7	1.1 1.5	2. 3.	Academic Performance	Yes
19. Have instruments been utilized for tracking individual student progress toward mastery of SOL content and skills from grade to grade? a. Please describe the instrument(s) being utilized.	SP7	1.1 1.5	3.	Academic Performance	Yes
20. As the leader of the school, do you conduct a formal assessment of school culture including input from all stakeholders? a. Please describe this process.	SC1 1	.1	1.	Perception	Yes

Case Study Interview Questions for Middle School Math Teachers:

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>1. a. Have you been provided training/professional development for teachers on the analysis and use of data to select instructional strategies? Please describe this process.</p> <p>b. Have you been provided training for teachers on the analysis and use of data to select instructional materials?</p> <p>c. In your opinion, what is the most valuable component of data analysis training you have received to select instructional strategies? Please give an example.</p>	<p>a. D4, PD7, PD8, PD12</p> <p>b. D8, PD7, PD8, PD12</p>	<p>a. 1.5</p> <p>b. 1.2</p>	2.	School Processes	Yes
<p>2. Have you developed an efficient method for collecting and recording data in your classroom?</p> <p>a. What types of data are collected and recorded?</p> <p>b. How often do you collect these types of data?</p> <p>c. Please describe this process.</p>	SP5	1.5	1.	School Processes	Yes
<p>3. Do you analyze available student performance data to determine students' skill/content strengths and weaknesses?</p> <p>a. What types of student performance data are available to you?</p> <p>b. How often do you analyze this data?</p> <p>c. In your opinion, what type of student performance data has had the greatest impact on analyzing your students' achievement?</p> <p>d. Please describe this process.</p>	CA25, IMP14	1.1 1.5	3.	Academic Performance	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
4. Do you use Student-Performance-By-Question SPBQ data to identify patterns needing attention? a. How is this data used to improve student achievement? b. Can you give a specific example?	D9, IMP14	1.5	1. 2. 3.	Academic Performance	Yes
5. Do you disaggregate data by reporting category? Do you use the data from the reporting categories to identify patterns needing attention? a. How often do you analyze this data? b. Please describe this process.	a. D1 b. D1	1.4 1.5	1. 3.	a. School Process b. Academic Performance	Yes
6. Do you disaggregate data by student subgroups? Do you use student subgroup data to identify patterns needing attention? a. How often do you analyze this data? b. Please describe this process.	a. D2, SIP5, IMP14 b. D2, SIP5, IMP14	1.1 1.5	1. 2. 3.	Demographic Data	Yes
7. Have you been provided training on the analysis and use of data to develop remediation/intervention activities? a. Please describe the training you have received.	D5	1.4	3.	School Processes	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>8. Do you use data to identify and provide remediation/intervention strategies for students who are unsuccessful?</p> <p>a. What types of data are used?</p> <p>b. Please describe this process.</p> <p>c. Can you think of any specific examples that illustrate this process from start to finish where the use of data had a positive impact on student achievement?</p>	CA24, IMP14	1.4 1.5	3.	Academic Performance	Yes
<p>9. Are you provided the opportunity to work collaboratively to share student data with staff across the curriculum?</p> <p>a. How often are you given this opportunity?</p> <p>b. Please describe this process.</p>	SP6	1.2	1. 2.	School Processes	Yes
<p>10. a. Have procedures been developed for tracking individual student progress toward mastery of SOL content and skills on a regular basis? Please describe this process.</p> <p>b. Have instruments been utilized for tracking individual student progress toward mastery of SOL content and skills on a regular basis during the school year? Please describe the instrument(s) being utilized.</p>	<p>a. SP7</p> <p>b. SP7</p>	<p>a. 1.1 1.5</p> <p>b. 1.1 1.5</p>	<p>a. 2. 3.</p> <p>b. 3.</p>	Academic Performance	Yes

Interview Questions	VA DOE Essential Actions	ELLC Standard	Research Question	Correlation to Bernhardt (2004) Research:	Symbolic Logic Established a Two-way Agreement
<p>11. a. Have procedures been developed for tracking individual student progress toward mastery of SOL content and skills from grade to grade? Please describe this process.</p> <p>b. Have instruments been utilized for tracking individual student progress toward mastery of SOL content and skills from grade to grade? Please describe the instrument(s) being utilized.</p>	<p>a. SP7</p> <p>b. SP7</p>	<p>a. 1.1 1.5</p> <p>b. 1.1 1.5</p>	<p>a. 2. 3.</p> <p>b. 3.</p>	<p>Academic Performance</p>	<p>Yes</p>
<p>12. Have you been asked to participate in a formal assessment of school culture? Please describe this process.</p>	<p>SC1</p>	<p>1.1</p>	<p>1.</p>	<p>Perception</p>	<p>Yes</p>

APPENDIX C
COPY OF LETTER TO SUPERINTENDENTS

February __, 2010

Dr. _____, Superintendent _____ Public Schools

_____, VA _____

Dear Dr. _____:

I am a doctoral candidate in the Educational Leadership and Policy Studies program at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. I am also the principal at Fort Chiswell Middle School in Wythe County, VA. The purpose of this letter is to request permission for a middle school in your school division to participate in my study entitled “A Multi Site Case Study: The Principal’s Role in Building Data-Driven Instructional Systems to Guide Educators and Improve Student Achievement”.

The purpose of my study is to obtain information on how schools are using data to improve student achievement. My focus group includes middle schools in southwest Virginia who have successfully emerged from “Accredited with Warning” status. From 2005- 2009 there were twelve middle schools in southwest Virginia who experienced the Academic Review process two years in a row as a result of low math scores in the sixth and seventh grades. Eight of these middle schools share common student demographics. Specifically, I wish to explore the data-driven process the eight schools have implemented to improve student achievement since undergoing the Academic Review process.

_____ school division has _____ middle school(s) which fit this description. I am requesting permission from you to contact your division’s middle school supervisor as well as your middle school principals. The first phase of my research study involves interviewing the middle school supervisor and principals via telephone. The second phase of my research study is to conduct follow-up visits where qualitative data will be collected. I am also asking your permission to conduct on-site visits to observe the process used to create a culture of data-driven instruction. In addition, I would also like to interview instructional staff on their impression of the data-driven process. The interviews will be scheduled at the teacher’s convenience and will be approximately 30 minutes in length.

Please be assured that all responses will remain confidential. I also want to assure you that I am not interested in collecting specific academic or demographic data from students in your school system. I am only interested in the process schools use to create a data-driven culture. I have attached a copy of the abstract, which provides further information concerning this study.

I would appreciate your consent for teachers and administrators in the following middle schools to participate in this study: *List schools here*

Should your staff participate in this study, I will be glad to provide you with a summary of the results. If you have any questions about this study at any time, please contact me at 276-637-4400 or bjames@wythe.k12.va.us. You may also contact my advisor, Dr. Theodore B. Creighton at (540) 231-4546 or tcreigh@vt.edu.

Please sign below if you grant permission to have this research conducted at your middle school. I have enclosed a self-addressed stamped envelope for you to return this letter of consent back to me. Thank you for your time and consideration to this research endeavor.

Sincerely,

Becki C. James
Doctoral Student



I grant permission for Becki James to conduct interviews and on-site visits to the schools listed above where she will research how the middle schools have implemented successful data-driven instructional systems to improve student achievement.

I do not grant permission for Becki James to conduct dissertation research in the _____ School Division.

Superintendent/Designee Signature _____ Date _____

APPENDIX D
PHONE INTERVIEW TRANSCRIPT
(INSTRUCTIONAL SUPERVISOR)

Hello, This is Becki James. I am the principal at Fort Chiswell Middle School in Wythe County, Virginia. I am also a doctoral student at Virginia Tech working on my dissertation by studying how schools use data to improve student achievement.

I chose this topic because my school is still in “Accredited with Warning” status and I wanted to learn more about how schools are using data from a practitioner’s point of view. I’m hoping to gain insight from my study and be able to apply what I have learned in my own school to help us regain our status of being accredited.

In my research I have discovered that _____ & _____ Middle Schools were in the same situation of being “Accredited with Warning” back in _____. Were you the principal back then and involved in the Academic Review Process?

I have gained permission from your superintendent to contact you to get more insight into how your school division has established a successful data-driven instructional system to improve student achievement.

Would you mind sharing your experiences with me and participating in my study on how schools use data to improve student achievement?

(Begin Interview Questions)

APPENDIX E
Phone Interview Transcript
(PRINCIPAL)

Hello, This is Becki James. I am the principal at Fort Chiswell Middle School in Wythe County, Virginia. I am also a doctoral student at Virginia Tech working on my dissertation by studying how schools use data to improve student achievement.

I chose this topic because my school is still in “Accredited with Warning” status and I wanted to learn more about how schools are using data from a practitioner’s point of view. I’m hoping to gain insight from my study and be able to apply what I have learned in my own school to help us regain our status of being accredited.

In my research I have discovered that _____ Middle School was in the same situation of being “Accredited with Warning” back in _____. Were you the principal back then and involved in the Academic Review Process?

I spoke with your Middle School Supervisor and he/she recommended I contact you to get more insight into how your school has established a successful data-driven instructional system to improve student achievement.

Would you mind sharing your experiences with me and participating in my study on how schools use data to improve student achievement?

YES - Q1 Was your school asked to incorporate the use of data more effectively as a result of the Academic Review Process?

NO – Q1 Does your current School Improvement Plan incorporate the use of data to improve student achievement?

Q2 Were you provided training on the analysis and use of data as a result of the Academic Review Process? Please describe.

Q3 How about your teachers? Were they provided training on the analysis and use of data as a result of the Academic Review Process? Please describe.

Q4 How did your school use data to determine student strengths and weaknesses to decide instructional strategies for implementation in the classroom?

Q5 Would you mind participating in a follow-up interview and on-site visit to help me better define how middle schools in southwest Virginia are using data to improve instruction and boost student achievement? I would like to see first hand how your school uses data to improve student achievement.

I appreciate your willingness to help me pursue my research study. When I am finished with my study, I hope to have a well-defined process of how schools use data to improve student achievement. I will be glad to share the results with you. Thank you for your time and I look forward to incorporating your school's success in to my research.

APPENDIX F
ON-SITE INTERVIEW TRANSCRIPT
(TEACHER)

Hello, My name is Becki James. I am the principal at Fort Chiswell Middle School in Wythe County, Virginia. I am also a doctoral student at Virginia Tech working on my dissertation by studying how schools use data to improve student achievement.

I chose this topic because my school is still in “Accredited with Warning” status and I wanted to learn more about how schools are using data from a practitioner’s point of view. I’m hoping to gain insight from my study and be able to apply what I have learned in my own school to help us regain our status of being accredited.

In my research I have discovered that _____ Middle School was in the same situation of being “Accredited with Warning” back in _____. Were you a teacher at this school back then and involved in the Academic Review Process?

I spoke with your Principal and he/she recommended I contact you to get more insight into how your school has established a successful data-driven instructional system to improve student achievement.

Would you mind sharing your experiences with me and participating in my study on how schools use data to improve student achievement?

(Begin Interview Questions)

APPENDIX G

THE FREQUENCY OF OCCURRENCE TABLE USED DETERMINE COMMON THEMES AND PATTERNS
(INSTRUCTIONAL SUPERVISOR)

Summary of Data Collection for Study

The data were grouped and matched based on the themes and patterns that emerged through the analysis process. A total of nine themes were identified with supporting evidence from the interviews and on-site visits. By referring back to the original research questions, a framework was provided to summarize and organize the findings into common themes and patterns. Appendix G illustrates the relations of research questions and emerged themes among the Instructional Supervisors interviewed in this study.

EMERGING THEMES AND PATTERNS:

Collaboration/Team Meetings

Setting Expectations and Required Procedures

Self-reflection/Students looking at their own data

Teacher has developed their own way to track data

Targeting all Students will automatically address improvement of subgroup performance

Training and Professional Development

Create a Visual Procedure for keeping track of Student data

DOE has provided assistance through an organized program

School Division Instructional Supervisor:

Data Collection Strategies					
<u>Research Questions</u>	<u>Interview Question Correlation</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	5df 6a	Interview, Observation	Interview In	terview	Interview, Collection of Artifacts

<u>Research Questions</u>	<u>Interview Question Correlation</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	2 5 6	Interview, Observation	Interview In	terview	Interview, Collection of Artifacts
3. How are administrators guiding teachers to use data to improve student achievement?	1 3 4 6	Interview, Observation	Interview In	terview	Interview, Collection of Artifacts

School Division Instructional Supervisor:

<u>Interview Results</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>
3. How are administrators guiding teachers to use data to improve student achievement?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>

School Division Instructional Supervisor:

<u>Emerging Themes and Patterns</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	<ul style="list-style-type: none"> • The more historical data you have, the more you can diagnose strengths and weaknesses. • Disaggregated SOL SPbQ • Disaggregated Benchmark 	<ul style="list-style-type: none"> • Disaggregated SOL, SPbQ, • Benchmark data • Student sub-group data 	<ul style="list-style-type: none"> • Disaggregated Benchmark data • Disaggregated SOL Data 	<ul style="list-style-type: none"> • Historical SOL Data that has been disaggregated • Disaggregated Benchmark Data
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<ul style="list-style-type: none"> • Training with follow up support from central office admin. • Collaboration • Common mtg. times • Make data visible • Teachers complete charts on their data 	<ul style="list-style-type: none"> • Provide Training and Staff Devel. to admin. and teachers on how to look at their Data (SPbQ and Benchmark). (It was up to the principal to oversee its continued use.) • *minimal collaboration is used among the department. The math coach took care of being the liaison for information in the math dept. 	<ul style="list-style-type: none"> • Provide Training and staff devel. on the data-driven process. • Collaboration using data teams 	<ul style="list-style-type: none"> • Provide training and staff development on the use of data to improve student achievement. • Encourage collaboration when analyzing data.

<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
<p>3. How are administrators guiding teachers to use data to improve student achievement?</p>	<ul style="list-style-type: none"> • Collaboration • Follow-up support • Self-Discovery approach when working with data • Setting Expectations of a data-driven culture 	<ul style="list-style-type: none"> • Setting the expectation of teachers using effective inst. strategies in the classroom. Data are a means to achieve this, but their improvement on student achievement is not solely based on the use of data. 	<ul style="list-style-type: none"> • Setting expectations of a data-driven culture. • Self-discovery using data teams 	<ul style="list-style-type: none"> • The district expectation is that principals acculturate their schools with the process of using data. Next, the district sets the expectation that Principals will establish a routine for evaluating and handling the data.

APPENDIX H

THE FREQUENCY OF OCCURRENCE TABLE USED DETERMINE COMMON THEMES AND PATTERNS (PRINCIPAL)

Summary of Data Collection for Study

The data were grouped and matched based on the themes and patterns that emerged through the analysis process. A total of nine themes were identified with supporting evidence from the interviews and on-site visits. By referring back to the original research questions, a framework was provided to summarize and organize the findings into common themes and patterns. Appendix H illustrates the relations of research questions and emerged themes among the Principals interviewed in this study.

EMERGING THEMES AND PATTERNS:

Collaboration/Team Meetings

Setting Expectations and Required Procedures

Self-reflection/Students looking at their own data

Teacher has developed their own way to track data

Targeting all Students will automatically address improvement of subgroup performance

Training and Professional Development

Create a Visual Procedure for keeping track of Student data

DOE has provided assistance through an organized program

Principal:

Data Collection Strategies					
<u>Research Questions</u>	<u>Interview Question Correlation</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	6 8df 9a 10 11 12 14a 15 20	Interview, Observation, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	2 3 7 8 10 11 12 14 15 16 18	Interview, Observation, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts

3. How are administrators guiding teachers to use data to improve student achievement?	1	Interview, Observation, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts	Interview, Collection of Artifacts
	4				
	5				
	9				
	10				
	11				
	12				
	13				
	14				
	16				
	17				
	18				
	19				

Principal:

<u>Results</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>
3. How are administrators guiding teachers to use data to improve student achievement?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>

Principal:

<u>Emerging Themes and Patterns</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
<p>1. What types of data do administrators consider essential to the success of their data-driven instructional programs?</p>	<ul style="list-style-type: none"> • The VA DOE report on school and individual student achievement called the Student Performance by Question (SPbQ) - The SPbQ provides educators with a detailed report on how students performed in each reporting category with a general description of the topic question. An SPbQ report is developed reporting the whole school performance as well as an individual report for each student in the school. • Benchmark Testing - Each school had a benchmark testing procedure in place where student achievement was formally assessed every 9 weeks throughout the school year. The philosophy was to monitor student mastery of the Commonwealth’s Standards of Learning Objectives throughout the year and provide remediation as needed rather than when it’s too late after the SOL tests have been administered. Better to catch student shortcomings in achievement during the school year rather than when it’s too late. • It doesn’t matter what type of formal Benchmark assessment is being given to students, as long as it is aligned with the curriculum and provides detailed reports of student achievement based on individual skill level. All administrators relied on the data reports produced by their benchmark testing to monitor teachers’ curriculum alignment and student achievement. These reports need to be developed quickly and have easy access to the data. Quote from Principal from school D, “Real-time data are more important as the year progresses”. Quote from Principal from School A, “Teacher’s time is valuable and the less they have to worry with the grading and reporting factor, the more time they can spend actually looking at the data and making better informed decisions based on real data and not gut feelings.” It is a necessity for benchmark programs to have the capability to produce quick and easy reports which makes data disaggregation much easier. • Administrators at each school all have their own way of managing historical and current data on each individual student in their school. The data are kept in the form of a spreadsheet. The spreadsheets allow them to look at individual student achievement while identifying patterns of strengths and weakness. 			

<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<ul style="list-style-type: none"> • First, the administrators have invested the time in participating in the data analysis process themselves. This is not a chore they have delegated to someone else. • The administrators have acculturated their schools with the philosophy of data being used to make instructional decisions for the school. • The school culture changed in all departments, not just math where the greatest weakness was. A true team effort was given and advancing student achievement was a goal for all not just the math teachers. Teacher from school A commented, "What started out as more collaboration using data in Math has 'bled-out' into other core areas." • The administrators have provided professional development training on how to examine and disaggregate school data. If they have not provided the training and led the discussions, themselves they have been directly involved with the person that has provided the training (ITRTs). • The administrators have approached their school data in a collaborative manner. The principals have set aside specific times throughout the school year to provide teachers an opportunity to discuss the school data in departmental teams. The principals have been an active participant in these discussions. • Administrators provided time for teachers to look at their data and collaborate on a regular basis. 			
3. How are administrators guiding teachers to use data to improve student achievement?	<ul style="list-style-type: none"> • High expectations are set by the administrators. • Common core planning time is developed on a regular basis • Required attendance is mandatory for teachers at team meetings to discuss data • Administrators expect teachers to use the training they have received on how to disaggregate the data • Administrators hold teachers accountable for keeping up with and regularly examining their classroom data and adjusting their instruction based on their data. They expect teacher to use their data training to incorporate strategies of using the data to provide differentiated instruction to meet individual student needs. • Administrators provide support to teachers by giving them the gift of time. Administrators are saving teacher's time by having the "housekeeping" part of the data process done for the teachers. For example, the ITRTs or the administrators themselves are printing out the data reports for teachers. The less time teachers spend obtaining the data, the more time they have to analyze it and provide remediation to those students who are not achieving as expected. • Administrators have developed data analysis sheets to help teachers manipulate their data • Administrators do not state what the strengths and weaknesses are, they have set up a system of self-discovery. If the teachers find the strengths and weaknesses on their own, then the data becomes much more real and powerful tool. 			

APPENDIX I

THE FREQUENCY OF OCCURRENCE TABLE USED DETERMINE COMMON THEMES AND PATTERNS
(CLASSROOM TEACHER)

Summary of Data Collection for Study

The data were grouped and matched based on the themes and patterns that emerged through the analysis process. A total of nine themes were identified with supporting evidence from the interviews and on-site visits. By referring back to the original research questions, a framework was provided to summarize and organize the findings into common themes and patterns. Appendix I illustrates the relations of research questions and emerged themes among the Classroom Teachers interviewed in this study.

EMERGING THEMES AND PATTERNS:

Collaboration/Team Meetings

Setting Expectations and Required Procedures

Self-reflection/Students looking at their own data

Teacher has developed their own way to track data

Targeting all Students will automatically address improvement of subgroup performance

Training and Professional Development

Create a Visual Procedure for keeping track of Student data

DOE has provided assistance through an organized program

Classroom Teacher:

Data Collection Strategies					
<u>Research Questions</u>	<u>Interview Question Correlation</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	2 4 5a 6 9 12	Interview, Observation Artifacts	Interview	Interview, Observation Artifacts	Interview, Observation Artifacts
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	1ab 4 6 9 10a 11a	Interview, Observation Artifacts	Interview	Interview, Observation Artifacts	Interview, Observation Artifacts
3. How are administrators guiding teachers to use data to improve student achievement?	3 4 5b 6 7 8 10ab 11ab	Interview, Observation Artifacts	Interview	Interview, Observation Artifacts	Interview, Observation Artifacts

Classroom Teacher:

<u>Results</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>

<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>
3. How are administrators guiding teachers to use data to improve student achievement?	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>	<i>*Field Notes Available upon Request</i>

Classroom Teacher:

<u>Emerging Themes and Patterns</u>				
<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
1. What types of data do administrators consider essential to the success of their data-driven instructional programs?	<ul style="list-style-type: none"> • <i>Same as Administrators answers:</i> <ul style="list-style-type: none"> ▪ Previous SOL data using SPbQ ▪ Benchmark data (<i>*Each school uses a different benchmark instrument</i>) <p>The reason this answer is the same as the administrators' answer is because the school administration has set an expectation for these two main sources of data be used. Because the four middle schools have been using this data for a long time they have been able to establish a correlation between the use of these two data sources and student performance on the SOL test. This process did not happen overnight, it has taken a while to establish a method of utilizing the SPbQ and Benchmark results. For example: The teacher in school D has been collecting 4 years of benchmark data on his students and tracking their progress through a method of color coding. The teacher has kept 4 years of benchmark data and compared its correlation to student performance on the SOL tests. He found that students are scoring very similar results on the benchmarks when compared to their final SOL scores. The teachers from School A have also seen a correlation on their benchmark (only administered to the lowest performing students) to that of student performance on the SOL test. "If we see positive results on the ARDT, then we also see positive results with those same students on the SOL test."</p>			
2. How do administrators involve teachers and other stakeholders in the school's data-driven instructional system?	<ul style="list-style-type: none"> • Teachers are required to attend data team meetings on a regular basis. • Teachers are provided training on how to read and analyze data reports and how to disaggregate their data. • Teachers are active participants in collaborative discussions held with administration and fellow colleagues on a regular basis. Teacher from school A commented, "What started out as more collaboration using data in Math has 'bled-out' into other core areas." 			

<u>Research Questions</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
3. How are administrators guiding teachers to use data to improve student achievement?	<ul style="list-style-type: none"> • Teachers are expected to alter their instruction to reflect strengths and weaknesses found in the data. • Teachers are expected to dig deep into their data and determine individual students weaknesses. • Teachers are expected to provide differentiated instructional strategies based on their data to individual students. • Administrators are present to provide support and resources for teachers to execute their plan. • Teachers are expected to carry out the school culture of constantly finding a way to improve instruction and obtain higher student achievement. Higher student achievement definitely means bringing lower performing students up, but it also means bringing the mediocre student up along with the higher performing students even higher. School data is not just for the helping students at the bottom of the educational ladder, school data is also used to bring ALL students beyond their potential. • Teachers are acculturated in a data-driven instructional system where they believe that ALL students can achieve. If ALL students are targeted, based on data and not gut feelings, then progress will be made regardless of their AYP subgroup classification. Teacher from school C commented, "Every student should be pushed to their best ability despite their subgroup classification." Teacher from school D said, "If you are targeting all students the subgroups will make it too." 			