A Study of the Impact of Data-informed Instruction on the Reading Comprehension of Tenth-Grade Students

Norma Vetter
St. John Fisher College

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Document Type
Dissertation

Degree Name
Doctor of Education (EdD)

Department
Executive Leadership

First Supervisor
Jason Berman

Second Supervisor
Katrina Arndt

Subject Categories
Education

This dissertation is available at Fisher Digital Publications: https://fisherpub.sjfc.edu/education_etd/78
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A Study of the Impact of Data-Informed Instruction on the Reading Comprehension of Tenth-Grade Students

By

Norma Vetter

Submitted in partial fulfillment of the requirements for the degree Ed.D in Executive Leadership

Supervised by
Dr. Jason Berman

Committee Member
Dr. Katrina Arndt

Ralph C. Wilson, Jr. School of Education
St. John Fisher College

November 2008
We recommend that the dissertation by

Norma Vetter

Entitled: A Study of the Impact of Data-Informed Instruction of the Reading Comprehension of Tenth-Grade Students

Be accepted in partial fulfillment of the requirements for the Education Doctorate degree.

Dr. Jason Berman, PhD., Chair

Dr. Katrina Arndt, Ph.D., Committee Member

September 19, 2008
Dedication

To Danita Mann, my wonderful and loving daughter, who has been steadfast in her support of my effort to pursue this endeavor; I appreciate all that you have done to make this journey a possibility.

To Curtis and Mavis Hughes whose love and encouragement have sustained me through all of my accomplishments; I thank you. You have taught me to value learning and have provided me every opportunity to achieve academic success.

To my six sisters and two brothers; thank you for encouraging me along the way.
Biographical Sketch

Norma Vetter is currently the Assistant Principal at Greece Olympia High School. Mrs. Vetter attended the University of Guyana from 1976 to 1981 and graduated with a Bachelor of Arts degree in 1981. She attended Nazareth College from 1986 to 1988 and graduated with a Master of Science Degree in Secondary Education in 1989. She also attended St. John Fisher College from 2000-2001 and graduated in 2002 with a Master of Science Degree in Educational Administration. She came to St. John Fisher College in the summer of 2006 and began doctoral studies in the Ed.D. Program in Executive Leadership. Mrs. Vetter pursued her research in data-informed instruction at the classroom level under the direction of Dr. Jason Berman and received the Ed.D. degree in 2008.
Acknowledgements

In recognition of your support of my study, I extend special thanks to the assistant superintendent, principal, and teachers who participated in this study. I truly appreciate your approval of allowing me to conduct my study at your school and for the flexibility that you showed during the selection process of the teachers and classrooms that were included in the study.

The members of my dissertation committee have guided me through this process with unwavering support; therefore, I extend a special thanks to Dr. Berman, my chairperson, and Dr. Arndt, my committee member. You challenged me to answer deep questions that you posed regarding my study. I especially commend you for making the journey toward the completion of my dissertation, an extraordinary learning experience.
Abstract

Current literature on data-driven decision-making is centered on the use of summative data from state and district tests for informing decisions regarding teaching and learning. Although annual data have provided schools valid evidence for making decisions for school improvement plans and curriculum changes, they have proven to be less effective in making a direct impact on the daily instructional decisions that teachers make for improving student achievement (Stiggins, 2000; Reeves, 2006). This study was an investigation on the effects that data-informed instruction may have on the reading comprehension of tenth-grade students.

The methodology was a quantitative design in which a pretest and posttest were administered to students from two control groups and one experimental group. The data from the pretest and posttest were analyzed to determine whether there were improvements in the reading comprehension of the students in the experimental group who received a treatment as compared to the control groups who received the district’s required instructional model. The results showed statistically significant differences in the change scores with the experimental group demonstrating more positive changes than the control groups (chi-square (2) = 14.132, p < .01). This study has implications for instructional practice and future research on the use of data in classrooms to inform teaching and learning.
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Chapter 1: Introduction

The emergence of extensive school accountability reforms at federal, state, and local levels in the United States have heightened the awareness and urgency among educators for establishing accountability systems in their schools. The focus of schools on using student data for decision-making has been documented as an attribute for improving academic achievement (Boreman, Hewes, Overman, & Brown, 2002; Trauman & Klemp, 2004; Wayman, 2005). However, despite the growing literature regarding the benefits of data-driven decision-making for school and district reforms, studies on the impact of data-driven classroom practices on student achievement have not been evident. Instead, many educators rely on their intuitions regarding student progress when planning daily classroom instruction (Schmoker, 2005; Blink & Halverson, 2005). To contribute to the body of knowledge on data-driven decision-making in schools, this study explored the use of data at the classroom level to better inform teaching and learning. The research question for this study was: To what extent does the reading comprehension of tenth-grade students improve when ongoing assessment and analysis of student performance is conducted to inform teaching and learning?

Educational reforms in the United States have necessitated the use of data in schools (Herman & Gibbons, 1999). Included in these reforms were mandates from the No Child Left Behind Act of 2001 (NCLB), which required schools and districts to establish reporting systems that were steeped in data collection and reporting processes (U.S. Department of Education, 2006). This federal legislation outlined the expectations
for schools for improving the academic achievement for students and specified the sanctions that could be placed upon school districts that do not meet the targeted progress in student achievement. More importantly, the high financial stakes that were attached to NCLB Act (2001) could adversely affect the financial support that schools and districts receive from the federal government (Herman & Gibbons, 1999). Sanctions could include restructuring of schools and districts that do not make adequate yearly progress and the reduction or reallocation of Title-I funds to offset costs for supplemental services for students. Unfortunately, the loss of some financial support could further limit schools’ ability to provide the best educational program for all students (AFT, 2007).

Some schools and districts that have not established effective accountability systems have relied heavily on state assessments to provide data on student performance. This has been evident in New York State where schools have had to demonstrate Adequate Yearly Progress (AYP) as defined by the state’s accountability system (U.S. Department of Education, 2006). Districts have used the state data to evaluate the effectiveness of their curriculum and student achievement in relation to the mandated state standards. However, while the annual, summative data form state tests provided some pertinent information on school curriculum and improvement plans, they have not been effective in meeting the needs of all students. The lack of systematic analysis and feedback on the effects of instruction on student performance have limited schools in providing students with immediate interventions when needed, which has resulted in a consistent decline in academic achievement for some students (Reeves, 2006; Wayman, 2005).

To meet state and federal mandates for improving the academic achievement of
all students, schools should establish comprehensive accountability systems that use multiple measures to determine students’ success in meeting the state standards (Halverson, Grigg, Prichett, & Thomas, 2005; & Schmoker, 2006). In addition to yearly testing at the state level, or the periodic testing that some districts administer, schools should also embrace systemic reforms that provide ongoing measurement of student performance at the classroom level (Reeves, 2006). The ongoing checks and feedback on student progress could be invaluable in providing timely and systematic collection and analysis of data to better inform instruction and meet the needs of individual students (Delioso, 2004).

Background of the Study

As a federal legislation, the NCLB Act affected schools nationally and has resulted in awareness of the level of accountability that schools face. These educational reforms had high stakes for students, schools, and districts (ED.gov, 2003). In considering the sanctions that they may face should they fail to meet the minimum standards demanded by the reforms, school districts should ensure that their accountability systems are effective in ongoing collection, analysis, and reporting of student performance data for decision-making which is consistent with classroom-level formative assessments in addition to the state mandated summative assessments. Ultimately, the goal of these initiatives should be to improve the academic achievement for all students which necessitates a closer examination of the ongoing use of data to inform daily instruction.
The literature has presented varied measures that school districts have taken to improve their accountability systems (Aschbacher, 1993; Lang et al.; & Valencia, 1997). Many of these approaches have centered on using disaggregated student data that the state has provided for decision-making relating to programs, curricula, and school improvement plans (Bernhardt, 1998; Delioso, 2004). However, little emphasis has been placed on the purposeful, ongoing collection and analysis of data from formative classroom and school assessments to inform practice (Black & Wiliam, 1998; Reeves, 2005; Schmoker, 2005). Formative assessments could provide educators with key indicators of individual student’s strengths and needs. The data could be analyzed to determine the placement of strategic academic supports to ensure direct alignment to students’ needs. More importantly, the data could also be used as a base for establishing accountability systems that provide ongoing feedback on the impact of instruction on student achievement (Aschbacher, 1993).

While some educators cite critical issues that surfaced in their attempts to implement data-driven systems in some schools, others have not seen the relevance of using data to inform their instruction (Englert, Fries, Martin-Glenn, & Michael, 2005). Instead, many educators have continued to rely on their professional experience and intuition to evaluate student needs (Halverson, et al., 2005). Although perceptions of student progress could be helpful in assessing students’ academic growth, educators should take the next step to also incorporate ongoing classroom data on student performance for targeted decision-making. Without such data, educators may be unaware of specific details regarding students’ strengths and needs which might have ensured timely and targeted changes in instruction. The result is that the systematic alignment of
instruction with the specific needs that students demonstrate may be impossible (Schmoker, 2005; Reeves, 2006).

A primary dispute relating to the ongoing collection of data is the disparity of educators' perception of the number of assessments that schools should administer to monitor students' academic growth. Some critics proposed that students have been tested too much (Bliem & Davinroy, 1997). Their negative responses to the systematic collection of data may be warranted; some schools have administered assessments without articulating clear purposes for administering them or establishing specific plans for using the results to improve teaching and learning. In these cases, the connection between the collection of data from assessments and student achievement was not evident and resulted in some educators' perceptions that the assessments were irrelevant (Bernhardt, 1998). Delisio (2004) concurred with the belief that testing students without using the results for taking any meaningful action was pointless. The literature has also documented accountability policies that have not consistently measured the effectiveness of their instructional practice in improving student achievement. Some accountability policies, for instance, have required schools to administer assessments that pay little or no attention to the rigor of the curriculum (Cotrell, 2006). While these schools may be collecting formative data on student performance, the data may not necessarily provide accurate information regarding student performance as compared to the standards.

The literature has also included evidence of a lack of prerequisite knowledge of using data to inform teaching and learning among educators (Aschbacher, 1993; Herman & Gibbons, 1999). Researchers have documented that when compared with district and school administrators, teachers have been least likely to have access to data or data
systems to engage in data-driven practices (Englert et al, 2005; Lang, et al, 2005). Moreover, even with access to data and data-systems, many educators have not shown much knowledge regarding the types of data that they should collect, the analysis of data, or an understanding of the data reports that they have received on student performance (Wayman, 2005). Consequently, there has been noted disinterest among some educators in using data to inform their practice.

Despite the limitations of school faculty in having requisite skills for using data to inform their practice, proponents for the ongoing collection and analysis of student performance data have strongly proposed that improved student achievement may be dependent on the use of formative data for making informed decisions regarding teaching and learning (Stiggins, 2004; Wayman, 2005). These supporters have further proposed that improved student achievement has been realized when educators have explicitly articulated students' current status in meeting the standards and have established practices that ensure the alignment of instruction with the academic needs of students (Stiggins; Wayman).

Furthermore, some schools have relied solely on standardized, summative data that the state has provided annually for their school improvement plans. However, these schools have faced the challenge of not knowing the specific reason for student success or failure. According to Reeves, “teachers and leaders are unable to link their professional practices to results because they do not know how their practices influence achievement” (2006, p. xxi). If this is the case, successful student achievement would be difficult to replicate and specific analysis regarding poor student achievement would be challenging to address. Moreover, summative data would not provide teachers and
students ongoing, timely, and relevant feedback that they would need to make changes to teaching and learning.

Empirical studies on data-driven instruction have validated the theory that establishing an ongoing, systematic approach to collecting, analyzing, and using data to support school decisions could improve student achievement (Boreman et al., 2002; Herman & Gribbons, 1999; Lozette & Jacoby, 1992). However, immediate, quality feedback to inform instruction has been lacking in many of the accountability policies that districts have implemented.

Research Problem Statement

It is evident that a special formula to improve student achievement does not yet exist; however, there are characteristics that differentiate consistently successful schools from poor performing schools (Cotton, 1988). Comparative studies (Cotton, 1988; Rumery, 2000) have indicated that an essential factor for improved student performance is data-driven instruction. However, some educators continue the practice of teaching their curriculum without assessing whether students understand or learn the information taught. They also make assumptions regarding student needs without analyzing student work to identify specific needs of each student; therefore, instruction may not address strategies and information that students might need to be able to move forward with their learning.

This study examined data-informed instruction and its impact on the reading comprehension of tenth-grade students. The focus of the study was on the implementation of a data-informed instructional model that incorporated the use of ongoing formative assessments to create purposeful changes in instruction to meet the
changing needs of students. The goal was to improve student achievement by addressing students’ needs in a timely manner and providing ongoing feedback on next steps for improvement.

Theoretical Rationale

The conceptual framework for this study (see Appendix B) was grounded in data-driven theories and related experiences of the researcher. Some of the frameworks around which data-driven theories were established were based on the conceptual framework proposed by Edwards Deming: “Total Quality Management” (Deming, 1994). This cyclical process of establishing plans, implementing them, assessing their effectiveness, and using the results to improve practice was also evident in the Data-Driven Instructional Systems (DDIS) model that was developed by Blink and Halverson (2005), the Theory of Action (TOA) model used by William and Hewlett (2004), and the Data-Driven Decision Process presented by the Education Commission of the States (ECS, 2000). The ongoing process of checking students’ strengths and needs and using the data to make informed decisions regarding teaching and learning was embedded in the conceptual framework of the instructional model that was implemented in the experimental group during this study.

Significance of the Study

The focus on educational reforms and mandates in the United States has been instrumental in heightening the need for schools to provide evidence of improved student achievement (Reeves, 2006). Educators have to discern whether their decisions and instructional practices are instrumental in fostering educational competence among all students as specified by the educational standards established by the state (NCLB).
An emphasis on data-driven school reform has been consistently documented in the literature (Herman & Gribbons, 1999; Kosanovich-Grek, 2005; Lachat, 2001). In addition, empirical evidence on data-driven school reforms has proven that schools that systematically use student data to make informed decisions regarding teaching and learning have improved student achievement (Lachat, 2001; Trautman & Klemp, 2004). However, despite the accountability mandates and the compelling evidence of the positive impact that data-driven decision-making could have on student achievement, many educators continue to resist participating in data-informed practices.

Bliem and Davinroy (1997) discussed the inconsistency that exists between the literature and teachers' perceptions of the relevance of using data to inform instruction in their classrooms. They cited some factors that may account for the slow movement toward data-informed decision-making in education. These factors included the following:

- Lack of prerequisite knowledge of educators in data use
- Fear of data being used by administration for punitive measures
- Inadequate access to technology that facilitates data-informed practices
- Reluctance of educators to give up traditional practices

The first factor is critical; lack of knowledge has led to the inability of some educators to connect classroom instruction to data-informed decision-making (Schmoker, 2006). This may be due to the educational reforms that many states have established for collecting and reporting summative data which have focused on school improvement and program changes and not on classroom data (Schmoker, 2006; Lachat, 2001; Reston,
As a result, teachers associate the use of data with making decisions for school-wide reform and not for instructional changes at the classroom level.

Bernhardt (2000) addressed the issue of teachers being hesitant to use data to inform their practice for fear of the data being used by administrators to judge them. Teachers feel that they would be held responsible for students not making the required standards when there may be other factors that may be influencing the students’ performance. Teachers’ fear of inaccurate evaluation of their practice was also discussed by Lachat and Smith (2005) who stated that “Effective use of data requires a culture that is driven by inquiry, not fear” (p. 337).

Emerging studies have made some connections between data use and classroom decision-making (Halverson, et al., 2005; Lang, et al., 2005; Reeves, 2006; Schmoker, 2006). However, the reports reviewed have mostly focused on theoretical dogma rather than providing empirical evidence of the impact that classroom-level, data-informed practice may have on teaching and learning, or they have examined student achievement from the perspective of the impact of school improvement and district initiatives (Kosanovich-Grek, 2005; Lachat, 2001; Schmoker, 2006). These factors have made the need to conduct further research on using data to inform classroom instruction a priority for current studies (Reston, 2004).

This study provided a practical instructional model of using data to inform classroom instruction with the goal of improving student achievement. The instructional model was a hybrid of data-driven practices of the researcher and models from the literature, such as the Breaking Ranks Model (Lachat, 2001) and the Data-Driven Instructional System Model (Blink & Halverson, 2005). The model for this study
provided a purposeful approach to collecting, analyzing, and reporting students' academic data from formative assessments to inform daily decisions regarding teaching and learning.

Purpose of the Study

The purpose of this study was to examine the impact that a data-informed instructional model may have on the reading comprehension of tenth-grade students. This study was designed to inform instructional practice in reading comprehension with the implementation of a data-informed instructional model and to determine whether there was a relationship between data-informed instruction and student achievement.

Research Question

To support the purpose for this study, the following research question was considered:

To what extent does the reading comprehension of tenth-grade students improve when ongoing assessment and analysis of student performance are conducted to inform teaching and learning?

This question was addressed in this study and provided empirical evidence on whether any significant improvement in students' reading comprehension occurred when a data-informed instructional model was consistently used to provide targeted, timely, and relevant feedback.

Definition of Terms

This study acknowledged as a premise that there was a demarcation between testing and assessment, which may be insightful in differentiating the success or lack
thereof in some accountability systems. Find below definitions of other terms used in this dissertation.

*Assessment.* The ongoing monitoring of student performance to identify students’ needs and strengths and to determine the best instructional supports that should be in place to meet their needs (Reeves 2006).

*Data-driven instruction.* The process of administering formative and summative assessments for collecting student performance data and analyzing the data to inform decisions regarding teaching and learning.

*Data-driven school reform.* Collecting and analyzing student data to plan school improvement initiatives. These student data may include attendance, standardized tests, district tests, demographics, and teacher-supported study time. Reform includes such things as changes in school programs, policy, and procedures.

*Data-informed instruction.* This is the ongoing collection and analysis of students’ academic performance from classroom assessments or assignments to inform instruction, plan academic interventions, and provide students, parents, and teachers with ongoing and relevant feedback on the impact of instruction on student achievement. The expectation is for students to be provided with specific feedback relative to strengths and needs evident in their work.

*Data-warehouse.* These are technological data systems that house school and district data such as student demographics, state and district testing data, and other data that foster easy efficiencies in collecting, analyzing, and storing data on a range of school and district information.
**Formative assessment.** This “refers to all those activities undertaken by teachers, and by students in assessing themselves, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged” (Black & Wiliam, 1998, p. 140).

**High-performing schools.** These schools demonstrate that the majority of their students meet and surpass the academic standards as defined by their state or school district.

**Instructional technology.** These are computerized systems whose functions include storing, scoring, analyzing, and creating statistical charts on a range of data on students and their academic performance.

**Low-performing schools.** These are schools that demonstrate poor student achievement in relation to students meeting the requisite academic standards determined by the school district or state in which they reside.

**Standards.** The level of quality that is accepted as the norm

Summative assessments. These are cumulative assessments that are given at the end of a learning unit, program, or course to determine whether students have met the performance outcomes.

**Testing.** Refers to administering summative tests to determine what students know in relation to the standards (Reeves 2006).
Chapter 2: Review of the Literature

Introduction and Purpose

Operating in a realm of accountability mandates and sanctions at district, state, and federal levels, schools in the United States face challenges in implementing data-driven systems for informing their decisions and ultimately improving student achievement. This literature review includes an examination of school reform models that conduct data-driven practices to improve student achievement. The data-driven reform models include the use of data in both low-performing and high-performing schools. Then, factors that hinder and foster the implementation of data-driven systems and address the implications for establishing data-informed instructional practices at the classroom level are presented.

Comprehensive School Reforms

Research-based comprehensive school reform models. Empirical studies of comprehensive school reform models consistently show that using data for decision-making provides conclusive evidence of instructional practices that are effective for improving teaching and learning. Additionally, these studies stress the need for comprehensive reforms to ensure sustainability of new initiatives.

Boreman, Hewes, Overman, and Brown (2002) conducted a meta-analysis of comprehensive school reform (CSR) models to identify common characteristics that contribute to the highest gains in student achievement. Comparative studies of the literature facilitated the selection of 29 CSR models used for this study. These researchers
conducted empirical analysis of the methodological biases of researches that were previously conducted on the inclusive models. The inclusion criteria for this research sample were scientifically based evidence of the models’ effectiveness in improving student achievement and the methodological biases found in the researches. The criterion for level of effectiveness was determined by student success on standardized assessments with expectations for students from CSR schools to score one-eighth of a standard deviation (2.5 NCEs) higher than control groups from non-CSR schools. Independent variables identified in the 232 studies that met the inclusion criteria totaled 1,111, and the methods used for computing the effect size for the study were standard deviations, frequency distributions, and correlations.

The CSR models that were statistically significant and had positive student achievement effects in this meta-analysis were Direct Instruction, School Development Program, and Success for All (Boreman et al., 2002). The findings demonstrated correlations among these CSR models regarding their effects on improving student performance. Also noted in these findings was evidence that student data were used to inform instruction in the three most effective CSR models, which was consistent with the literature (McTighe, J. & Wiggins, 1999).

*Comprehensive reform in low performing schools.* Lachat (2001) conducted a study in eight low-performing high schools that had implemented the Breaking Ranks school reform model (1996) to guide their decisions. According to Lachat (2001), a key component of the Breaking Ranks Model was to establish a system for collecting and analyzing data to improve instruction. She indicated that before the Breaking Ranks Model was implemented, decisions were based on the staff’s perceptions of programs and
systems that worked. After implementing the data-driven decision-making process, evident in the Breaking Ranks Model, the staff in the schools from this study recognized that their perceptions about teaching and learning were not always accurate because they lacked the necessary evidence to make informed decisions. Although this research ended prior to acquiring sufficient data to determine the impact of this instructional approach on student achievement, the findings indicated an increased awareness among the faculty of the necessity of using data for making educational decisions. It was evident that the instructional focus in these schools shifted from teaching a standardized curriculum in specific time periods to creating plans around student performance data.

**Comprehensive reform in high-performing schools.** In 2004, the International Center for Leadership in Education conducted a national study in the United States to identify key characteristics of successful schools. The purpose of the study was to identify the strengths and best practices in each school that could be replicated in other schools. During this study, thirty urban high schools were recommended by state education leaders for this project based on their high student achievement across disaggregated student population. This study gathered data through pre-visits which consisted of phone conferences and site visits at each of the thirty schools. The findings demonstrated that one of the principal factors noted in the schools was the use of data to inform decisions regarding student achievement. While some of the schools collected and analyzed data from state assessments, others used a combination of state data and school assessment data to inform their decision. The key findings from this
study were the staff’s new focus on making informed decisions about school plans and practices based on evidence from their student performance data.

Factors That Hinder Data-Informed Practices in Education

*Lack of requisite expertise in using data.* Lang, et al. (2005) studied the prerequisite knowledge and perceived skills that educators demonstrate when using student data to make instructional decisions and implement school reforms. These researchers studied 125 educators from 25 middle schools throughout Florida whose student populations ranged from 20% to 78% for eligibility to receive free or reduced lunch. The sample size included a total of 22 principals and assistant principals, 22 reading coaches, and 81 teachers.

The inclusion criteria for this study required each school to have a reading coach, core and supplemental reading programs, a reading assessment plan, and at least three reading or language arts teachers who did not teach the same group of students. To test participants’ knowledge of reading assessments and data analysis, Lang, et al. (2005) administered a Test of Assessment Skills and Knowledge (TASK). Additionally, two surveys were used to test participants’ perceptions of their ability to use data and their attitude toward reading assessments: (1) Survey of Reading Endorsement Competencies (SREC), which had an alpha coefficient of the rating scale of 0.95 and (2) Survey of Concerns Related to Reading Assessment Training (SCRRAT), a derivative of the Concerns-Based Adoption model (CABM), and whose alpha coefficients ranged from 0.64 to 0.83. These instruments were administered over a two-week period through a Blackboard 6 (Bb6) online system. The data were analyzed for descriptive statistics and reliability estimates using Cronbach’s alpha, Microsoft Excel, and SPSS instruments.
The findings from this study indicated that all three samples scored low on all three instruments. On the TASK instrument, the mean score was 54.05 out of a total possible score of 99 with no statistically significant difference between the groups as indicated by this ANOVA, $F(92, 122) = 4.10, p = .02$. On the SREC instrument, 122 participants had a mean score of 53.36 ($SD = 11.62$), and the ANOVA, $F(2, 118) = .78, p = .46$, showed no statistical significance. Results from the SCRRAT survey indicated a correlation among the participants’ perceptions of their awareness and willingness to get information on reading assessments. These were evident in the data, which showed a ranking in the 91st percentile for the highest group score.

The findings from this research (Lang, et al., 2005) were consistent with the literature, which showed distinct limitations in educators’ ability to use data to inform their decisions (Aschbacher, 1993; Herman & Gribbons, 1999). The findings also demonstrated a need for educators to improve their knowledge and skills in collecting, analyzing, and reporting student performance data to better inform decisions they make regarding teaching and learning (Schmoker, 2005; Trimble, 2005; White, 2005).

The need for professional expertise in using data was also evident in the study conducted by Herman and Gribbons (1999). This study focused its findings on two urban schools in southern California. The purpose of this study was to establish a system that would build staff capacity to use information for decision making. Their initial investigation into the use of data to inform decisions in these schools revealed inefficiencies which included the need for professional expertise to identify, analyze, and interpret the data that they had collected. Therefore, even though data was available, the inefficiencies prevented staff from using them to inform decisions.
Mieles and Foley (2005) conducted research in eight districts that have established data warehouse systems to support their initiatives. The premise from Mieles and Foley’s research was to compile information from these schools about the implementation of their data warehouse systems and documenting information to help other schools have an easier process in implementing a data warehouse. This study was conducted in eight states, in mostly urban districts with student populations that ranged from 900 to 274,000 students. A key element that was consistent in the literature was the faculty’s lack of expertise in analyzing data or even to compose questions about the data that would provide relevant information about teaching and learning (Aschbacher, 1993; Bliem & Davinroy, 1997). In addition, the efficiencies in getting relevant information from the data in a timely manner were difficult to achieve. Collecting, analyzing, and reporting of data were lengthy processes that limited the use of the data for ongoing feedback on teaching and learning. Furthermore, some teachers did not see the relevance of the data to their classroom practices (Mieles and Foley). These factors contributed to the ineffectiveness in the use of data for decision-making on student achievement.

Aschbacher (1993) examined the impact new assessment initiatives could have on educators. She conducted action research in several schools with diverse student populations. The focus of the research was to implement performance assessments and analyze the barriers and facilitators toward implementation. This research indicated that educators consistently had difficulty articulating the outcomes that they expected from performance assessments. The key factors that created barriers to implementing the new assessment initiative pertained to the teachers’ focus on learning activities rather than outcomes, difficulty or unwillingness to determine the criteria to judge student work, lack
of time, need for training, aversion to assessments, and reluctance to change. Her findings were consistent to those of Reeves (2004) and Stiggins (2002), who also indicated that much of teachers’ planning focused on planning activities for instruction rather than analyzing student outcomes. These barriers to implementing performance assessments were indicative of the reluctance to incorporate data-informed instruction in classrooms.

Educators’ perception of data use. Englert, Fries, Martin-Glenn, and Michael (2005) conducted a comparative, descriptive analysis of responses from superintendents, principals, and teachers regarding their incorporation of assessments and accountability practices in their professional practice. They also compared each group’s perceptions of these practices in relation to student achievement.

Surveys were administered to each group separately, over a two-year period, in four states. Independent studies were conducted for each group, which were analyzed for implications regarding practice. These data were then compared for correlations and differences among the groups. For the independent group studies, the inclusive samples consisted of 49 superintendents, 121 principals, and 153 teachers from rural, urban, and suburban districts. To determine the variation in responses relative from one group to another, a smaller sample was used that comprised all of the teachers from the first sample (N = 153), the principals of those teachers (N = 27), and the superintendents of those principals (N = 19). Due to the small sample size, characteristics of each group were analyzed for sampling bias. The data indicated that the sample was representative of the population of the schools in the representative states. For the first analysis, an examination of the mean differences of the constructs between the groups was conducted.

The analysis of this research data showed significant differences between
teachers' and principals' responses regarding data use, with teachers rating their use of data and perception of the quality of their accountability systems comparatively low (Bliem & Davinroy, 1997). This result was also evident in the nested analysis that was conducted for this research (Englert, Fries, Martin-Glenn, & Michael, 2005). The findings demonstrated a correlation between the analysis of the larger samples and the smaller groups for the nested analysis. Even though the data for the nested analysis were gathered from respondents from the same schools and districts, the findings showed similarly low perceptions and use of data among the teachers' groups as compared to the principals' groups.

In a one-year study of fourteen teachers in three elementary schools, Bliem and Davinroy (1997) reported that teachers' beliefs about assessments may be a critical factor that researchers should address when implementing new instructional practices. During this research, teachers were provided with embedded performance assessments to determine students' reading ability. The focus of this research was to analyze teachers' responses as they implemented and analyzed the results from these performance assessments. The data from this research were gathered primarily from transcripts of bi-weekly meetings that the researchers had with the teachers. The findings indicated that teachers' perceptions about the purpose of assessments had a profound impact on their instruction. For example, teachers used one of the assessments to assess all of their students even though they were told to assess only students who were reading below grade level. There was an underlying belief that all students should use the same assessments to be fair. This research indicated that despite explicitly stated goals of connecting assessment to instruction, teachers focused mostly on the assessment and did
not make the connections of its impact on instruction until the end of the year.

Factors that Foster the Use of Data in Schools

Professional development. A study by Wayman and Stringfield (2006) also showed inefficiencies in data use in the schools that they studied. However, with professional supports in place, they reported the success that could be achieved in implementing a data-informed system in schools. Wayman and Stringfield studied three schools that were known for their emerging use of school-wide student data systems to identify correlative trends that may facilitate the school-wide use of student data systems and to discern the impact they may have on the practices and attitudes of faculty. This research sample comprised 28 participants that included district administrators and school faculty. Data were gathered from taped interviews, which were conducted by phone and at the school sites, and then transcribed for a descriptive analysis. The research findings demonstrated that school-wide use of student data systems increased efficiencies in the professional practice of the sample studied and increased collaborations among staff. Key factors that were consistently evident in facilitating school-wide use of student data systems included the following:

- Support of district and school administrators in fostering a school culture that was technologically equipped with data-warehouse programs for systemic collection, analysis, and reporting of student data
- Large-scale interest by faculty in using data to inform practice
• Ongoing professional development for faculty. Consistent with the literature (Rosenholtz, Zelm, & Kotter, 1993; Mieles & Fuley, 2005) were data from some of the participants in this research, whose limitations in using data created a corresponding negative perception of data-driven practices.

*Instructional technology.* The literature expounds the benefits of establishing data systems that track student progress and provide accurate information regarding student achievement (Keeney, 1998; Montgomery & Rossi, 1994; Wayman, 2005). According to Montgomery and Rossi, a systemic approach to collecting student performance data to inform decisions about teaching and learning should be a principal goal for schools. This viewpoint was also supported by Wayman (2005) who reported that consistent use of data for decision-making correlates to improved student achievement. Data technology could help to facilitate more efficient and timely collection and analysis of data.

Trautman and Klemp (2004) also examined the role of technology in fostering the use of data to inform educational decisions. They conducted research in four elementary, suburban schools to examine the effects on student achievement when student performance data were used to inform instruction. Over a two-year period this research examined the integration of a computer-based instructional program, *A+nyWhere Learning System,* which incorporated the concepts of mastery learning. The inclusion criterion for this study was the sample’s use of the A+nyWhere Learning System. Teachers in all of the inclusive schools were trained in using this technology program. However, while two schools were given the choice to use this tool instructionally, the
others were mandated to use it, which was an important factor for the methodology used in this study.

The sample for this study consisted of 980 students from all four schools, which was approximately half of the total population of the schools. Data were collected from instruction conducted during the regularly scheduled instructional time and where students spent approximately 19 to 22 minutes per week using the A+nyWhere Learning System. The research analysis was conducted by using descriptive statistics and analysis of variance analytic procedures. The findings from Trautman & Klemp’s (2004) research showed significant gains in reading and math among students from the mandated schools as compared to the optional-use schools. These data have been consistent with the literature, which reported a positive impact on student performance when student performance data were used systematically to inform instruction (Bliem, 1997; Reston, 2004; Stiggins, 2004).

Summary

The focus on school accountability has fostered more awareness regarding the use of data to drive school reforms. Contemporary schools have to take active roles in collecting and analyzing data to make informed decisions to improve student achievement. The heightened awareness of data-use in education has fostered a better understanding of using data to make informed decisions regarding student achievement. More importantly, educators now know that the necessary tools to respond to questions about student performance data and their implications for teaching and learning are available (Schmoker, 2006).
Even though the literature presented empirical evidence of the benefits to student achievement when data were used to inform school improvement decisions, studies that examined the process of using data to inform daily instruction as its principal focus for improving student achievement were not found. Current literature addressed district and school reforms with some information pertaining to classroom instruction. Some technological programs that have provided schools data to inform practice have been cited in the literature (Kosanovich-Grek, 2005); however, they have been costly and difficult for some districts to sustain and some teachers have continued to be hesitant in using the data to inform daily instruction. Conducting research on the use of current data at the classroom level to inform daily instruction and learning will add to the current body of knowledge.

The ensuing methodology presents a research process that will be used for this study. It establishes systematic collection, analysis, and reporting of student performance data to inform teaching and learning. A theoretical framework that relates to Deming's Total Quality Management Theory (1985) and Blink and Halversonthe's Data-Driven Instructional Systems (2005) is used in this model to guide the analysis and decision-making process to ensure that the best instructional practices will be implemented to address students’ needs and ultimately improve student achievement.
Chapter 3: Research Design and Methodology

Introduction

To explore the impact that data-informed instruction may have on student performance, investigations should occur at the classroom level to foster ongoing feedback on the effects of instruction on meeting the academic needs of students. Such investigations can provide critical data on the factors that may facilitate or impede the effectiveness of a data-informed instructional model. The research question that was investigated in this study was:

To what extent does the reading comprehension of tenth-grade students improve when ongoing assessment and analysis of student performance are conducted to inform teaching and learning?

The study examined whether the treatment, a data-informed instructional model, implemented with the experimental group had an impact on student performance reading comprehension. The null hypothesis that was tested stated that student achievement does not improve with data-informed instruction. The alternative hypothesis was that student achievement should improve with data-informed instruction. This chapter will present the methodology that was used for this study that was conducted at Mc Brier School District (a pseudonym for the name of the district).

Research Design

A true experimental design (Campbell & Stanley, 1963) was used in this study in which a pretest and posttest were administered to one experimental and two control
groups of students. In the Mc Brier School District, students were randomly assigned to their core classes through the use of the CIMS Data Management System at the beginning of the school year. This random assignment of students to their English classes established randomization for the research model.

A quantitative method was used for collecting, analyzing, and reporting the data for the study. Data were collected from the pretest and posttest that comprised reading comprehension selections and questions from New York State Regents Comprehensive English Exams for June 2003 and June 2005 respectively. These selections were chosen because they were recent and the multiple choice questions for the section of the test that was used included questions on making inferences. This performance indicator was important for this study because it is usually an area of difficulty for students who struggle in reading comprehension (Cain, Oakhill, Barnes & Bryant, 2001; Keene & Zimmerman, 2007; Woolley, 2005). The data from the pretest and posttest were analyzed to determine whether the treatment had any impact on the reading comprehension of the students in the experimental group as compared to the performance of the students from the control group who had the conventional instructional model of the district.

The decision to focus on reading comprehension as the academic concept to be measured in the pretest and posttest was determined by the poor student performance in this reading standard. Poor student performance in reading comprehension was an overall concern at Mc Brier High School, but it was especially evident among Hispanic and African American students at this school. The school data (NYS Report Card, 2005-06) showed that the academic achievement in English Language Arts of African American and Hispanic students consistently lagged behind the general population. Since one of the
mandates for the No Child Left Behind (NCLB) Act (2001) specified that all students, regardless of their demographics, should demonstrate proficiency in reading as measured against the state standards, it was essential for Mc Brier High School to address the gap in reading performance among its students.

The data-informed instructional model was especially selected to address the needs at Mc Brier High School for providing students ongoing and essential feedback on their academic performance with the goal of improving students’ academic performance. The concern regarding the lack of timely and relevant feedback from teachers became evident in the data from the Mc Brier School District’s annual School Quality Survey (2005).

An analysis of the survey data indicated that students rated teacher feedback on their academic performance as being inadequate in meeting their needs. This student perception data showed that students perceived teachers’ feedback as being inconsistent and often provided too late for them to make necessary changes for improving their work. The perception of a lack of explicit and timely feedback from teachers at Mc Brier High School may have been a contributing factor to the low academic achievement at Mc Brier High School compared to the other high schools in the district. The literature confirms that ineffective feedback to students on their work is one characteristic of schools that have low student achievement (Lachat, 2001; Black & William, 1998; Reeves, 2006). When compared to the other high schools in the district, Mc Brier High School demonstrated lower student achievement scores on standardized tests than the other schools in the district, which was evident in the student data from the NYS Report Card for the Mc Brier School District (2005/2006).
The data-informed instructional model (Appendix B) was developed from the teaching experience of the researcher and a hybrid of other data-driven instructional models that were documented in the literature (Lachat, 2001; Blink & Halversont, 2005; William & Hewlett, 2004). This model consisted of an ongoing evaluation of targeted teaching and learning outcomes to provide feedback to teachers and students of their progress or lack thereof.

Research Context

The study was conducted from March 17, 2008 to June 13, 2008 at a large suburban school district in New York State. The student population at the Mc Brier School District comprised 13,634 students, with an instructional and support staff of 2,945 people. This district consisted of three high schools, three middle schools, one sixth- to twelfth-grade school, and twelve elementary schools. Mc Brier High School was one of the three high schools in this district.

Mc Brier High School had a total student population of 1,425 students. Its neighboring community consisted of a diverse population that was reflected in the student demographics. This student population included 10% African American, 6% Hispanic, 2% Asian, and 82% White (NYS School Report Card, 2005/2006). The data from the school report card (Appendix A) also showed that 30% of the students at Mc Brier High School are eligible for free or reduced lunch. This percentage appeared to be small when compared to urban schools in New York State; however, it was high when compared with the other high schools in the Mc Brier School District. The percentage of students that participated in free and reduced lunch programs in the other high schools in this district ranged from 12% to 24% (NYS School Report Card, 2005/2006).
A comparison of the demographics of Mc Brier High School and Mc Brier School District was conducted to show the level of diversity at this high school when compared to the disaggregated data for the district. Of the total student population in the district (n = 3520) that received free or reduced lunch, 423 of these students were enrolled at Mc Brier High School. This disproportionately higher number of students in each disaggregated area that attended Mc Brier Higher School as evident in Table 3.1 was a critical factor for understanding some of the differences among the student population at Mc Brier High School as compared to the general population of the district. This table demonstrates the number and corresponding percentage of the students at Mc Brier High School compared to the total student population of the Mc Brier School District for each disaggregated area. Although the diversity in the student population was an asset to the school, it posed the need for a different approach to instruction to meet the changing needs of the students.

Table 3.1

Demographics: Mc Brier High School Compared to Mc Brier School District

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Enrollment</th>
<th>Eligible Free/ Reduced Lunch</th>
<th>Black African/ American</th>
<th>Hispanic</th>
<th>White</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>District (2005/06)</td>
<td>13154</td>
<td>3520</td>
<td>1064</td>
<td>622</td>
<td>11157</td>
<td>311</td>
</tr>
<tr>
<td>Mc Brier HS (2005/06)</td>
<td>1425</td>
<td>423</td>
<td>139</td>
<td>84</td>
<td>1167</td>
<td>35</td>
</tr>
</tbody>
</table>

Although the diversity in the student population was an asset to the school, it posed the need for a different approach to instruction to meet the changing needs of the students.
Table 3.2 represents the demographics of the students who participated in this study. Of the three groups, the experimental group consisted of more minority students which totaled 33% of the total population for that group. The percentage of minority students for Control C was 11% and Control R was 5%.

Table 3.2

Demographics: Total student population by groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Black/ African American</th>
<th>Hispanic</th>
<th>White</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Control C</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Control R</td>
<td>18</td>
<td>1</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
</tbody>
</table>

Research Participants

Teachers. Three English teachers participated in the study, all of whom were responsible for two or more English 10 classes. All three teachers were novice teachers with only one year of prior teaching experience. The teachers from the experiment group and one of the control groups were specifically selected for the study because of the similarity of their experiences in teaching. They both had one year of teaching experience which provided a basis for establishing similarity. The original teacher for the second control group was a veteran teacher; however, due to a leave of absence at the commencement of the study, another teacher replaced her. The teacher that assumed this position happened to have one year prior teaching experience also, which made all of the teachers in the study comparable in teaching experiences.
The researcher did not use randomization for the selection of the teacher for the experimental group. Identifying the experimental teacher from the three teachers who participated in the study was deliberate. The limited time frame of the study necessitated the selection of a teacher who had the basic rudiments of instructional practice and receptivity to using the data-informed instructional model. After informal discussions with each of the three teachers, the researcher selected the teacher who met these criteria.

Labels were chosen by the researcher to represent the teachers who participated in the study to differentiate the groups that they taught without revealing their identities. The labels were Teacher E for the experimental group and Teacher C and Teacher R for the control groups. Their classes that were included in this study were similarly labeled: Experimental group, Control C group, and Control R group.

Students. At Mc Brier High School, students are randomly assigned to their core classes, which include English classes, using the CIMS data management system. Students are not given the option to select their core classes except a small percentage of students who request to enroll in specific programs. For example, at the tenth-grade, students can request to enroll in the English Honors course rather than the regular English 10 course. Out of 333 tenth-grade students, 45 students were enrolled in the English 10 Honors classes for the 2007/2008 school year, and those students were not included in the study.

The students from the control and experimental classes were all randomly assigned to their English classes by the CIMS Data Management System. This study acknowledges that each student is uniquely different in their academic abilities; however, there are some similarities in their experiences in their English 9 classes that would have
provided them similar skills in reading. They all received the same curriculum and instructional model that was required for all ninth-grade students at Mc Brier High School. This curriculum was aligned to the Mc Brier School District’s curriculum requirements and the State standards. Furthermore, all English 10 students had to successfully complete the English 9 course requirements before being accepted for English 10 which would have aligned their reading experiences and establish the similarities among the groups.

The study included all students that were enrolled in the experimental and control classes. The registered students for each class that participated in the study were as follows: the experimental group comprised 21 students; the control groups, labeled Group C and Group R, consisted of 25 students and 24 students respectively. The total number of registered students for the classes that were present at the beginning of the study was 70 (N = 70).

Although all of the students stayed in their groups for the duration of the study, the attrition rate from the pretest to the posttest was low. From a total of 70 students, 52 students were present for both the pretest and the posttest. This affected the number of students whose scores were used for the data analysis for the study. Of the 52 students that sat for both the pretest and the posttest 15 students were from the experimental group, 18 students from the Control C group, and 19 students from the Control R group.

Procedure

All of the teachers were informed of their roles in the study and the need for them to commit to the guidelines of the study. They were informed that their participation in the study was voluntary and they had the right to revoke their permission any time during
the study; their names would not be included in the study; and the results would not be used to assess or evaluate their performance in their roles as teachers at Mc Brier High School or for any other evaluative purposes. In addition, the researcher did not conduct any formal observation or evaluation of their performance in their classrooms on behalf of the school or the district nor did the researcher use any information from the study to influence the annual classroom observations and teacher performance evaluations that were conducted by school and district administrators.

Classroom observations. The professional pedagogy at Mc Brier High School includes classroom observations by administrators, mentors, and lead teachers. These observations are both formal and informal with the administrative staff conducting the formal observations for teacher evaluations. The informal observations are typically frequent and brief. The purpose of the informal observations is to capture a snapshot of instructional practice and to provide teachers ongoing feedback on the instruction that is observed with the intent to improve practice. The teachers in the study were provided additional support because they were novice teachers. The support included informal classroom observations by the administrators, the lead teacher from the English Department, and other veteran teachers who had assumed the role of mentors.

The researcher conducted informal observations that were similar in nature to typical walk-through observations in all of the classrooms that were included in the study and provided teachers feedback on their practice. These observations varied between 10 minutes to 20 minutes. The feedback to the teachers from the control groups directly pertained to their practice compared to the district’s expected instructional practice. After the observations, the researcher met with the teachers to provide feedback on their
practice. When the lead teacher visited these classrooms, the researcher met with her to discuss the teachers’ progress and determine any additional support that they might need to effectively meet the district’s expectations for instructional practice.

The teacher from the experimental group received feedback pertaining to the data-informed instructional model that she was implementing. The observations of the experimental class were considered manipulation checks because they provided valid evidence of the teacher’s fidelity to the study. The manipulation checks were conducted in the experimental classroom at least once for each two-week period of the study. While conducting the manipulation checks, the researcher recorded the observations using handwritten notes and a checklist (Appendix E) that was developed by the researcher to determine whether data-informed instructional practices were evident in the experimental class. The information from the handwritten notes and the checklist on the teacher’s use of student performance data to inform the lessons observed was collected. Although manipulation checks may hinder the natural process of the lesson, this phenomenon was alleviated once the teacher became accustomed to being observed and also because the observations were no more than twenty minutes. After the first manipulation check and the follow-up meeting, the teacher had a better understanding of the process and the purpose for the classroom checks which made her feel more comfortable with these class visits. The benefits of the manipulation checks included the personal observation of the data-informed instructional model as it was used in the experimental class and for conforming the teacher’s fidelity to the treatment model (Campbell & Stanley, 1963).

Additionally, a follow-up meeting with targeted agenda (see Appendix E) was conducted with the researcher and the teacher from the experimental group after each of
the manipulation checks. The purpose of the meetings was to provide the teacher and the researcher an opportunity to discuss the teacher’s perception of the efficacy and effectiveness of implementing the treatment. The researcher also addressed any concerns that arose regarding the teacher’s fidelity to the data-informed instructional model. Moreover, the researcher posed open-ended questions to facilitate the discussions.

*Professional development.* The teachers from the control and experimental groups received professional development that was available to the faculty at Mc Brier High School, some of which were required. Once per week when school was in session, the faculty engaged in professional development or pedagogical discussions which lasted for one hour after students are dismissed. The professional development was provided by the district, the school, and the academic department. It included the following activities: using best instructional practices, modeling of effective instruction, analyzing student data from summative assessments, and presenting exceptional lessons. The pedagogical discussions occurred at one of the weekly sessions each month and were facilitated by the instructional leader for the department.

All three teachers met with the researcher at least once bi-weekly for approximately 15 to 30 minutes for each meeting. These meetings included discussions and mini-professional development regarding their instructional practice and supports that they needed to improve their practice. While the discussions and professional development with the teacher from the experimental group centered on data-driven instruction, those with the teachers from the control groups were related to the current instructional program employed by the district. The characteristics and instructional protocol for the control and experimental teachers are demonstrated in Table 3.3.
Table 3.3

*Teacher Characteristics and Instructional Protocol*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Teacher E</th>
<th>Teacher C</th>
<th>Teacher R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Experience</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Groups</td>
<td>Experimental</td>
<td>Control</td>
<td>Control</td>
</tr>
<tr>
<td>Instructional Model</td>
<td>Data-Informed</td>
<td>Mc Brier District</td>
<td>Mc Brier District</td>
</tr>
<tr>
<td>Professional Meetings</td>
<td>Meetings with</td>
<td>Meetings with</td>
<td>Meetings with</td>
</tr>
<tr>
<td>Meetings</td>
<td>English Department and with researcher</td>
<td>English Department and with researcher</td>
<td>English Department and with researcher</td>
</tr>
<tr>
<td>Professional Development</td>
<td>development on data-informed instruction</td>
<td>development on the district’s instructional model</td>
<td>development on the district’s instructional model</td>
</tr>
</tbody>
</table>

A key component of the instructional model that was used for the experimental group was the ongoing feedback sessions between the teacher from the experimental group and the researcher, which was an essential component for this data-informed instructional model. The feedback on the implementation of the model was pertinent to the study. It fostered discussions regarding data collection from student assessments and assignments, data analysis, modifications to instruction to meet individual needs of students, and reflections on the impact of instruction on students’ academic performance. The discussions were essential for implementing and sustaining the data-informed instructional process.
Instruction. The treatment for the experimental group included the use of a data-informed instructional model to facilitate a systematic approach to using formative classroom assessments to inform teaching and provide students timely and relevant feedback on their reading comprehension. The theoretical framework for the instructional model that was used for the experimental group was guided by the belief that systematic feedback to students on their academic progress, or lack thereof, would provide them explicit indicators of whether they were achieving the targeted goal(s) and further steps that they needed to meet their goals. This instructional process was similar to Deming’s theory of Total Quality Management (Deming, 1985) that is presented in Figure 3.1.

Figure 3.1

Deming’s Cycle: Total Quality Management

- Plan: Establish objective and instructional process to deliver results
- Do: Implement process
- Check: Monitor and evaluate process and results against objectives
- Act: Apply actions – review steps and modify for improvement

(Deming, 1985).

The principal characteristic of this tool that pertained to data-informed instruction was the on-going collection and analysis of data to inform decisions for current and
future action steps. The data-informed instructional model that was used with the experimental group is demonstrated in Table 3.4.

In the experimental group, students received ongoing formative assessments and detailed teacher feedback on their academic progress in the targeted area at least once every two weeks. Ongoing feedback on daily performance was also provided. The feedback consisted of explicit explanations of strengths and needs and the steps that the students should take for improvement. Students also kept a record of their academic performance from teacher and student conferences to track their growth, or lack thereof, in relation to their academic targets. The timely and relevant feedback provided students specific information on immediate steps that they should take to improve their academic performance. The goal was to make students more aware of their academic status and their specific needs so that they could make necessary changes for improvement before they started to fall behind. The frequency and content of the feedback given to the students in the experimental group were critical for determining the effectiveness of a data-informed instructional model. Therefore, the experimental teacher provided students frequent opportunities to demonstrate their knowledge of the instructional materials and provided immediate feedback for improvements. Students in the experimental class received explicit feedback on their work at least once per week. This was evident in the samples of student work with feedback information that the experimental teacher shared with the researcher.

The treatment represented in Figure 3.2 was the data-informed instructional model that was administered to the experimental group. This instructional model was a hybrid created from some instructional models from the literature and combined with the
researcher's teaching experience (Barnhardt, 2002; Lachat, 2001). Figure 3.2 also presents the key concepts and the overarching process for the treatment. Furthermore, additional information delineated in this table includes using data systematically to identify instructional targets, administering formative assessments to inform teachers and students about the impact of instruction on their performance, making adjustments to instruction when necessary, and monitoring the effectiveness of plan.

The students from the control groups continued to receive instruction that aligned with current instructional practices of the district. This instruction relied on summative data to inform practice and to provide students feedback on their progress. The summative data was gathered from end-of-unit assessments and the district's quarterly English tests. Students were given feedback on their progress that sometimes included reviewing their work and identifying strengths and needs, but the feedback was mostly in the form of grades. The key difference between the instructional model that was used with the experimental group and the one that was used with the control groups was the use of ongoing formative assessments to provide specific information on the targeted objective and for making changes to teaching and learning.
Figure 3.2

**Instructional Model: Data-Informed Instructional Process**

**Progress Monitoring**
What evidence demonstrated that the process was effective?
When data was used to:
- Inform teaching and learning
- Differentiate instruction
- Inform which students needed additional support
- Identify trends in student performance and their implications for instruction

**Data**
Which data were collected and analyzed?

**Instructional Targets**
What was targeted?
Student needs were identified from:
- Pretest
- Ongoing classroom assessments
- Assignments
- Class discussions
- Group work

**Assessments**
When were assessments administered?
Which assessments were administered?
- Pre-assessments
- Post-assessments
- Continuous monitoring of student performance
Table 3.4 demonstrates the differences in the instructional models that were used in the experimental and control groups.

Table 3.4

*Key Differences between the Instructional Models*

<table>
<thead>
<tr>
<th>Task</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targets/Objectives</td>
<td>- Pretest data, formative assessments and summative assessments</td>
<td>- Curriculum and summative data</td>
</tr>
<tr>
<td>Targeted Instruction</td>
<td>- Included explicit strategies for progress based on students' needs and strengths</td>
<td>- Instruction was driven by curriculum</td>
</tr>
<tr>
<td>Ongoing monitoring</td>
<td>- Focused instruction: Included guided and independent practice, formative assessments, class discussions, and group work.</td>
<td>- Typically summative assessments at end of units</td>
</tr>
<tr>
<td>Teacher feedback</td>
<td>- Ongoing, targeted, and individualized feedback and intervention.</td>
<td>- Feedback and intervention typically on summative data</td>
</tr>
</tbody>
</table>
Data Collection and Analysis

The pretest and posttest for this study provided a measurement of the participants’ reading comprehension proficiency. It consisted of multiple-choice questions that were garnered from past New York State Regents English Comprehensive Exams (NYS Regents English). This exam was usually administered in the 11th grade in this district. Preparing students for this English assessment often included a similar manner of preparation with the use of old NYS Regents English for practice. The pretest and posttest for this study were selected from two NYS Regents English, Part 2, from June 2003 and June 2005 respectively. A readability test was done on the reading selections and questions from the tests to insure that the readability level did not exceed the eleventh grade reading level. The Fry’s Readability Graph and the SMOG Readability Formula were used for that process.

The central purpose of this study was to demonstrate whether the implementation of a data-informed instructional model in the experimental group would result in an improvement in reading comprehension of the students. Therefore, a reading comprehension test was administered before and after the treatment to determine the changes in the scores from the pretest to the posttest. To reject the null hypothesis for the study, the students in the experimental group had to demonstrate more positive change scores than the students in the control groups. The change scores were obtained by subtracting the pretest from the posttest: Change score = posttest – pretest. Therefore, the scores could reflect both positive and negative changes. The change scores helped the researcher to determine whether student performance in reading comprehension improved more for the students who received the data-informed instructional model
compared to the students who received the conventional instructional model.

To analyze whether there was a significant difference in the change scores among
the groups, a statistical analysis of the change scores was conducted using Mood’s
Median Non-parametric Test. The median test was selected because of the small numbers
of the samples for this study.

Summary of the Methodology

The methods, data collection and analysis, and instrumentation provided evidence
on whether data-informed instruction had an impact on student performance in the
targeted reading skills. The ultimate intent was to discern the extent to which data-
informed instruction might have influenced student achievement in reading
comprehension. A quantitative method was used for collecting and analyzing the data
from the pretest and posttest that was administered to the students in the experimental and
control groups. The results from the study are delineated in Chapter 4.
Chapter 4: Results

Research Question

This study was an investigation on the impact of data-informed instruction on students’ performance in reading comprehension. The focal purpose of the study was to assess whether a data-informed instructional model that was used as the treatment caused improvements in students’ reading comprehension as measured by a pretest and posttest. The results from the study addressed the following research question:

Does the reading comprehension among tenth-grade students improve significantly when ongoing assessment and analysis of student performance is conducted to inform teaching and learning?

This chapter presents the results from the pretest of the study from which a comparison of the data from the experimental and control groups was conducted to get a baseline of the students’ reading comprehension before the treatment was administered to the experimental class. The data from the posttest from all three classes in the study were analyzed. Comparisons were made of the pretest and posttest to determine the gain score for each student. Then, a comparison was made of each group’s performance on the pretest and the posttest. Also analyzed were the data from the experimental group as compared to the control groups to determine any significance in changes in student performance from the pretest to the posttest. Additionally, a summary of the findings from the results from each inclusive student group was included as the final part of the chapter.
Data Analysis and Findings

Pretest data. As stated in Chapter 3, the total number of participants in the classes for the study was 70 (N=70). However, the number of participants from the posttest to the pretest dropped to 52 (n=52) due to attrition. The data that is included in the analysis of the findings pertain to the 52 participants that met the following inclusion criteria:

1. All participants from the experimental and control groups were randomly assigned to their English 10 classes through the CIMS data management system, which was a computerized system that was used in the Mc Brier School District prior to the commencement of the study.

2. All participants had successfully completed an English 9 course.

3. All participants remained in the same treatment or control group throughout the duration of the study.

4. All participants sat for both the pretest and the posttest.

Table 4.1 compares the participants for each group that completed both the pretest and the posttest to demonstrate that the groups were statistically equivalent. The mean and the median of the pretest scores for the groups were comparable. A non-parametric median test (Table 4.1) of the pretest scores was performed on the data. All groups were found to be comparable (chi-square (2) = .523, p >.05). The statistical analysis in Table 4.2 shows similar means (68.33 vs 78.42) and identical medians (80) for the two control groups in their pretest performance. The experimental group’s performance had a mean of 66.67 and a median of 70.67. The minimum and maximum scores showed that the distribution of the scores for all of the groups was large ranging from a low of 10 points to a high of 100 points.
Table 4.1

Non-parametric Median Test of Pretest Data for Inclusive Groups

<table>
<thead>
<tr>
<th>Value</th>
<th>Pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>52</td>
</tr>
<tr>
<td>Median</td>
<td>80,0000</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>.523</td>
</tr>
<tr>
<td>df</td>
<td>2</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.770</td>
</tr>
</tbody>
</table>

Table 4.2

Comparison of the Pretest Data for Inclusive Groups

<table>
<thead>
<tr>
<th>Value</th>
<th>Pretest experimental</th>
<th>Pretest control C</th>
<th>Pretest control R</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>15.00</td>
<td>18.00</td>
<td>19.00</td>
</tr>
<tr>
<td>Mean</td>
<td>66.67</td>
<td>68.33</td>
<td>78.42</td>
</tr>
<tr>
<td>Median</td>
<td>70.67</td>
<td>80.00</td>
<td>80.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>20.00</td>
<td>10.00</td>
<td>30.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>90.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Pretest and posttest data analysis. Due to the large distribution and skewed scores within each group, a statistical analysis is conducted of the median scores rather than the means to test the significance of the changes in the scores on the pretest to the posttest. The box-plots in Figure 4.1 demonstrate the median for the scores for the pretest and posttest for each group. The median for the pretest for Control C and Control R are at 80,
and the median for the experimental group is 70. Conversely, on the posttest, the median for the control groups are at 70, while the median for the experimental group increases from 70 to 90.

Figure 4.1

Comparison of Pretest and Posttest Median of Inclusive Groups

The gain score was computed for each student for each group to determine the difference between the pretest score and the posttest score (Appendix G). Table 4.3 shows the pretest, posttest, and gain scores for all three groups. On average, the students in the control groups had negative gain scores which indicated a decline in student performance from the pretest to the posttest. Control C and Control R had mean gain scores of -1.66 and -9.47 respectively. The students that received the treatment showed overall improvement with a gain score of 12. Standard deviations of the gain scores were
22.48 for Control C, 18.07 for Control R, and 20.32 for the Experimental Group.

*Table 4.3*

**Pretest, Posttest, and Gain Scores for all Groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Gain score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Control C</td>
<td>18</td>
<td>68.33</td>
<td>26.17</td>
</tr>
<tr>
<td>Control R</td>
<td>19</td>
<td>78.42</td>
<td>19.51</td>
</tr>
<tr>
<td>Experimental</td>
<td>15</td>
<td>66.67</td>
<td>22.57</td>
</tr>
</tbody>
</table>

A comparison of the percentage of decline or gain in scores from the groups is presented in Figure 4.3. These data were analyzed by establishing four categories that represented the criteria for changes in scores: decline (negative change score), no change (zero change score), moderate improvement (positive gain score < 10 points), and large improvement (positive change score > 10 points). The data showed large improvements for the majority of students in the experimental group. The comparison of the percentage of students with improved scores for the groups placed the experimental group at 74% (n = 11) compared with 23% (n = 4) for Control C and 15% (n = 3) for Control R groups.
Nonparametric analysis of medians of change scores. Because the distributions were skewed and did not approximate a normal distribution (Appendix F), the investigator used the Mood’s Median test to analyze the data. The Mood’s Median test evaluates whether the median change scores from the three groups could have come from one distribution. It is a non-parametric, distribution-free analogue to ANOVA focusing on the medians instead of the means, because medians are not influenced by the presence of extreme values and high skew. Mood’s median test compares all three groups with respect to the overall median change score.
The nonparametric analysis of the overall median of the groups show that the overall change score for the groups was zero. The test of the medians for the change score for each group shows 11 cases above that median in the experimental group, compared with 3 and 4 for control groups R and C respectively. These differences were statistically significant (chi-square (2) = 14.132, p <.01) as evident in Table 4.5.

Table 4.4

Nonparametric Test of the Medians for Inclusive Groups

<table>
<thead>
<tr>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Posttest-Pretest</strong></td>
</tr>
<tr>
<td>Change Score</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Summary of Results

The pretest-posttest comparisons show both positive and negative differences for individual students and the whole groups that participated in the study. The students from the experimental group show an overall improvement in their reading comprehension scores after receiving the treatment. Both control groups show a decline in student performance from the pretest to the posttest. Although the teachers from the control groups also received professional development in best teaching practices, they did not use the data-informed instructional model that was used for the treatment in the experimental group.
Table 4.5

Nonparametric Analysis of the Overall Median of the Groups

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>Value</th>
<th>Change score</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>.0000</td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>14.132</td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.001</td>
<td></td>
</tr>
</tbody>
</table>

Chapter 5 will provide a discussion and the implications of the results from the study. It will also provide further interpretations of the data-informed instructional method that was used in the experimental class. Furthermore, conclusions of the findings and recommendations will be discussed.
Chapter 5: Summary and Discussion

Introduction

This study was an examination of the impact of data-informed instruction on the reading comprehension of tenth-grade students from a suburban high school. The purpose of the study was to determine whether the implementation of a data-informed instructional model would significantly improve students' reading comprehension in the experimental group when compared to the results from the control groups that received the required district's instructional model. This chapter presents a discussion of the study and examines the implications the study may have in relation to the literature and current practice. It also provides recommendations for future research.

Discussion

Conceptual Framework. The conceptual framework for this study was highly supported by data-driven theories such as Deming's Total Quality Management (1994), the Data-Driven Instructional Systems (DDIS) model that was developed by Blink and Halverson (2005), the Theory of Action (TOA) model used by William and Hewlett (2004), and the Data-Driven Decision Process presented by the Education Commission of the States (ECS, 2000). The focal concept of each of the educational models was the process of continual checks for progress and the efficacy of the plan that was implemented. Each of these models has been effective in improving overall academic achievement for schools. The focus of the current reform models, however, is on analyzing summative data to inform their decisions. While relying on summative data
may be effective for some schools, this process is less effective in providing timely feedback to address the needs of students who consistently struggle academically. To meet the individual needs of all students as outlined in the NCLB Act, the examination of student performance should be occurring at the classroom level to facilitate immediate feedback and intervention.

The Data-informed Instructional Process (DIP) was specifically designed to facilitate classroom-embedded, data-informed decision-making. The focal concept was that the individual needs of students could be readily discerned at the classroom level through ongoing collection and analysis of data from formative assessments. The process of immediately identifying students’ strengths and needs fostered quicker intervention for students who needed it. Additionally, the literature has shown that timely and relevant feedback and intervention should be essential components of plans that especially target the needs of low-performing students (Black & William, 1998; Lachat, 2001; Reeves, 2006). Therefore, DIP (2003) could be a critical asset to schools that are attempting to improve the performance of all students.

Methodology

This study was conducted in a large suburban high school, McBrier High School, (a pseudonym) in New York State, from March 2008 to June 2008. The methodology for this study included a pretest and posttest for a true experimental design. Students were randomly assigned to their English classes at the beginning of the school year through a computerized program that the McBrier High School used to randomly assign students to their core classes.

The null hypothesis for this study was that student performance in reading
comprehension does not improve with the implementation of the data-informed instructional process that was used in this study. The alternative hypothesis was that student achievement improves with the implementation of the data-informed instructional process.

Three tenth-grade classes participated in the study for a total of 70 students (N = 70). All students received the pretest and posttest with the experiment group receiving the Data-Informed Instructional Process as a treatment while the control groups received the instructional model that was required by the district. However, due to poor attendance, the attrition for students that took both the pretest and posttest dropped by 26% (n = 18) to a total of 52 students (n = 52). The number of students that sat for both tests was the following for each group: Experimental group had 15 students (n = 15), Control C group had 18 students (n = 18), and Control R group had 19 students (n = 19).

Consistent with the literature (Andergg, 2007; Lang, et. al, 2005), this study recognized that professional development in the collection, analysis, and reporting of data was essential to the efficacy of implementing a data-informed instructional model. This study provided professional development to the inclusive teachers. The teacher from the experimental group received professional development directly pertaining to data-informed instructional practices, while the teachers from the control groups received professional development on the district’s professional and instructional initiatives. The professional development on using data fostered a better understanding of the collection and analysis of data for informing daily instruction and for providing a system that facilitated ongoing feedback to students on their academic progress or lack thereof. In addition, meetings were held with the experimental group’s teacher and the researcher to
assess the efficacy of the process of using the data-informed instructional model and whether it fostered any improvement in the students' reading comprehension.

The data-informed process that was used in the study facilitated targeted instruction that included steps for addressing the specific needs of each student. Both the students and the teacher from the experimental group were continually cognizant of the impact of instruction on student performance. The teacher readily made changes or adjustments to instruction based on the student-performance data and followed up with specific feedback for students to move their academic performance to a higher level. Therefore, students who were successful in meeting the desired outcomes were provided instruction that met their needs, and the students who struggled in meeting the outcomes were provided timely and relevant academic intervention. It should be noted that the academic intervention for this study included strategies for accelerating student learning such as pre-teaching instructional strategies and materials before they were presented to the class. This allowed students who struggled in their reading comprehension to have previews of the challenging vocabulary and to be provided small-group instruction on strategies for making connections to the text. Therefore, intervention and feedback for all students were timely, relevant, and consistent in the experiment class.

A critical factor in implementing the data-informed instructional model was the conscious decision to alleviate teachers' perceived resistance to using data to inform their practice. The literature has cited teachers' resistance to data-use because of perception that the data would adversely affect their teacher evaluation process as a key deterrent to data-use by teachers (Bernhardt, 2000; Lachat & Smith, 2005). To address this perception, this study explicitly stated that the collection and analysis of student
performance data was to assess where students were in meeting the desired performance outcomes and to make necessary changes in teaching and learning from the information that was collected from the data. Understanding that their professional performance was not being evaluated in the data-informed process was an important factor in the acceptance of implementing this instructional model. Discussions on student performance and instruction were centered on understanding where students were academically and what should be done instructionally to move them forward.

Findings and Interpretations

Data-Informed Instruction. Because the design of the instructional model in this study provided students and teachers ongoing feedback on student performance, continuous adjustments and changes to instruction and to students’ work was fostered. The frequency of assessing students’ progress helped the teacher to assess smaller amounts of instructional materials, which facilitated easier development and administration of the assessments. Additionally, establishing a focused instructional process alleviated some of the uncertainty in determining whether students understood the strategies and reading materials that were used in instruction.

If students did not meet the desired performance outcomes, the data helped to discern the specific area(s) of need with the changes and adjustments that should be made to instruction. Furthermore, the teacher was able to immediately seek specific support from colleagues on instructional strategies to meet the varying needs of the students in the experiment class.

The data-informed instructional model also fostered better teacher-student connections in the experimental group. Crucial roles of the teacher in a data-informed
classroom were to stay current in knowing the needs of students by assessing the impact of instruction on students' performance and to provide students ongoing feedback on their performance and steps for improvement. This ongoing communication process helped the teacher to make critical connections with students individually regarding their academic performance. The literature shows that making connections with students is a key step toward engaging and motivating students to succeed academically (Fuchs & Fuchs, 1986; Marzano, 2006). The connections that the experimental teacher made with students may also have contributed to the high level of success that students experienced in their reading comprehension compared to the students from the control groups.

Although the alternative hypothesis of this study stated that the data-informed model would improve student performance in reading comprehension, it was assumed that the students from the control groups would also experience some improvement in their performance after receiving the district's conventional instructional model. However, the differences in the scores from the pretest to the posttest for the control groups were disheartening (Appendix I). With 50% decline in scores for Control C and 63% decline for Control R, it might be inferred that the differences in scores from the pretest to the posttest were probably due to lack of motivation and engagement among the students in the control groups. The conventional instruction that students received in the control groups was not focused on providing students ongoing feedback; therefore, the individual connections that were fostered between the experimental teacher and her students may not have been evident in the control groups. Teachers' oversight of the importance of building personal connections with students relating to their academic performance may have alienated the students. The students may have perceived that
completing the curriculum was more important to their teachers than taking time check for their understanding of the material before moving forward with instruction. This could have resulted in lack of motivation and subsequent decline in the students’ performance (Davis 1999; Eckstein, Bergin, & Sharp, 2002).

Data. To differentiate the groups that participated in this study, the researcher chose to use the following labels for the groups: Experimental; Control C; and Control R. A Mood’s Median Test of the pretest data for all of the groups was conducted to determine the similarities of the groups. This analysis showed that the students’ ability in reading comprehension was comparable (chi-square (2) = .523, p > .05). All groups had similar means and medians with the experimental group showing a mean of 66.67 and a median of 70.67, Control C group had a mean of 68.33 and a median of 80, and the Control R group had a mean of 78.42 and a median of 80.

The findings from the posttest data were derived from a series of data analysis. First, the pretest data was subtracted from the posttest data to find the change scores for each student: Posttest - Pretest = Change Score. The results showed both positive and negative change scores within each group. Second, an analysis of the frequencies of each group was conducted to determine the number of students from each group who had improved scores compared to those who did not demonstrate any improvements. The experimental group had a larger number of students who improved their scores from the pretest to the posttest when compared to the control groups. In the experimental group, 74% (n = 11) of the students showed improvements compared to Control C that had 23% (n = 4) and Control R with 15% (n = 3). Third, a Mood’s Median Test was conducted to test the statistical significance of the differences in the change scores among the groups.
This test showed that the differences were statistically significant (chi-square (2) = 14.132, p < .01).

The results from the data analysis of the pretest and posttest show that student achievement improved for students in the experimental group after they received the data-informed instructional model as the treatment. These results from the study reject the null hypothesis and supported the alternative hypothesis.

Implications

Practice. The literature suggests that a data-informed instructional system can lend to improved student achievement. This study brings current research on using data for decision-making closer to students by focusing on the use of data-informed instruction for regular classroom practice. With administrative support in providing relevant professional development and the time for collegial sharing, this instructional model has the potential to impact student achievement. The results from this study validate this premise.

Implications of this study can be examined from each level of the educational process. At the district level, this study could provide a systems change for instructional practice since the instructional model lends to easy transference to all curriculum content. The structure of the data-informed instructional process can be adapted to all instructional practice because the steps for this instructional model are strategically centered on making informed decisions from information gathered from student work that can be done with any curriculum. The difference between this instructional model and common teaching practice is the systematic process of using formative data to make ongoing changes to instruction and student learning. The systematic application of this
instructional process is the key to the success of this model.

At the school level, the implications of this study include having current data from formative assessments in addition to summative data to make informed decisions regarding teaching and learning, knowing where each student is in meeting academic goals and being able to address needs in a timely manner, and allotting funds purposefully to support instructional needs. In the classroom, teachers would have ongoing knowledge of the impact of instruction on student performance and making targeted changes and adjustments to instruction based on the formative data. Teachers can also provide students timely and ongoing feedback on their work to improve student performance. All students can benefit from the data-informed instructional process. Struggling students can have immediate support that specifically targets their needs, while students who have met the performance objectives and need to move to a higher instructional level can also have their needs met.

*Future research.* Because current literature focuses on the use of summative data for enacting educational changes (Lachat, 2001), this study can have implications for future research that focuses on both the individual students and struggling students. The literature confirms that timely and specific feedback to students can improve the academic achievement of students who struggle academically (Black & William, 1998; Marzano, 2006). However, research on the effectiveness of a data-informed instructional process at the classroom level has not been fully documented. Marzano (2006) discussed effective ways to use assessments to improve student achievement but did not provide empirical evidence of the effectiveness of a data-informed instructional model. Schmoker (2006) also addressed the benefits of assessments for improving student achievement by
analyzing several studies and extrapolating best practices from them to present his theory on the factors that positively influence student achievement. However, he does not provide evidence of a specific instructional model that systematically uses data at the classroom level to inform daily instruction and learning. This study provides a framework of a data-informed process at the classroom level that was successful in improving student performance, which will contribute to the body of literature.

Limitations

One of the challenges at Mc Brier High School was truancy, which also proved a challenge for the attrition of students in the study. The data from the pretest and posttest showed 26% (n = 18) of students from the study missed either the pretest or the posttest or both tests. Although all of the students (N = 70) remained in their groups throughout the study, the data that were used in the analysis were exclusively from the students who sat for both tests. This reduced the number of students whose data were used for the statistical analysis to 52. The small, skewed samples limited the types of statistical tests that could be used to analyze the data from the study. Traditional means test for hypothesis testing could not be used. Instead, the Mood's Median Nonparametric test was used to analyze the data because this test can produce robust results when analyzing small, skewed samples.

The short timeframe of this study limited the amount of academic content that was covered. This study addressed students' performance in making inferences, which is a key performance indicator of the reading standards. The necessity of this skill for reading comprehension supports the academic rigor of the study. However, since the results from the study represent the findings from a narrow curriculum focus,
generalizing the effect of the study to other curriculum was limited. Nevertheless, because the structure of the data-informed model lends to a natural and systematic instructional process, the implications of the transference of its use to other curriculum would be founded.

The process that was used to select the teachers for this study was a limitation to the study. The teachers were selected as convenience samples. All of the teachers were in their second year of teaching; therefore, they had limited teaching experience at the time of the study. However, all three teachers received professional development and ongoing professional support from the researcher, the district, and the English Department's instructional leader; therefore, their lack of experience as teachers was offset by the professional support that they were provided.

Another limitation in the selection process for the teachers in this study was in determining which teacher should be the experimental teacher. The short time frame of the study limited the amount of preparation that the researcher could have provided the teachers for the study. Additionally, the necessity for the data-informed teacher to have a level of readiness in teaching proficiency to successfully implement the data-informed instructional model made the selection process for the experimental teacher very purposeful. This opens the possibility that the experimental teacher's pedagogy may have been a variable for the results in the experimental class. This selection process indicates that teachers who implement the data-informed instructional model must have the prerequisite basic skills in instruction or be provided with professional development prior to the implementation of the model to bring them to the level of readiness that is necessary to successfully implement the model.
A factor that may be perceived as a limitation to this study was the role of the researcher in working with the teacher from the experimental group. The improvement in scores in the experimental group may be considered a result from the input of the researcher and not necessarily from the data-informed instructional model. However, it could be argued that the researcher provided similar support to the control teachers as she did to the experimental teacher: professional development support, collegial sharing, meetings to discuss their instructional progress related to the instructional model that they taught, and classroom visits with feedback. Additionally, the process that is inherent in the data-informed instructional model directly related to common instructional practice. The difference in the data-informed instructional model is the combination of processes and instructional strategies that are applied systematically. The explicit delineation of the steps for this instructional model makes implementation of the model possible without the researcher. The only caveat is that the teacher should have professional development and collegial support in data collection, analysis, reporting, and application to be successful. These factors are also stated as necessary steps to the implementation of the model. The conclusions that can be made regarding this implied limitation is that fidelity to the data-informed instructional model was the key to the success that was witnessed in the experimental class and not the role of the researcher.

The availability of technology for processing data could also be a limitation to the implementation. Although the data-informed instructional model used in the study did not require extensive data analysis, for the process to be implemented school-wide, technological support would be essential. At the classroom level, the teacher could use the regular, computerized grading system to document student progress and provide
students with specific feedback on their performance. A key step to the data-informed process is the timely and relevant feedback that teachers and students receive from the data. Therefore, the traditional documentation and reporting of grades without providing specific feedback on steps for improvement was not evident in the data-informed instructional process used in this study.

Another necessary component of successful implementation of a data-informed process in schools is the need for collegial sharing and analysis of the data. The collaborative aspect of the process would require specific time allocated to teachers for collegial sharing. Collaborations could also foster sharing of strategies that work best for students and could especially be helpful in ensuring that the grade-level standards are met in instruction.

Administrators would have to play a key role in implementing and sustaining a data-informed instructional process in schools. Ongoing monitoring of the process to determine its effectiveness in meeting the needs of students would be necessary. This level of monitoring and provision of recommendations for change and adjustments also become a part of the cyclical process of working toward achieving targeted results in student achievement and instruction.

Most of the limitations presented in this study can be transformed into assets to instructional programs and school improvement systems if they are incorporated into instructional practice. Therefore, should they be used systematically for decision-making for teaching and learning, they can be considered best practices for educators.

Conclusions and Recommendations

The results from this study indicated that data-informed instruction impacted the
reading performance of 74% of the students who participated in the experimental group. Although the purpose of this study was to present evidence of the impact of data-informed instruction on the students for the study and not to make generalizations regarding the general population, the improvement in test scores for the experimental group in the study should be noted. Nevertheless, assumptions about the significance of the study on the general population would be premature.

Replication of this study is recommended because of the implications that this study may have on improving the academic achievement for students. However, further research on this topic should include a larger number of students from a wider cross-section of school districts to test whether the treatment that was used in this study would have the same impact on students from a wider geographical area and with more diverse demographics. Future researchers should also control for the requisite pedagogy that is needed to implement the data-informed instructional model and for teachers’ receptiveness to using the model since this is critical to the successful implementation of the model.

It is important to point out that in order for data-informed instruction to be successful practitioners should be schooled in data-collection, data-analysis, and the application of information that was garnered from the data-analysis. Without the skills needed to effectively implement a data-informed instructional process, success at such an initiative would be limited, if not impossible, for improving student achievement.

It is recommended that districts and schools establish an ongoing professional development system that provides the faculty and staff the requisite knowledge they need to successfully implement a data-informed instructional process. In addition to
professional development on collecting and using data to inform teaching and learning, faculty and staff would also need time for collegial sharing and support to better connect their individual work to the work of others who are using the same process. Such collegial sharing would also facilitate a better understanding of whether instruction is influencing learning and the extent of the impact or lack thereof.

Conclusion

Conducting this study on the impact of data-informed instruction on improving the reading comprehension of tenth-grade students has strong implications for future studies. Although many studies have documented the use of data for decision-making in education broadly, examining the impact on student achievement when a data-informed instructional model is used to inform daily classroom practice has not been fully explored in empirical studies. This study will contribute to the body of knowledge that examines the use of data to inform teaching and learning in classrooms. It also provides an instructional model that can be used daily.
References


Lezotte, L, Skaife, R., & Holstead, M. (2002). Effective schools – Only you can make a difference. All Star.


Appendix A

School Demographics
Appendix A compares the demographics for the student population at Mc Brier High School to the other three high schools in the Mc Brier School District. The diversity in student population at Mc Brier High School surpasses those of the other schools.
Appendix B

Mc Brier High School
English Department Instructional Model
Progress Monitoring
Departments meetings included collegial sharing of:
- How to use data from parallel assessments to inform teaching & learning
- Best practices in teaching English
- Looking at student work

Data
Which data were analyzed?
- Parallel assessments
  (English 10)

Instructional Targets
Targets were identified from
- Parallel assessments
- Student work
- Class discussions

Assessments
When were assessments administered?
Which assessments were administered?
- Pre-assessments
- Post-assessments
- Quarterly Parallel Assessments

(Vetter, 2003)
Appendix C

Professional Development
Data-Informed Instructional Plan

**Instructional**

Teacher from the experimental group will engage in the following activities:

1. Learn how to create Class Profiles for data collection and analysis.
2. Collaborate with researcher to create mini reading comprehension assessments.
3. Learn how to identify areas of strengths and needs from data from the formative assessments.

**Process**

Teacher will engage in the following steps for the implementation of the data-driven model:

1. Administer pretest to experimental group.
2. Use data from the pretest to identify students’ reading comprehension strengths and needs.
3. Target the needs during instruction by embedding the targeted skills in instruction.
4. Explicitly teach targeted skills.
5. Follow up direct instruction with student practice.
6. Assess students on each targeted reading comprehension skill that was taught and practiced.
7. Analyze data from each formative, mini-assessment to identify the impact of instruction on students’ academic performance.
8. Continue this process with each targeted need in reading comprehension.
9. Report to students, at least once bi-weekly, on their academic progress, or lack thereof, based on the performance data.

10. Provide students specific guidelines on steps they should take for addressing their academic needs.

Materials

1. Use grade-level literature selections from the district's curriculum.

2. Formative assessments – Develop and administer reading comprehension multiple-choice assessments that are aligned to the literature selections and the specific skill that was taught.

3. Class profiles
Appendix D

Study's Manipulation Checks Checklist
<table>
<thead>
<tr>
<th><strong>Activities</strong></th>
<th><strong>Comments</strong></th>
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| **Content**   | -Activate prior knowledge  
-Connect reading to relevant background knowledge |
| **Instruction** | -Communicate purpose of the lesson  
-What should students know and be able to do by the end of the lesson  
-Provide opportunities for structured class or small group discussions  
-Direct instruction  
-Modeling  
-Guided practice - immediately  
-Maintain a focus of the strategy taught while teaching content |
| **Students** | -Create questions based on the text – e.g.:  
-Comprehension question frames  
-Connection/analysis question frames  
-Write notes to connect with the text  
-Summarize what they have read  
-Engage in independent practice |
| **Assessment** | -Assess how well students used reading strategy  
-How well students understand the content  
-Students are provided opportunities for self-reflection and peer feedback |
| **Feedback** | -Monitor student progress and provide ongoing feedback during the lesson  
-Provide positive feedback – encourage students to improve  
-Communicate to students strengths and provide them specific strategies that they can use to improve |

"Whole class or individual"
Appendix E

Pretest Distribution of Scores for Inclusive Groups
Distribution of Scores – Pretest Experimental Group

Distribution of Scores – Control C Group

Distribution of Scores – Control R Group
Appendix F

Change Score Comparison of Inclusive Groups
Comparison of the Percentage of Students for Each Change Score Category

Groups

C

R

E

categories of change score

□ Decline
□ No Change
□ Moderate Improvement
□ Large Improvement
Appendix G

Pretest, Posttest, and Change Scores for Experimental Group
### Pretest, Posttest, and Change Scores for Experiment Group

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Appendix H

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